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The Thin Green Line

An Assessment of DoD's Readiness and Environmental Protection Initiative to Buffer Installation Encroachment

Beth E. Lachman, Anny Wong, Susan A. Resetar

Prepared for the Office of the Secretary of Defense

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Preface

This monograph documents the results of an assessment of the Department of Defense's (DoD's) Readiness and Environmental Protection Initiative (REPI), which was established to help military installations deal with encroachment caused by sprawl and environmental concerns. It presents the results of an analysis of the effectiveness (and, to a limited extent, efficiency) of the REPI program. This research was conducted between June and December 2006.

This assessment should interest those involved in installation testing and training, management, encroachment, conservation, and environmental protection. It should also interest other federal agencies, state and local governments, and environmental and community organizations concerned with land preservation, biodiversity, and sprawl.

This research was sponsored by the Office of the Secretary of Defense and was conducted within the Acquisition and Technology Policy Center of the RAND National Defense Research Institute, a federally funded research and development center sponsored by the Office of the Secretary of Defense, the Joint Staff, the Unified Combatant Commands, the Department of the Navy, the Marine Corps, the defense agencies, and the defense Intelligence Community.

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Summary

Background and Purpose

When first established decades ago, most U.S. military installations were far from major cities and towns. That is no longer true. A growing population and changing land development patterns over the past several decades have led to lands vital to military readiness being surrounded by urban, suburban, and other types of development. Such development, especially large residential tracts, can limit the installation's operational capability. Complaints about noise, dust, and smoke from aircraft, weapons, and vehicles force commanders to curtail training of certain types or during certain hours. As development destroys or displaces native species of plants and animals, military posts become their critical refuge, and their presence further restricts military operations. These constraints have been so severe in some cases that installations have had to close.

Such pressures are called encroachment. Encroachment can be defined as issues external to military operations that affect or have the potential to affect military installation testing, training, and other operations and overall military readiness.¹

Recognizing the gravity of the problem, Congress provided legislative authority to allow military departments to partner with government or private organizations to establish buffer areas near training and testing areas. The Office of the Secretary of Defense (OSD) created the Conservation Partnering Program (now known as the Readiness and Environmental Protection Initiative (REPI)²) to implement this authority. Under this program, OSD funds the Services to implement compatible land use partnering projects that aim to relieve encroachment pressures on training, testing, and support operations at U.S. military bases—from either incompatible development or loss of natural habitat. The military usually partners with state and local governments and nonprofit organizations to acquire property interests, such as land and conservation easements.³ However, because the military may not own land through this program, the partner usually owns any land that is purchased, whereas the military and/or partner acquires the property easements. DoD also addresses encroachment in other ways,

¹ Encroachment issues include urban growth around military installations, noise and air pollution, endangered species and critical habitat, wetlands, water quality and supply, cultural resources, competition for airspace and maritime space, competition for radio frequency spectrum, and unexploded ordnance and munitions remnants.

² It is important to note that REPI is an official OSD program even though it now has the word *initiative* in its name.

³ A conservation easement is a deed restriction landowners voluntarily place on their property to protect the conservation values of the land, usually in perpetuity.

such as by working with local governments to develop favorable zoning and environmental management activities to help address environmental encroachment. REPI is designed to complement these activities and provide a new approach by allowing the military to partner with other groups to acquire buffering property interests.⁴

OSD wanted to know how effective the program has been so far so that it can set the future directions for the program. It asked RAND's National Defense Research Institute (NDRI) to assess the effectiveness of the OSD Readiness and Environmental Protection Initiative projects and recommend ways to improve the program. In response to this request, NDRI carried out a detailed assessment of the program by examining six installation case studies on site and in depth; by conducting phone interviews at five other installations and Service and NGO headquarters and with regional experts who had insights across multiple installations; by analyzing relevant installation Geographic Information System (GIS) maps, easements, and other installation documents; and by reviewing relevant literature and the public press. Over 60 experts were interviewed including state and local government partners, conservation NGO partners, U.S. Fish and Wildlife and other relevant federal agency staff, landowners participating in the program, and installation and service buffering, encroachment, training, and environmental staff. This research was conducted between June and December 2006.

Study Findings

After conducting this research, NDRI researchers conclude the following:

Encroachment Stems from Two Primary Sources: Sprawl and the Loss of Biodiversity

The former is intuitive and well publicized. Suburban and rural commuter sprawl and a growth in the number and size of resort and retirement communities are encroaching on many installation fence lines. Such development of land has become a state and local issue as governments struggle to adapt their infrastructures and services to rapidly increasing populations. Such sprawl near installations causes many of the different types of encroachment problems. The loss of biodiversity within an ecoregion⁵ (which affects installations in that ecoregion) is less well recognized but also an important cause of one type of encroachment. Biodiversity refers to biological variety and is important to maintaining ecosystem, habitat, and species health. When biodiversity is reduced, native animal and plant species become increasingly scarce. One effect of this reduced diversity is that the number of threatened and endangered species (T&ES) will likely increase, which could profoundly affect any military installation that contains such species. Their presence could result in restrictions on the type and timing of training and testing operations, as has been the case at some installations.

REPI Appears to Be Effective So Far

NDRI researchers applied the following criteria to assess the effectiveness of REPI to date:

⁴ See Chapter Three for a discussion of other DoD activities to address encroachment. Chapter Five and other parts of this report discuss the synergies between REPI and these other DoD activities.

⁵ An ecoregion is a relatively large unit of land or water characterized by a distinctive climate, ecological features, and plant and animal communities.

- promoting military readiness and other mission benefits
- addressing sprawl and limiting other incompatible land use
- preserving habitat and other environmental benefits
- community relationship and partnership benefits
- additional community benefits.

Judging by these criteria, it appears, so far, that REPI has been effective, as evidenced by some initial project accomplishments. REPI projects have shown accomplishments in all five of these areas, as is discussed more below. (See Table S.1 for a sample of the range of benefits from installation buffering projects.) However, more could be done to increase the overall effectiveness of the buffering activities if DoD were to provide more financial support, more policy and implementation guidance, and more implementation support, as is also discussed more below.

At this point, it is unclear whether such activities and accomplishments will be sufficient to solve significant amounts of encroachment, but they show promise. For example, the RAND assessment at Fort Carson supports the claim of a former installation commander who stated that the buffering activities have the potential to prevent 90 percent of the residential sprawl encroachment problems at this installation.⁶ However, it is too soon to tell whether the program will be that successful: It is only three years old, which is a relatively short time when dealing with land acquisition and easement issues that often take several years to complete. Furthermore, it has had relatively modest resources to work with. That said, evidence indicates that REPI has the potential to help buffer military installations against encroachment. OSD started funding projects in 2004. In three years, it has provided over \$40 million to installation projects, has leveraged over \$86 million in partner funds, and REPI-funded projects have been implemented at 24 installations.

With respect to promoting military readiness, the RAND team's assessment showed that at all six case study installations examined in depth, the majority of the buffering projects were in important areas, such as in safety and noise zones for air and ground training. Preventing housing and other incompatible land use in air safety zones and near ground training supports installation operations. Some installations are taking strategic action,⁷ such as Eglin AFB, which is trying to protect a 100-mile-long air corridor. Others are attempting to deal with the potential problem of threatened and endangered species before it affects them, which can provide operational and regulatory flexibility. Fort Carson's efforts to preserve four unique plant species off the installation are noteworthy in this regard. These buffering efforts have the additional benefit of reducing the number of complaints and lawsuits. Some buffering projects have helped joint readiness, but projects could be more effective in this area with more strategic planning and cross-Service coordination for joint long-term use and training buffering. In sum, the installation buffering projects have had some effectiveness in promoting military readiness. However, more could be done to increase the effectiveness and it is too soon to tell if such initial successes will continue and be enough to significantly help protect military readiness from encroachment problems.

⁶ See Appendix C for the assessment of Fort Carson buffering activities and more about the former installation commander's statements.

⁷ In this monograph, strategic action refers to considering the full range of implications from buffering activities, both short term and long term, and acting both locally and regionally.

Table S.1
Range of Benefits from Installation Buffering Activities

Benefit Categories	Subcategories	Sample Benefits
Promoting military readiness and other mission benefits	Direct testing and training benefits	Helps preserve testing and training space
		Allows more training to be conducted
		Helps facilitate joint use and training
	Minimizing community complaints and interference	Minimizes the effects on surrounding communities and thereby minimizes neighbor complaints about noise, smoke, and other effects and the costs of dealing with them
		Minimizes light interference, allowing night training
	Other installation operational benefits	Increases operational flexibility
		Has increased regulatory flexibility
Addressing sprawl and limiting other incompatible land use	Preventing incompatible land use	Stopped likely subdivision and development of Yellow River Ravines 11,313 acres near Eglin AFB
		Prevented a high-rise bridge from being built in the accident potential zone at MCAS Beaufort
		Stopped construction of three apartment complexes near the end of the runway at NAS Whiting Field
	Helping local and regional growth management and planning	A county has focused on concentrating development away from the installation
		Has helped local governments become more interested in protecting open space and managing growth
Preserving habitat and other environmental benefits	Preserving habitat, biodiversity, and T&ES	Helps to protect habitat, wildlife corridors, biodiversity, and ecosystems
		Helps protect and sustain T&ES off base
		Helps keep the black bear off the federal T&ES list
	Water benefits	Helps protect watersheds
		Helps with water quality and quantity concerns
	Strategic landscape, regional, and ecosystem management and planning	Helps protect broader ecosystem through the Gulf Coastal Plain Ecosystem Partnership
		Helps protect specific ecosystems, such as parts of the Central Shortgrass Prairie (CSP) ecoregion
	Other environmental benefits	Improves installation environmental management
		Helps educate local governments and communities about the need for ecosystem protection and management
Community relations and partnership benefits	Community relations benefits for the installation and military	Has improved relations with environmental groups, regulators, state and local governments, and landowners
		Has improved installation public communications process
		Has improved environmental and overall reputation of the installation
	Working partnerships benefits	Improves working relationship with partners, in both buffering projects and other activities
		Helps foster more collaborative approaches to conservation in the region

Table S.1—continued

Benefit Categories	Subcategories	Sample Benefits
Additional community benefits	Benefits regarding internal installation collaboration and management	Has improved installation management's attitudes about collaboration with nonmilitary organizations
		Has helped improve collaboration and relationships between training and environmental staff
	Economic benefits	Helps keep the installation as an economic force in the county and region
		Provides economic benefit to farmers, ranchers, and other landowners
		Has helped states and counties leverage conservation funds
	Land preservation and outdoor recreation benefits	Helps preserve agricultural lands, ranch lands, forest lands, and family farms
		Provides parklands and other local outdoor recreation areas and facilities, such as trails
		Helps provide recreational access on private and public lands, such as for hunting, fishing, and hiking
	Improving quality of life	Helps preserve the agricultural way of life
		Helps maintain local quality of life and community sense of place

NOTE: For more details on these benefits see the discussions in Chapter Five and Appendices B–G.

Turning to the issue of sprawl and other development that is incompatible with military testing and training, the case study research found that the REPI projects and other installation buffering activities are helping to limit incompatible land use near installations. They have prevented some known and likely incompatible development encroachment by preventing subdivisions of land and residential developments and helping to prevent higher-density development in areas with encroachment issues. However, in some cases major incompatible land use, such as large-scale housing developments, still occurs. Buffering projects also help support and complement other DoD activities to address incompatible land use, such as efforts to work with local governments on zoning and land use controls.

Installations have also had some success at preserving habitat and providing other environmental benefits, such as protecting watersheds. The buffering projects have had a wide range of environmental benefits, including helping to preserve habitat, biodiversity, and T&ES; protecting wildlife corridors; and helping with water quality and supply concerns. However, some installations are mostly addressing sprawl and not fully considering T&ES or loss of biodiversity concerns. Only a couple of installations have participated in larger ecosystem collaborations. Such participation can be particularly helpful in stopping biodiversity loss and the resulting T&ES problems. More long-term benefits could and should accrue if installation activities focus more on conservation issues, especially larger ecosystem and ecoregional concerns.

All the buffering activities the RAND researchers studied have also helped improve community relations and working partnerships. These benefits not only help the buffering and environmental programs but also improve the installation's reputation within the community. However, more could be accomplished at some installations, especially if more staff and resources focused on community outreach. In addition, most partners are quite satisfied with the partnership arrangements. For example, NAS Fallon has a very close working relationship

with Churchill County, Nevada. Partnerships based on cooperative agreements accrue both effectiveness and efficiency benefits from outsourcing key functions, such as the appraisal, monitoring, and enforcement processes. REPI-funded projects have also helped facilitate other installation buffering projects and collaborations that were not using REPI project dollars.

Finally, the buffering projects have provided many other benefits to communities, including economic ones (especially to landowners who sell conservation or restrictive easements for buffering). For example, at MCAS Beaufort a landowner who is participating in the program said that the buffering easement program was “like a dream come true.” “I got to get money out of my farm and did not have to sell it.” Such programs also have helped provide parkland, trails, and other recreational facilities. The buffering projects have also helped preserve agricultural, forest, and ranch lands, and have helped to maintain local and regional quality of life. Many of these actions benefit both the local community and the installation, since installation staff, Service members, and their families also take advantage of parklands, trails, and recreational facilities.

In sum, installation buffering projects have had some effectiveness in all five areas. However, more could be done to increase the effectiveness of buffering activities by more focus on joint training buffering, strategic conservation concerns, and community outreach. In addition, it is too early to tell if installation buffering programs will be able to effectively address significant amounts of encroachment.

Zoning Will Not Substitute for Buffering Activities

Some military personnel believe that zoning and other government land use controls can serve the same purpose as the REPI projects. They cannot. Although favorable zoning is beneficial to installations, it can change, and zoning exemptions can be made quickly if local officials wish it. Local politics and policies are likely to change as development pressures increase. As more people who have no experience with an installation move near one and as the local economy becomes less dependent on an installation, there is likely to be less support for the installation. Such a situation will likely lead to changes in zoning and other local land use policies so that they no longer favor the installation, as some installations have already experienced.

There Is Limited Time for Buffering to Have a Useful Effect

DoD has a relatively narrow time window, perhaps a decade, to make substantial gains in buffering installations. During that time, both the price of land and the number of landowners that DoD must negotiate with will likely increase substantially. More large tracts of remaining private open space—farmland, forests, and ranches—are being sold and subdivided for development. These trends will not only make land more expensive but will also make it more difficult to acquire. The fact that land negotiations can take years to complete underscores the need for urgency.

REPI Is Underfunded

In FY 2007, the program was funded by Congress at \$40 million. Given land prices and buffering needs, funding needs to be substantially higher, and because of the urgency involved, additional funding needs to be available soon, if broad buffering objectives are to be realized in a substantive and effective way. For example, some individual buffering easements can cost as much as \$10 million to \$15 million because of current land prices. From our analysis, REPI could easily use \$150 million per year to address encroachment. An annual budget of about

\$150 million or even more would be needed to complete the major buffering that can and needs to be done over the next five to 10 years. However, more analysis is needed to assess the exact amount needed and how fast the program could absorb budget increases.

In the long run, accelerated funding now will in all likelihood save DoD money because land values have been increasing and are likely to continue to increase, since the demand for land seems likely to outstrip supply. Table S.2 illustrates some recent property price trends near U.S. installations and a national average.

This table illustrates how property trends have increased in many areas. For large tracts of land, investing now rather than waiting a few years can have significant savings for the military. To help demonstrate such savings, an analytical case is presented for ranch land in southern Colorado near Fort Carson and two conservation easement appraisals on the Walker Ranch conducted in 2002 and 2006, respectively. The compound annual growth rate (CAGR)⁸ for the Walker Ranch was 37 percent, which means that in 2006, Fort Carson would have to pay 316 percent more than in 2002 for a conservation easement on the Walker Ranch. If inflation and the cost of leasing the 30,000 acres⁹ is taken into account, purchasing a 30,000-acre easement on this property at the end of a five-year period could cost DoD nearly \$21 million more—300 percent more in real terms (using the gross domestic product deflator) (see Appendix I for the details on this calculation). In many places in 2006, land prices have slowed, so such trends and savings may not be as dramatic in the near future. But, they are likely to increase later given the

Table S.2
A Sample of Property Price Trends Near U.S. Installations

Location and Type of Land	Past Price for Land or Conservation Easement in Base Year	More Recent Price for Similar Property in Comparison Year	Compound Annual Growth Rate
Easement on Walker Ranch south of Fort Carson in Pueblo County, Colorado	\$360/acre in 2002	\$1,085 per acre in 2006	37%
Building sites with water in Churchill County (near NAS Fallon)	\$65,000–\$80,000 in 2003	\$150,000–\$200,000 in 2006	25–45%
Santa Rosa County, Florida, property (near Eglin AFB and NAS Whiting Field)	2002 ^a	2005 ^a	15%
National average for agricultural conservation easement	\$1,519/acre in 1999	\$2,899/acre in 2004	14%

SOURCES: Florida data are from the Florida Department of Revenue and the national farmland easement prices are from Kirchhoff (2006).

NOTE: For other sources and more details on the other examples and their calculations, see Appendix I.

^a The data provide the value of real property over time and do not provide price per acre.

⁸ The compound annual growth rate is a calculated value that shows the smoothed annual growth rate for the period the investment was held. It is calculated using the value of the initial investment, the ending value, and the number of years the investment was held. In reality, the value of investments fluctuates and does not necessarily grow monotonically, any given year, therefore this term is best used to compare investments over the same or similar timeframes.

⁹ Fort Carson is leasing some of this ranch land until it acquires sufficient funds to purchase more conservation easements. See Appendix C for more details. It is important to note that the lease amount is minor when compared to the overall easement costs.

proximity of bases to developing areas.¹⁰ Thus, there is an opportunity now for installations to protect land before prices rise as fast again.

In addition, other associated transaction costs will likely be higher in the future because more transactions will be needed once land is subdivided (in other words, acquiring property from one large landowner now is cheaper than dealing with 50 small landowners in the future). Transaction costs include the appraisals; staff time to negotiate, review, and close deals; legal fees and reviews; and monitoring the easements. Such costs are not trivial; for example, the Navy and U.S. Marine Corps (USMC) pay \$20,000 to \$30,000 for just a single property appraisal, so 50 appraisals would cost \$1,000,000 to \$1,500,000. Therefore, DoD would get far more benefit per dollar from investing \$200 million today than it would investing the equivalent amount (adjusted for inflation) evenly over 10 years.

Installations' Programs Are Understaffed

Staffing for the program differs across installations, with work on the program being an additional duty at some locations and a primary responsibility at others. It should not be an additional duty. The program is too complex and its demands are too great to assign it to someone with multiple responsibilities.

Buffering Activities Need to Be More Strategic

Many installations are taking strategic actions in their buffering activities, but more needs to be done. So far, many installations have focused their buffering efforts on adjacent lands. Although these are important, that focus is myopic, and installations need to be more strategic in their approach. A strategic approach has several aspects. First, buffering staff members need to look both further afield and further into the future. For example, low-level flight routes can extend many miles from the installation and require buffering just as much as artillery impact areas. Furthermore, future weapon systems may require more extensive areas. Additionally, buffering staff members need to consider joint use and training requirements and effects when they plan their buffering activities.

Second, many installations need to consider environmental issues more and factor the entire ecosystem and ecoregion into their planning, i.e., take a regional ecosystem approach. Ecosystems cut across county and state boundaries, and encroachment and environmental problems need to be addressed at both the local and regional level to be effective. Given that loss of biodiversity within an ecoregion causes T&ES encroachment, what happens across the entire ecoregion concerns the installations. It is important to note that an installation may successfully address sprawl problems with buffering to solve most of its sprawl-related encroachment problems, but if the installation's buffering program is not addressing biodiversity loss, then T&ES will likely still cause encroachment problems.

Third, DoD also needs to look at what other federal land managers are doing, especially the Bureau of Land Management and the Forest Service. These two organizations along with DoD manage the majority of federal lands containing most of U.S. biodiversity and habitat where biodiversity is most at risk. What they do on the land under their control can affect military installations, particularly with respect to biodiversity loss. Therefore, it is in the instal-

¹⁰ Given the various growth pressures near these and other installations, many local government land appraisers and other experts that RAND researchers interviewed expect prices to rise again near the installations.

lations' own interest to work with other government organizations to preserve species and habitat.

Fourth, just because an installation today is in a remote area and not being encroached on does not mean it does not need buffering. Given the national trends with sprawl, biodiversity loss, and the fact that land is a finite resource, this will likely change. The military needs to take strategic action to buffer these installations as well. In fact, it is easier and cheaper for the military to buffer before major encroachment problems develop.

Creating conservation buffers—and doing it strategically—not only will likely save the military money (as mentioned above) but will allow the military to conduct the full range of training, testing, and other activities necessary to prepare warfighters for success (and to keep them safe) in combat operations.

Additional Policy Guidance Is Needed

As the program has evolved, it is clear that additional guidance is needed. Each Service has implemented the program without comprehensive implementation guidance from OSD. Although some flexibility is needed for different Service needs, lack of overall guidance leads to inconsistencies across the Services, which particularly creates difficulties when two Services are dealing with the same partner. A lack of guidance has also caused some actions to be redone and has slowed the process as different installation and Service staffs spend time debating and figuring out how to implement the program. Given such guidance needs, in summer 2006, OSD working with the Services provided an initial guidance document, “The Department of Defense Conservation Partnering Program Guide.” However, it mostly focuses on how to submit REPI proposals and the criteria for evaluating those proposals. Such guidance needs to be expanded to provide more guidance about ways to implement the buffering program successfully.

Implementation Needs to Be Streamlined and Hastened

Understandably, it can take a long time to negotiate a land transfer or easement with a landowner. However, the military process to assess, approve, and fund a property agreement takes too long, especially if a commercial land developer has cash on hand and can consummate a sale in a matter of weeks. For example, the Navy and USMC appraisal process and easement development and review process to final offer takes months and has taken up to a year at some installations. In addition, acquiring military funds is usually a several-month process. In a competitive environment, the military is at a disadvantage when its partner does not have ready funding to make a deal quickly. Such processes need to be streamlined and other flexibility needs to be built into the system to enable the military to respond quickly to real estate opportunities. Policies and procedures will need to be established to enable responsiveness yet provide reasonable oversight and approvals to prevent waste, fraud, or abuse.

Community Outreach Is Essential

Community outreach is a slow but essential process to any installation buffering program. Establishing relationships with local communities, landowners, nongovernmental organizations (NGOs), and other organizations interested in preserving land from development has shown itself to be an important component of successful buffering programs. It is particularly critical to build trust with the landowners. They must believe that the negotiations are being made in good faith and address their concerns.

Recommendations

DoD Needs to Invest More Resources Soon

Because of the common installation need to act swiftly or lose opportunities to buffer as surrounding lands are subdivided and developed and become too expensive and owned by too many different entities to use for buffering, OSD and the Services need to invest more resources in buffering now. Such resources include financial, manpower, policy guidance, and technical support. Other funds are available and should be pursued. However, the fundamental need is for significantly more funding by Congress and DoD. As discussed above, an annual REPI budget of about \$150 million or even more appears to be readily absorbable for good buffering opportunities. However, more analysis is needed to assess the exact amount needed and how fast the program could absorb budget increases.

Address Other Financial Issues

A number of other financial issues in addition to increased funding also need to be addressed to improve the program.

First, OSD needs to provide multiyear funds for all Services and installations to enable negotiations and deal closures that cross fiscal year boundaries. Second, OSD, the Services, and Congress should work with state and local governments to support funding of land conservation for installation buffering benefit. Third, REPI should assess opportunities for and help support leveraging of other military and federal agency funding, especially for land and ecosystem analysis and preservation, such as funds from the U.S. Department of Agriculture. Fourth, OSD, the Navy, and USMC need to make it clear that the program does not require that partners match (or even come close to matching) military funds. This requirement has the potential to derail valuable buffering agreements. Fifth, Congress and DoD need some flexibility in implementing the “fair market value” requirement in acquiring land interests for buffering. The program should acquire property at less than fair market value if landowners are agreeable, as long as they know the price offered is below the fair market value, or it should allow paying more than the appraised value to beat a competitive bid if that is necessary to get land crucial for buffering. Once such land falls under development, for all practical purposes it is lost to DoD forever. Sixth, OSD needs to speed up the funding process for approving and providing funds to buffering projects. An important part of doing this is that OSD should create an emergency funding reserve. Finally, OSD and the Services should help fund more than just the land acquisition process. Funding for regional growth and ecosystem and ecoregional assessments, collaboration, and management is also needed to help improve the program, especially for addressing strategic issues such as preventing biodiversity loss.

Improve Program Policy Guidance and Focus

REPI needs to build on existing program guidance to expand it to be an overarching program implementation guidance document. Such guidance should include a consistent approach across the Services for how the program should be implemented with reasonable flexibilities built in to facilitate creativeness, deal with local situations, and enable more rapid response to opportunities. Because of the benefits from collaboration and outsourcing key functions, such as the appraisal process, the Army’s “cooperative agreement” approach with partners seems

the best model, rather than the Navy's "real estate" approach.¹¹ This guidance should focus on leveraging expertise from diverse partners when it makes strategic sense and is reasonable to do so. It should also require REPI-funded projects to focus on conservation as much as possible when appropriate and feasible, such as implementing conservation easements rather than restrictive easements to protect land with conservation value. In addition, OSD and the Services should ensure that installations are taking strategic action to address T&ES issues and ecoregional biodiversity loss by participating in broader ecosystem planning and management activities as part of their buffering programs.

Improve the Implementation Process

The process needs to move faster. Clarifying guidance will help, but OSD and the Services need to consider other approaches as well. These include delegating deal-making authority and some funds to the local installation, establishing an optional fixed rate for each installation for a conservation buffer or land price to avoid lengthy appraisals and reviews, and having standard conservation easement documents. These may require changes to current statutes. Often, land that is not adjacent to the installation is important to its buffering activities, such as for protecting flight corridors and habitat. The statute allows the program to use such property for buffering, but some installations consider only areas adjacent to the installation. OSD and the Services should encourage the implementation process to focus more on nonadjacent land. This step would enable installations to take a more strategic approach to buffering.

Improve Community Outreach

Ensuring that there is a full-time installation staff member involved in the buffering program would also help outreach. Other steps include having installation staff participate in local community planning, funding planning coordination and collaboration with local and state governments, presenting encroachment programs to local audiences as a way of illustrating the importance of training and the effect encroachment has on it, and educating the installation staff as well.

Conclusions

REPI projects have demonstrated effectiveness in helping to preserve testing and training operations and promote military readiness by preventing incompatible land use and preserving habitat for T&ES. Buffering projects also have provided other benefits, such as improving installations' images and community relations, improving water quality, providing community parklands, and helping maintain local quality of life. The projects complement other DoD activities to address encroachment. Conservation buffering activities show some promise in helping to solve installation encroachment problems. However, it is too soon to tell if such efforts will prevent significant encroachment problems or at what total cost. In addition, a number of efficiency and effectiveness issues need to be addressed to improve the REPI program so that installations have a better chance to actually prevent most of their fundamental encroachment problems. Most important, Congress and DoD need to provide significantly more funds soon to buffer before the chance to buffer is lost. OSD also needs to develop clear

¹¹ See Chapter Six.

policy implementation guidance that streamlines the implementation process and ensures that installations are taking strategic action, such as strategically helping to preserve habitat and address declining biodiversity. With these and the other suggested improvements, REPI has the potential to help many installations solve most of their major encroachment problems, so these installations' military testing and training operations are no longer restricted or degraded by encroachment.

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Any errors of fact or judgment that remain are solely those of the authors.

Abbreviations

AARC	Active Adult Retirement Community
ACE	Ashepoo, Combahee, and South Edisto
ACS	Army Claims Service
ACUB	Army Compatible Use Buffer
ADUSD	Assistant Deputy Under Secretary of Defense
AEC	Army Environmental Command
AFB	Air Force Base
AICUZ	Air Installation Compatible Use Zones
APZ	Accident Potential Zone
ATV	all terrain vehicle
BASH	bird air strike hazard
BLM	Bureau of Land Management
BRAC	Base Closure and Realignment Commission
CAGR	compound annual growth rate
CCRC	Continuing Care Retirement Community
CGPLI	Coastal Georgia Private Lands Initiative
CHPPM	Center for Health Promotion and Preventive Medicine
CNF	Conecuh National Forest
CNO	Chief of Naval Operations
CP&LO	Community Planning and Liaison Officer
CSAR	Combat Search and Rescue
CSEDC	Colorado Springs Economic Development Corporation
CSP	Central Shortgrass Prairie
CWA	Clean Water Act
DECAM	Directorate of Environmental Compliance and Management
DEP	Department of Environmental Protection
DoD	Department of Defense
DOE	Department of Energy
DOI	Department of the Interior
DON	Department of the Navy

DOT	Department of Transportation
DU	Ducks Unlimited
EAP	Encroachment Action Plan
ECM	Encroachment Condition Module
ECP	Encroachment Control Plan
EP	Encroachment Partnering
EPA	Environmental Protection Agency
EPP	Encroachment Partnering Program
ESA	Endangered Species Act
ESOH	Environment, Safety and Occupational Health
FDA	Florida Defense Alliance
FDOT	Florida Department of Transportation
FRTC	Fallon Range Training Complex
FS	Forest Service
FWS	U.S. Fish and Wildlife Service
FY	fiscal year
GCPEP	Gulf Coastal Plain Ecosystem Partnership
GIS	Geographic Information System
GLT	Georgia Land Trust
GWOT	Global War on Terrorism
HAAF	Hunter Army Airfield
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
INRMP	Integrated Natural Resources Management Plan
IP	International Paper
IUCN	World Conservation Union
JLUS	Joint Land Use Study
JSF	Joint Strike Fighter
LCOG	Lowcountry Council of Governments
LLP	longleaf pine
LTA	Land Trust Alliance
LURS	Land Use Requirement Study
LVEA	Lahontan Valley Environmental Alliance
MAZ	military airport zone
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
MEO	Mission Enhancement Office
MI	Military Intelligence

MILCON	Military Construction
MOA	military operating area
MOU	Memorandum of Understanding
MWTR	Mountain Warfare Training Range
NAS	Naval Air Station
NAVFAC	Navy Facilities Engineering Command
NDRI	National Defense Research Institute
NEPA	National Environmental Policy Act
NGO	nongovernmental organization
NIA	Natural Infrastructure Assessment
NIM	Natural Infrastructure Management
NOLF	Navy Outlying Landing Field
NRCS	Natural Resources Conservation Service
OEA	Office of Economic Adjustment
OGT	Office of Greenways and Trails
OLF	Outlying Landing Field
O&M	operations and maintenance
OPAREA	Operating Area
OPNAV	Office of the Chief of Naval Operations
OSD	Office of the Secretary of Defense
PCMS	Pinon Canyon Maneuver Site
RAICUZ	Range Air Installations Compatible Use Zone
RCLP	Rural and Critical Land Preservation
RCMP	Range Complex Management Plan
RCW	red-cockaded woodpecker
R&D	research and development
RDECOM	Research Development and Engineering Command
REPI	Readiness and Environmental Protection Initiative
RLSP	Rural Land Stewardship Program
SERDP	Strategic Environmental Research and Development Program
SERPPAS	Southeast Regional Partnership for Planning and Sustainability
SF	Special Forces
SNWR	Stillwater National Wildlife Refuge
SRI	Sustainable Ranges Initiative
SRP	Sustainable Range Program
TDR	transfer of development rights
T&ES	threatened and endangered species
TNC	The Nature Conservancy

TPL	The Trust for Public Land
UN	United Nations
USAF	U.S. Air Force
USDA	U.S. Department of Agriculture
USMC	U.S. Marine Corps
UXO	unexploded ordnance

Introduction

When most U.S. military installations were created, they were located far from major cities and towns. Because of a growing population and changing land development patterns over the past several decades, military lands that are vital for training and testing to support military readiness are increasingly becoming surrounded by urban, suburban, and other types of land development. Land development next to an installation, especially extensive residential development, can affect the installation's operational capability. Noise, dust, and smoke from weapons, vehicles, and aircraft prompt citizen complaints about military training and testing. Commanders frequently must choose between being good neighbors and meeting training and testing requirements. Noise concerns, the presence of cultural and historic resources, and the distribution of threatened and endangered species can result in training restrictions affecting military readiness. Such pressures are referred to as encroachment, defined as urban, suburban, and other types of development surrounding military installations; environmental concerns; and other external pressures that affect the ability of the military to test and train realistically. Encroachment concerns have caused installations to change how they train; restricted certain training operations, such as those involving smoke and night training; and increased testing and training costs. The result is degraded testing and training, stress on achieving military readiness, and even the closing of installations when these constraints become too severe.

In December 2002, Congress provided legislative authority to expand the Private Lands Initiative to help address this growing encroachment problem by passing 10 USC §2684a, "Agreements to limit encroachments and other constraints on military training, testing, and operations." This authority allows military departments to partner with state and local governments or private nonprofit organizations to establish buffer areas around active training and testing areas.

In 2003, the Office of the Secretary of Defense (OSD) created the Conservation Partnering Program, also now known as the Readiness and Environmental Protection Initiative (REPI), to implement this authority. Under this program, OSD provides funding to the Services to implement compatible land use partnering projects that relieve encroachment pressures—from either incompatible land use or loss of natural plant and animal habitat—on training, testing, and support operations at U.S. military installations, at ranges, at Operating Areas, and in military airspace.

Since REPI is a fairly new program but had been operating for three years by summer 2006, OSD wanted to assess how effective the program has been so far to help set the future directions for the program. In addition, in March 2007, OSD was required to report back to Congress on its efforts to address encroachment and to assess the effectiveness of REPI.

Given these needs, OSD asked RAND's National Defense Research Institute to assess the effectiveness of REPI projects and to recommend improvements to the program. The research reported here was conducted between June and December 2006. To meet the objective of this study, RAND researchers undertook four tasks:

- develop criteria for assessing the progress of the conservation buffer projects
- conduct in-depth case study assessments of six conservation buffer projects
- analyze potential improvements for REPI
- document the findings and make recommendations for improving REPI.

In the next chapter, this monograph explains the range of encroachment problems, how encroachment affects the military, and the fundamental causes of encroachment. Chapter Three discusses how DoD and other organizations are addressing encroachment and its causes. Chapter Four explains the study methodology and the criteria used to assess the accomplishments of the buffering activities. Chapter Five presents an assessment of REPI's accomplishments. This assessment covers both the effectiveness and the efficiency of the buffering projects. Chapter Six presents the findings of the study, including what is needed to improve military installation conservation buffering. Chapter Seven provides recommendations to address these needs and improve the effectiveness and efficiency of these activities. Appendix A provides scientific evidence about the importance of biodiversity and its loss and the relationship to military installations. The next six appendices give detailed overviews and assessments of the buffering activities of six case studies that were examined in depth. Appendix H then presents one-page summary descriptions of other installations' buffering activities that were examined during this study. Appendix I offers an analysis of land price trends for Colorado near Fort Carson and for Nevada near Naval Air Station (NAS) Fallon.

Since this is a long document, some readers may choose to read only the parts that interest them the most, such as the findings, the recommendations, or an appendix dealing with an individual installation. Because of this, there is some repetition of examples and other information to clarify points for readers who do not read the entire document.

Understanding the Encroachment Threat

To measure the effectiveness of the REPI program at addressing installation encroachment, it is important to understand the current and future encroachment threat to installations and what is being done to address it. This chapter defines encroachment, assesses its significance to military operations, identifies its fundamental causes, and determines whether these causes are getting worse over time. The next chapter explains how encroachment is being addressed.

How Encroachment Affects Military Readiness

This section explains how encroachment on installation testing and training poses a serious problem because it can, and has started to, degrade military readiness. It explains the types of encroachment and describes the ways encroachment affects military installations' testing and training operations and, ultimately, military readiness.

A Range of Encroachment Issues Affect Installations

Encroachment can be defined as issues external to military operations that affect or can affect military installation testing, training, and other operations and overall military readiness. OSD and the Services have identified 11 main encroachment issues:¹

- noise pollution
- endangered species and critical habitat
- wetlands
- water quality and supply
- air pollution and quality
- cultural resources
- maritime competition
- competition for airspace
- competition for radio frequency spectrum
- urban growth around military installations
- unexploded ordnance and munitions constituents.

¹ Since the Services and OSD use slightly different definitions of encroachment, this list is a combination of both, from several sources, including Office of the Secretary of Defense (2007), U.S. General Accounting Office (2002), and U.S. Army (n.d.a).

Below, this monograph briefly explains how each issue can encroach on installation operations. These issues are ordered not in terms of importance but in a logical way for presentation.

Encroachment concerns evolve and change over time. For example, energy production, such as windmill farms, is not on this list, but it has become more of an encroachment threat recently.

It is important to note that installations often have multiple encroachment problems, especially in more urbanized areas. This discussion is followed by some specific examples to illustrate this point, detailing how encroachment issues have affected installations.

Noise Pollution. Military testing and training operations, both air and ground, are noisy. People who live and work near such operations, whether under a low-level flying training route or next to an artillery range, complain about the noise. Training with more powerful and noisy weapons and increased urban and suburban sprawl near installations have resulted in more noise complaints,² which forces changes in testing and training operations and restrictions, such as no late night flying. If noise complaints become too numerous, they can even lead to the closing of the testing or training installation.³

Endangered Species and Critical Habitat. With the loss of habitat, pollution, and other problems, more species are threatened and endangered (T&ES). The federal Endangered Species Act (ESA) protects such species and can restrict federal activities that affect them.⁴ For example, the ESA requires that the FWS designate critical habitat for endangered species, which can restrict testing and training operations on installations. Many military installations are becoming the islands of habitat protection for such species, which has meant increasing restrictions on military use of land. The oceans, coastal areas, and other waterways also face significant pressures from the need to protect federally protected species, resulting in water space restrictions. States also have T&ES or species of concern laws and requirements, which can also affect installations.⁵

Wetlands. The Clean Water Act (CWA) precludes the alteration and destruction of wetlands. This law requires special review and permits for developments and other activities in wetlands, which can affect military testing and training operations. Installations with wetlands, such as Fort Stewart, need to perform extra work to apply and receive such permits and,

² Several installations as well as Service representatives explained how noise complaints increased as residential developments increased near testing and training ranges.

³ Encroachment factors, especially noise complaints, have been a factor in Base Closure and Realignment Commission (BRAC) rounds; see, for example, the 2005 BRAC Commission findings and recommendations regarding Naval Air Station (NAS) Oceana (Defense Base Closure and Realignment Commission, 2005, pp. 107–109).

⁴ The ESA's purposes "are to provide a means whereby ecosystems upon which endangered species and threatened species depend may be conserved, [and] to provide a program for the conservation of such endangered and threatened species" (16 USC §1531b or Farley and Belfit, 2001). To accomplish this objective, the U.S. Fish and Wildlife Service (FWS) establishes a list of species in danger of extinction, identifies the habitat needed for conservation, and develops plans to recover the species, and listed species are protected from being "taken" without express authorization of the FWS.

⁵ Some within the Department of Defense (DoD) advocate using military readiness needs to exempt installations from federally and state protected species requirements as the solution to this encroachment problem. However, such an approach is short-sighted and not very feasible for a number of reasons, two of which are mentioned here. First, it would be politically difficult to do this, especially given all the different federal and state laws and requirements that can come into play. Second, it would create political tension, distrust, and ill-will with environmental and conservation nongovernmental organizations (NGOs) and state and local governments, which would hurt other efforts to address encroachment, such as installation conservation buffering activities.

in some cases, changes need to be made in testing and training operations. In other cases, wetlands issues may even restrict or stop the testing and training activity itself.

Water Quality and Supply. Federal and state environmental laws, such as the CWA, impose various permitting, reporting, and operational restrictions on installations because of clean water concerns, which can influence testing and training operations. For example, tank training can cause significant erosion problems, affecting nearby stream and river water quality. Sometimes, testing and training operations must be revised or restricted because of such concerns. In addition, additional costs may be incurred to prevent these problems. For example, installations implement erosion control practices and technologies to prevent erosion.⁶ In addition, water supply constraints within a region could potentially restrict certain operations, such as not permitting a new testing facility to be built because of its water requirements.

Air Pollution and Quality Concerns. Because of the effects on human and environmental health, the Clean Air Act restricts activities that pollute the air. In some parts of the country, because local and regional air quality does not meet national air quality standards, state or local regulatory agencies implement strict emissions requirements on businesses and installations. Because of such requirements, installations in these areas may need to change or restrict certain testing and training operations, for example, by not conducting training exercises that produce smoke on bad air quality days.

Cultural Resources. U.S. military installations must follow U.S. regulations and laws to help preserve cultural resources, such as cemeteries, archaeological sites, and historic buildings. Regulatory requirements for cultural resource management are found in the National Historic Preservation Act, the American Indian Religious Freedom Act, the Archaeological Resources Protection Act, and the Native American Graves Protection and Repatriation Act. Such requirements have also caused restrictions and forced changes in operations on testing and training ranges. For example, installations may not be able to use certain parts of a training range because of archaeological sites located there.

Maritime Competition. Maritime testing and training operations face encroachment from competition for water space by humans and wildlife. First, increased competition from commercial and recreational boating and other activities can cause restrictions on installation testing and training, for example by restricting hours of training because of commercial boating needs. Similarly, approval of new offshore oil drilling rigs can potentially limit the amount of training space that is available.⁷

Second, federally and state protected species also compete for waterspace. Wildlife protection laws and requirements also can restrict testing and training in oceans, bays, and other waterways. For example, at certain times of day or year or when rare and wide-ranging marine mammals are present, such as the endangered right whale (*Eubalaena glacialis*), certain testing and training operations must stop.

⁶ It is important to note that some of these practices, such as erosion control, are being implemented because they are also important in sustaining the ranges for realistic and long-term training benefits.

⁷ This issue became a concern at Eglin Air Force Base (AFB) and other military installations, because the Department of the Interior (DOI) wanted to extend the area where commercial oil rigs would be allowed in the Gulf Coast. This would have affected military testing and training operations over water. However, U.S. Air Force (USAF) senior management met with DOI to ensure that the new proposed areas for oil drilling did not overlap with the military's Gulf Coast ranges. However, in the future, the military might not be able to extend its overwater testing and training ranges, because of extended areas of oil drilling next to the military range space.

Competition for Airspace. Commercial air traffic competes with the military for airspace. U.S. airspace is becoming more congested. Commercial air traffic continues to grow, which increases the commercial demand for airspace volume. Military training use of airspace has also been increasing and will continue to increase to accommodate the next generation of high-performance weapon systems, standoff munitions, and unmanned aerial vehicles. Such competition means that military air testing and training may be altered or restricted to meet nonmilitary demands. For example, military flight routes are sometimes changed so as not to interfere with commercial aircraft routes.⁸

Competition for Radio Frequency Spectrum. The commercial communications industry has over the years acquired more parts of the frequency spectrum and is using more frequencies in more areas. This can cause communications interference with military testing and training operations. For example, at Eglin AFB, a major target control system has experienced frequency interference from nearby commercial operators, presenting a safety issue problem because the interference can affect data links to weapon systems.

Urban Growth Around Military Installations. Many installations have also seen urban and suburban communities grow up all around them, often right up to the fence line. The result is more people in the community nearby who are affected by some of the products of testing and training operations, such as noise and smoke. This leads to more noise complaints and environmental concerns, such as air and water quality problems, affecting the installation. In fact, it can contribute to increases in all of the encroachment problems mentioned above.

Unexploded Ordnance and Munitions Constituents. Another encroachment concern comes from environmental laws and requirements regarding unexploded ordnance (UXO) and munitions constituents use and cleanup. In some cases, such environmental concerns could potentially limit the use of live fire or could stop training because UXO areas need to be cleaned up to address ground water pollution problems. For example, because unexploded ordnance and munitions constituents leached into drinking water in the area surrounding the Massachusetts Military Reservation, actions taken in 1997 under the Safe Drinking Water Act terminated live-fire training there.

It is important to note that almost all of these encroachment concerns are affected by compatible land and waterway use activities, which the REPI program is designed to help with. Some encroachment issues are affected more than others. For example, conservation buffering addresses noise complaints from housing near the fence line better than it does issues with unexploded ordnance and munitions. However, even in the example of the Massachusetts Military Reservation, given above, had there been a large enough land buffer between the installation and the drinking water source, the leaching problem might not have caused training to be stopped.

Encroachment issues are affecting installation testing and training operations at many installations, especially ones that have experienced urban growth around them. Two examples, both in areas with significant urban and suburban sprawl pressures over the last couple of decades, are Marine Corps Base Camp Pendleton, California, and Fort Lewis and Yakima Training Center, Washington.

⁸ For a good example showing how congested U.S. airspace is and the competition between the military and commercial traffic, see Figure 5.2 in Lachman et al. (2007), which shows a map of commercial air traffic air tracks on October 16, 2003, in comparison with military airspace.

Camp Pendleton has experienced training and other operational restrictions because of encroachment from T&ES, airspace competition, and noise complaints from the community. FWS designated 10 percent of the installation as critical habitat for endangered species, which limits the use of offroad vehicles and the digging of defensive positions. This designation has also reduced the amount of beach available for amphibious assault, preventing training to doctrinal standards. Air space restrictions have limited the number of days that weapon systems can be employed and noise restrictions have curtailed night helicopter operations.⁹

Fort Lewis and Yakima Training Center have had encroachment problems because of noise concerns, air pollution, T&ES issues, and radio frequency interference. Increased urbanization and the resulting noise complaints from the community have caused Fort Lewis to stop certain demolitions training. Air quality restrictions limit Fort Lewis's ability to operate new smoke generators. The presence of endangered species and their habitat limits the use of offroad vehicle training in both facilities and limits river crossing operations at Yakima. It also restricts maneuvers in prairie areas at Fort Lewis to preserve an endangered plant and at Yakima to protect western sage grouse habitat. Also, commercial communication networks have interfered with radio frequency spectrum at Fort Lewis.¹⁰

Encroachment Is a Significant Problem for Military Installations

Encroachment is a significant problem because it can influence installation operations in numerous ways, ultimately hurting the military's effectiveness and efficiency. DoD officials and staff have described four main ways that encroachment affects military operations:¹¹

- imposes testing, training, and other operational restrictions
- increases operational costs, especially for testing and training exercises
- fosters community complaints and damage claims
- degrades military readiness.

Unfortunately, no comprehensive analysis has been performed to assess how widespread or how significant such effects are across DoD or in any given Service. Anecdotal evidence from installation, Service, and other DoD staff, and some initial analysis, suggests that such effects are widespread and increasing. For example, the Army states that more than 40 percent of its installations report encroachment issues.¹² Taken together, all this information shows how encroachment is a significant problem for the military.

Each effect is described below along with some evidence about its significance.

Imposes Testing, Training, and Other Operational Restrictions. Encroachment has caused installations to lose access to part or all of their training and testing ranges, either temporarily or permanently, or has caused them to change the exercise or test itself because of restrictions from encroachment. Whether it is the presence of endangered species and their habitat on installations or urban and suburban growth near bases, encroachment can force installations

⁹ U.S. General Accounting Office (2002, p. 12). Effective July 7, 2005, this agency's name changed from General Accounting Office to Government Accountability Office.

¹⁰ U.S. General Accounting Office (2002, p. 10).

¹¹ This categorization of effects is based on a range of sources referenced throughout this section. See, for example, U.S. General Accounting Office (2002).

¹² U.S. Army (n.d.a).

to restrict their training and testing activities because of such issues as noise complaints from the community or because light pollution from homes and businesses makes night training impossible to conduct. For example, at Nellis AFB, Nevada, because of tremendous urban growth south of the base and safety concerns about overflying urban areas with live munitions, armed aircraft must take off and land from the north, which has caused mission delays and mission cancellations because of wind effects. In fact, this encroachment is so significant that Nellis AFB and its Nevada Test and Training Range “receive about 250 noise-related complaints annually that require adjustments to air operations.”¹³ This works out to more than one per day for the typical training calendar.

Many military installations are home to federally and state protected species that have caused or have the potential to cause testing and training restrictions. Over 300 federally listed endangered plant and animal species have been found on military installations across the United States.¹⁴ Within just the Army, nearly 100 installations “are home to more than 150 federally listed and protected species, creating a disproportionate burden for critical habitat management to support species recovery.”¹⁵ The presence of such species has also caused testing and training restrictions and workarounds. For example, in 2003 at Fort Hood, Texas, the presence of a T&ES restricted access to land, training activities, and the time and duration of training. Approximately 66,000 acres, about 33 percent, of installation training land was protected as endangered bird habitat (black capped vireo and golden cheeked warbler), which prohibited digging, tree or brush cutting, and “habitat destruction” throughout the year in this area. During March through August, vehicle and dismounted maneuver training was restricted to established trails, and site occupations were limited to two hours. Artillery firing, smoke generation, and riot control grenades were prohibited within 100 meters of the boundaries of the designated “core areas” (46,620 acres). Use of camouflage netting and bivouac were prohibited across the entire “core area.” These restrictions forced soldiers to train for combat with “significant artificial workarounds.”¹⁶ However, it is important to note that most of these restrictions have been eliminated because of better management of habitat on the installation. In fact, the 2005 FWS Biological Opinion designated 3,846 hectares (ha) out of 88,500 ha, only 4.3 percent of the installation, as core habitat.¹⁷

If encroachment problems become too significant, they can lead to the closing of the installation and the relocation of the testing and training missions. In fact, encroachment considerations have become a major consideration in BRAC decisionmaking. In the 1995 BRAC round, NAS Miramar was closed partly because of training encroachment problems mostly resulting from community noise complaints. The Navy’s F-14 squadrons were moved to Oceana, Virginia, and the Navy’s Top Gun program was transferred to Fallon, Nevada.¹⁸

¹³ U.S. General Accounting Office (2002, p. 11).

¹⁴ U.S. General Accounting Office (2002, p. 6).

¹⁵ Knott and Natoli (2004).

¹⁶ “Examples of Training Constraints . . .” (2003).

¹⁷ This example also illustrates how good environmental management and natural resource practices can address encroachment.

¹⁸ The Miramar facility was reopened as a fixed wing and helicopter base for the Marines, becoming Marine Corps Air Station (MCAS) Miramar.

Increases Operational Costs, Especially for Testing and Training Exercises. When access to training and testing ranges and activities is restricted, the time of the training and testing activities is changed and other workarounds are devised, or they are conducted at other installations. Such workarounds at an installation or having to move installation training and testing elsewhere also impose additional costs to the military. First, scheduling flexibility is reduced, which means that uniformed and civilian personnel work schedules must be adjusted to support training and testing activities. There is additional cost to develop and implement this change of schedule. In addition, this scheduling is often less efficient, further increasing costs.

Second, additional costs to the military are incurred when soldiers, weapons, and equipment must be transported elsewhere for training and testing. One study by the U.S. Army Center for Health Promotion and Preventive Medicine (CHPPM) on the cost of noise encroachment to the Army estimates that the cost of sending soldiers to train at alternative sites, including transportation, loss of training hours, and constrained schedules, can exceed \$300 million per year.¹⁹

Third, when soldiers must go elsewhere for training, the increase in time away from their families may also adversely affect retention, which is another cost to the military.²⁰

Fourth, workarounds may cost more, particularly if special procedures are needed to deal with federally and state protected species. At Fort Bragg and other installations in the Southeast, restrictions on training near red-cockaded woodpecker (RCW) nesting trees imposed a number of additional costs to the installations, such as more staff time being needed for environmental monitoring and assessment of the RCW, more personnel time to mark the trees and erect warning signs, and additional training of troops to implement proper procedures near these areas.

Fosters Community Complaints and Damage Claims. Community claims for damage, including from noise or smoke pollution and damage to property and human lives resulting from training and testing mishaps, is another added cost of encroachment. The Services must also sustain personnel and establish policies to handle complaints and investigate claims, all of which imposes further financial costs to the military. For example, MCAS Beaufort has had noise complaint lawsuits, which meant that the installation had to employ lawyers and other staff to deal with the concerns, and, as will be discussed below, in one case, had to pay the additional cost to settle with the plaintiff rather than go to court. Data on damage claims and complaints have not been easy to obtain because much of this information is maintained at the installation level and is not published in the open literature. Nevertheless, it appears that these costs can be substantial. The same noise damage study by CHPPM referred to above estimates that each year damage claims directly attributable to noise submitted to the Army Claims Service (ACS) total about \$15 million, and about \$250,000 is paid out by the ACS. These claims do not include those smaller than \$25,000, which are handled locally. Adding local claims to the \$250,000 paid out by the ACS, the Army is estimated to pay out about \$800,000 annually for noise damage. Further, labor costs to process noise claims and complaints are estimated

¹⁹ This is a general estimate based on some basic cost data and extrapolating across training installations. U.S. Army Center for Health Promotion and Preventive Medicine (n.d.). All costs are estimated in FY 2002 dollars and are not adjusted for inflation.

²⁰ See Department of Defense (n.d.f). This source states that retention has been affected; however, other studies have showed mixed results in the association between relocations and retention.

at, respectively, \$2.88 million and \$5.4 million annually, and these sums do not include the Army's expenditures on technology and personnel training to handle complaints and process claims.²¹

Degrades Military Readiness. The operational restrictions and resulting workarounds from encroachment pressures ultimately degrade military testing and training in different ways. Three examples illustrate the effects. First, changing training operations by changing flight and ground vehicle patterns, altitudes, speeds, and time of day or night training operations for air, sea, and land training can affect training effectiveness. Second, light interference from nearby street lights and homes can diminish a military unit's ability to train with night vision devices, which affects the quality of the training. Third, when the number of hours that a particular flight path or training corridor is available for use is decreased, training effectiveness and regularity are reduced.

When testing and training range access and use are reduced or altered in such ways, it segments training exercises and degrades their realism and value. Usually, training for combat skills is more effective when completed in the context of a continuous operational scenario more like real combat. As stated by the GAO Director of Defense Infrastructure Issues in testimony before the Senate Committee on Environment and Public Works, "The potential problem with workarounds is that they lack realism and can lead to the practice of tactics that are contrary to those used in combat."²²

It is difficult to assess the significance of such encroachment's effect on military readiness. No comprehensive study has yet been done to assess the full effect. OSD and the Services are developing tools to help with such assessments. However, there is enough military expert judgment to show that encroachment presents a significant and serious problem for DoD. For example, Colonel Thomas Waldhauser, commander of the 15th Marine Expeditionary Unit, reported to the House Government Reform Committee in May 2002 that his soldiers were not fully trained for combat in Afghanistan because of restrictions at Marine Base Camp Pendleton:

The troops rarely practiced digging in . . . due to environmental restrictions and the base's limits on off-road maneuvering left Marine drivers unprepared for Afghanistan's rugged terrain. Over time, as we build bad habits into our training, or substitute the classroom and simulators for field training, our combat edge will become dulled. . . . Limited training opportunities translate into increased risk where the price of success in combat will be unnecessarily high.²³

Another example comes from Captain Jason Amerine, member of a Special Forces team that supported President Harmid Karzai in Afghanistan. He stated that, "From an operational perspective, my team's ability to train for this war was far from ideal. Range encroachment issues affected nearly every aspect of this mission's profile."²⁴

²¹ U.S. Army Center for Health Promotion and Preventive Medicine (n.d.). All costs are estimated in FY 2002 dollars and are not adjusted for inflation.

²² Holman (2003).

²³ Cahlink (2002).

²⁴ See Department of Defense (n.d.f).

Ultimately, reduced military readiness is the most deeply troublesome encroachment issue for DoD and the Services. The Defense Science Board Task Force on Training Superiority and Training Surprise concluded in 2001 that because of encroachment “Our uniquely American training superiority is eroding,” and that “training failure will negate hardware promise.”²⁵

Encroachment is having financial and operational effects on military operations, ultimately causing some degradation of military readiness. It is unclear how serious this degradation is, but increasing evidence shows that encroachment is a significant problem for installations because of both financial and operational effects.

Understanding the Fundamental Causes of Most Encroachment

To address installation encroachment, it is important to understand what causes it. By understanding the causes, and then by addressing them, the military can most effectively work to prevent encroachment.

After reviewing and analyzing installation encroachment and examining the land use and scientific literature summarized below, this study identified two main trends in U.S. society that are causing most of the encroachment problems: extensive land development, especially sprawl, and the loss of biodiversity.²⁶ Land developments that are encroaching on installations can be grouped into three main types:

- increasing suburban and rural sprawl from commuters
- retirement communities
- resort and vacation home developments.

Sprawl causes many different types of encroachment problems. The loss of biodiversity mainly leads to more problems with threatened and endangered species and other species of concern, which causes more environmental encroachment.

These issues are explained in more detail in the following pages. The reader may choose to skip over this section or selected subsections unless he or she wants more information.

The Spread of Suburban and Rural Sprawl

Over the last 10 to 30 years, the United States has seen suburban sprawl increase as homes are built farther and farther from core city areas. People have been moving away from urban areas, wanting bigger homes and yards and more space, and fleeing inner-city crime and other problems. Cities and surrounding suburbs are now larger, taking up a significant number of acres throughout the country. Such urban and suburban areas can be defined as locations with < 1.7 acres per housing unit.

During the last couple of decades, another type of sprawl has also developed—rural sprawl. Rural sprawl can be defined as low-density residential development and commercial strip development along roads scattered outside suburbs and cities. Rural sprawl is rural resi-

²⁵ Angello (2001).

²⁶ Other external pressures cause a small fraction of encroachment problems, such as commercial wind farms and environmental laws about UXO.

dential development at exurban densities with 1.7 to 20 acres per housing unit.²⁷ Rural sprawl has become a major development pattern in the United States, and by the year 2000, exurban development had covered 25 percent of the 48 contiguous states.²⁸ More people want to live on several acres of land in the country. “The foundation of rural sprawl is the proliferation of large, remote parcels rather than compact, efficient and socially vibrant communities. Planners and sociologists observe that this is most likely an attempt to replace the loss of traditional public spaces (parks, theaters, and cafes) with private spaces (landscaped grounds and home entertainment centers).”²⁹

Causes of Suburban and Rural Sprawl

Suburban and rural sprawl have been increasing for a number of reasons. First, land is a finite resource, and more people are buying homes. The U.S. population reached 300 million in 2006. Second, people are living longer. Third, they are willing to commute longer distances, and new communications technologies, such as the Internet and cell phones, enable people to telecommute and work from increasingly remote areas. Furthermore, many of these areas are not as remote from cities as they seem. “For instance, 53 percent of the nation’s population lives in a metro area of 1,000,000 or more; 82.6 percent lives in metro counties; 6 percent lives in nonmetro, nonadjacent counties; and 66 percent of those in nonmetro counties, live in counties adjacent to a metro area.”³⁰ Fourth, as discussed above, some people want bigger houses and more space, and often acquiring these is cheaper in suburban and rural areas. Thus, economic reasons help create sprawl. Such areas also seem to offer the peace and isolation that many people seek. Fifth, federal, state, and local policies, such as tax policies, road building, and other service infrastructure development, also tend to encourage suburban and rural sprawl. Expanding or building a new highway causes sprawl to spread, especially into more rural areas.³¹

All these trends mean that more people are moving closer to more installations. Most parts of the country are no longer remote areas far from any type of residential developments. As a result, installations come under increasing pressures from suburban and rural sprawl.

Increase in Retirement Communities

Over the last 30 years, the United States has also seen an increase in the number and size of retirement communities.³² It is estimated that about 5 percent of retirees will move to a new town, county, or state.³³ Five percent does not seem like much, but given the size of the current

²⁷ “In some states, exurban areas are defined as having between 1.7 and 40 acres per housing unit, depending on state land use laws. Rural areas have > 20 acres per housing unit (or > 40 acres).” Theobald (2003, p. 2).

²⁸ Hansen et al. (2005).

²⁹ Boddy (1995).

³⁰ Gasteyer and Gray (2005).

³¹ Several installations observed this trend and it also has been documented in some of the transportation literature. See, for example, Litman (2006).

³² For more information about such retirement trends and how they are likely to continue in the future, see Hass and Serow (2000, pp. 150–164).

³³ Streib (2002, pp. 3–5). Note that this 5 percent does not include “snowbirds”—people who live in warmer climates during the winter and return to colder northern places during the summer and consequently have two residences.

senior population, and the fact that people are living longer and many are retiring younger, this influx of retirees can significantly affect some communities when new retirement communities are developed, as is explained below.

Over the years, many have used the term “retirement community” to mean “a planned, age-segregated residential development designed for active older adults, often with provision for recreational and other appropriate services.”³⁴ More recently, the term Active Adult Retirement Community (AARC) has been used to refer to these planned amenity-equipped residential developments with a resident age restriction, often age 55 and older. So some now use the term “retirement community” more broadly to refer to neighborhoods, towns, and other areas with a high percentage of retirees, whether they live in AARCs or not. Many states, towns, and other local governments, such as in rural Georgia,³⁵ actively sell themselves as retirement communities, to attract retirees. The broader definition of retirement communities is used here to include both AARCs and communities with a high percentage of retirees.

From their start in California, Florida, and Arizona in the 1960s and 1970s, AARCs have become quite common and have grown in many parts of the country, especially the South and Southwest.³⁶ As people live longer and healthier lives, many want to move to retirement developments with a variety of amenities. Many prefer quiet, scenic, warm areas. More retirees are active and expect to enjoy more recreational services during retirement. Many also have the financial resources to live in more expensive retirement communities with a variety of amenities. Large-scale developers buy up large tracts of land, sometimes 10,000 to 20,000 acres, in places such as Pueblo County, Colorado, and Walton County, Florida. They then build AARCs with golf courses, tennis courts, swimming pools, hundreds to thousands of housing units, security, community centers, shops, and even medical facilities. Such communities vary in size, cost, and the kind of activities and services provided. One researcher has suggested that the reason the United States has so many more diverse AARCs than other industrialized nations is because it has a “vast area with vacant land” where such retirement communities can be developed and a large number of sunny locations for them to develop in.³⁷

Besides AARCs, there has been an increase in other retirement living options, such as Continuing Care Retirement Communities (CCRCs), sometimes in the same retirement community or even as part of an AARC. A CCRC is a development that, through long-term contracts with residents, provides housing, services, or such amenities as memory support and wellness and nursing care, usually on one campus. Many communities with a large population of retirees have a combination of developments such as these and also retirees who live in regular neighborhoods. In many cases, such developments start out small with an AARC and then grow larger over time as more retirees move to the area and more AARCs and other developments are built.

Areas along the coast or warm areas, such as in the South, have seen a large growth in the number and size of such retirement communities. Western areas, coastal states, Southwest desert areas, even as far north as northern Nevada, and the Southeast all have been experiencing retiree population growths. The West and Southwest have seen an increase compared to

³⁴ Doyle (1977).

³⁵ For more information, see Georgia Tech (2006).

³⁶ For more about the growth of the AARCs in the 1960s and 1970s, see Doyle (1977).

³⁷ Streib (2002, p. 3).

the original retirement growth seen in such areas as Florida and California—states traditionally known as popular destinations for retirees. During the 1990s, according to census data, Nevada had the largest percentage increase of people age 65 and older, at 72 percent, Arizona had a 39 percent increase, and New Mexico had a 30 percent increase.³⁸ Some retirees, such as snowbirds, have two or more homes.

Thus, military installations in such states as South Carolina, Georgia, Florida, Arizona, Colorado, California, Nevada, New Mexico, and North Carolina are seeing encroachment from retirement developments. Although retirement community growth is strongest in these areas, even in other parts of the country, such as the Midwest, retiree populations are increasing. Part of this trend is the consequence of people living longer and wanting to stay near their homes and families, so retirement facilities, especially CCRCs and neighborhoods, have developed near aging populations throughout the country.³⁹

More Resort and Vacation Home Developments

Another type of increase in land development comes from the increase in the number and size of resort areas and vacation homes. More and more people want to vacation in quiet, beautiful, natural areas, but they also want amenities such as shops, restaurants, and entertainment. In addition, more people are buying second or even third homes or condos as vacation properties. The long period of low-interest housing loans and an increase in the number of wealthy people have contributed to this trend. The result is a tremendous growth in resort developments over the last 10 to 20 years in areas with peaceful rural and beautiful natural areas, such as mountains, beaches, and lakes. As with retirement communities, large-scale developers buy large tracts of land, often in the same areas as retirement communities, and put in large-scale resort communities with golf courses, hundreds to thousands of condos and homes, numerous hotels, restaurants, shops, and entertainment. All over the United States, a wide range of specialized resorts have developed, including ski, beach, golf, and even business meeting resorts that cater to conferences and business meetings.⁴⁰ Resort communities have affected many mountain areas, especially in the West. As reported in one Idaho paper, “Resorts throughout the West are experiencing tremendous swells of new residents looking for lifestyle communities and seeking solace from more urban environments.”⁴¹ Many lake, beach, and coastal areas have had a similar experience. In some cases, a chain reaction occurs. Initial development starts slowly, but once the resort area is established, more land is sold in the area for new hotels, condos, vacation homes, and other vacation facilities which then generate additional demand for land.

In some cases, resort development and vacation home constructions are so numerous and widespread that the sprawl has spilled over into nearby communities and counties, which some have called the “suburbanization of resort communities.” This situation is occurring in many mountain areas in the West. In resort places such as Lake Tahoe, California; Teton County, Wyoming; Aspen, Colorado; and Park City, Utah, development has “leapfrogged” state boundaries, highways, and mountains to communities 40 miles away or more. Part of this

³⁸ Stohr (2004).

³⁹ People who move to a retirement community near their homes or families are not included in the 5 percent estimate.

⁴⁰ For a discussion of other types of specialized resorts and the growth of such resorts, see McElyea and Cory (1998).

⁴¹ Stahl (2004).

sprawl is suburban commuter sprawl because the people who work in the resorts can no longer afford to live in the expensive resort towns and commute long distances.⁴²

Resort and vacation home development has been a significant trend throughout the country. Coastal and mountain areas or areas with special natural attractions, such as national parks and beaches, have experienced this trend the most but so have places in the Midwest, such as Minnesota and Wisconsin, as a result of summer vacation home construction near lakes and woods. Areas within a couple-hour commute of major urban areas, such as the Shenandoah Mountains near the District of Columbia and the Pocono Mountains in Pennsylvania near New York City, have also experienced such growth. However, given low airfares, such resorts need not be near major cities. One researcher who analyzed these trends in the western United States found that many vacation and second homes in western counties are vacant for most of the year.

In 2000, nearly 1/4 of western counties had a > 25% vacancy rate; 11 counties had a > 50% vacancy rate. As a result, the ratio of number of people in a county per house varies widely around the mean of 2.2 for the West, so that 1/4 of the counties have a people per unit ratio lower than 1.9 and 8 counties have more housing units than people.⁴³

However, if these homes are near military installation testing and training, people on holiday complain about the noise, since they were hoping for a quiet vacation.

As with retirement communities, resort developments are encroaching on military installations across the country, such as in Beaufort County, South Carolina, near MCAS Beaufort; around Las Vegas, Nevada, near Nellis AFB; and in Santa Rosa County, Florida, near NAS Whiting Field and Eglin AFB. Many areas throughout the United States and near many installations, as in Beaufort County, South Carolina, and the Florida Panhandle, are feeling significant development pressures from both resort and retirement communities. Many have suburban and rural sprawl problems as well.

It is important to note that such trends also increase land prices, especially when there are both retiree and resort communities in the region. For example, in San Juan Island, Washington: “the majority of locals agree that the most influential factor in the price boom on the island has been an influx of affluent retirees and vacation-home owners.”⁴⁴

Declining U.S. Biodiversity

The second fundamental cause of some encroachment at installations is the loss of biodiversity, which causes more species to be listed as T&ES and creates other environmental encroachment problems. To understand this issue, this section briefly defines biodiversity, its loss, and the effects on installations. More details about biodiversity can be found in Appendix A.

Biodiversity can be defined as biological variety, referring to the number and diversity of species, the genetic material of those species, and the natural communities, ecosystems,⁴⁵ and

⁴² Carlton (2004).

⁴³ Theobald (2003, p. 2).

⁴⁴ “Community Profiles” (2005, p. 15).

⁴⁵ An ecosystem is a group of various species of plants, animals, and microbes interacting with each other and their environment, which includes precipitation, temperature, amount of moisture, and other chemical and physical factors to which organisms are exposed (Nebel and Wright, 1993). An ecosystem is an organized system of associated physical and biological

landscapes in which they live. Biodiversity is important to maintain healthy and diverse natural resources, processes, and ecosystems that humans depend on for food, fiber, clean water, and other resources. According to the United Nations (UN), the benefits of biodiversity and healthy ecosystems include generation of soils; maintenance of soil, air, and water quality; pest control; detoxification and decomposition of wastes; plant reproduction; climate stabilization; and prevention and mitigation of natural disasters.⁴⁶

Currently, the planet is experiencing high rates of biodiversity loss. The most obvious measure of biodiversity loss is the extinction of species. Species loss is a natural phenomenon; however, the rate at which species are currently becoming extinct is significantly higher than natural rates. Worldwide, tens of thousands of species become extinct every year,⁴⁷ and current extinction rates are estimated to be 1,000 to 10,000 times higher than natural extinction rates.⁴⁸ The World Conservation Union (IUCN) has estimated the significance of these threats. For example, over 5,200 species of animals are currently threatened with extinction, along with 34,000 species of higher plants. About 24 percent of the total number of mammals are threatened with extinction (close to 1,100 species of mammals) and about 20 percent of the known freshwater fish species (over 2,000 species).⁴⁹

This biodiversity loss has a significant effect on U.S. military installations because of the current locations of and threats to biodiversity.

In the United States, federally and privately owned lands harbor the greatest number of species and habitats that are at risk, although state lands also have significant numbers of species and habitats. On federal lands, Forest Service (FS), Department of Defense, and Bureau of Land Management are the federal landowners with most federally listed and imperiled species⁵⁰ and populations. In fact, looking at the distribution of species and populations on federal lands,

we find that Department of Defense lands contain the most federally listed species of any agency, with at least one example of about one-fifth (21%) of all federally listed species. This finding is particularly striking, given that these lands represent just 3% of the federal estate. Many military bases turn out to be strategically placed, not just from a military standpoint but also from a biological perspective. Often found in coastal areas with fast-growing human populations, many of the Department of Defense land holdings, such as southern California's Camp Pendleton Marine Base, are becoming islands of natural habitat in rapidly urbanizing regions.⁵¹

components that are interconnected, so that a change in one component will affect the others and the system as a whole, namely, a group of plants and animals living in a defined area and functioning together as a system. Ecosystems are a subset of an ecoregion.

⁴⁶ United Nations Development Programme (n.d.). For more details on the benefits and importance of biodiversity, see Appendix A.

⁴⁷ Smith and Smith (2001, p. VII-A).

⁴⁸ Kellert and Wilson (1993).

⁴⁹ United Nations Development Programme (n.d.).

⁵⁰ Federally listed threatened and endangered species represent a relatively small portion of U.S. species considered at risk by scientists. Imperiled species refers to a fuller array of nearly 2,800 U.S. species identified as being imperiled or vulnerable (Stein, Kutner, and Adams, 2000, p. 165).

⁵¹ Stein, Kutner, and Adams (2000, pp. 279–280). For more details on these issues, see Appendix A.

In the United States, the main threats to biodiversity and species come from habitat degradation and loss, alien species, pollution, overexploitation, and disease. Habitat degradation and loss are the largest problems, threatening an estimated 85 percent of species at risk. The spread of alien species is the second greatest threat, at 49 percent; pollution is third, at 24 percent; overexploitation is fourth, at 17 percent; and disease is last, at 3 percent.⁵²

One main cause of habitat loss and decline is land conversion for commercial development, mostly from suburban and rural sprawl. Other causes include agriculture; water development (such as building irrigation systems and dams); outdoor recreation, including offroad vehicles; livestock grazing; pollutants; and infrastructure development, mostly from roads. Disruption of the fire ecology from logging and from mining, oil, and gas geothermal activities also are threatening activities.⁵³

Suburban and rural sprawl often bring a number of these problems, including land conversion for commercial development, more infrastructure development, more water development, increases in invasive species, and more pollutants. Thus, the cumulative effect of sprawl on species and biodiversity loss is significant. In addition, the increased trend of rural sprawl, which consumes larger amounts of land, has likely accelerated some of this decline because of its ecological effect and amounts of land affected. Ecological research shows that even at relatively low densities, rural sprawl causes declines in species richness, declines in habitat, fragmentation effects, increases in nonnative and human-adapted species, increased air and water pollution, and modification of critical ecological processes.⁵⁴ Similar effects are seen with suburban sprawl. Thus, sprawl also increases installations' encroachment problems with wetlands, water quality and supply, and air pollution.

The result is that more species are likely to be listed T&ES because of increasing sprawl, as biodiversity is lost on private lands that are developed. In addition, the main other federal lands with most of the biodiversity and biodiversity most at risk—Bureau of Land Management (BLM) and FS lands—have more demands placed on them for multiple uses, including offroad vehicles and other outdoor recreation, grazing, logging, mining, and oil and natural gas extraction. In the last few years, these types of uses have increased, especially logging and oil and natural gas extraction, which often degrade or destroy habitat and biodiversity. As more BLM and FS lands are used more intensively for such activities, they lose biodiversity and more species become at risk. The result is more T&ES, and military installations assume a greater importance in protecting the habitat for these species, with the concomitant effect that T&ES encroachment becomes even more of a problem for military installations.

Encroachment Is Increasing

Given all these factors, installation encroachment has been and is likely to continue to increase. Suburban and rural sprawl and retirement community and resort development growth continue to increase because of all the reasons mentioned above. Such increasing sprawl increases most of the encroachment problems discussed here, including noise complaints, maritime and airspace competition, air pollution, and water quality and supply problems.

⁵² Stein, Kutner, and Adams (2000, p. 242).

⁵³ Stein, Kutner, and Adams (2000). See Appendix A for more details.

⁵⁴ Hansen et al. (2005) and Theobald (2003).

Biodiversity and T&ES issues also increase with more sprawl and federal agency activities also have an effect. As activities that degrade and decrease the amount of critical habitat and biodiversity increase on other federal lands, especially BLM and FS lands, the importance of military installations for protecting species and biodiversity is increased.

Adding to the significance of future encroachment problems is the fact that new weapon systems and warfighting operational practices will require more air, water, and land area and most ranges are already being used at or close to capacity. As stated by the Defense Science Board Task Force on “Training Superiority and Training Surprise” in January 2001,

The weapon systems, force structure and tactics of the future will require larger areas in which to test and train. Many newer weapon systems already have flight distances and safety footprints that stress existing range capabilities. Ground maneuver forces of the future will need to operate over much greater land areas than in the past. The development of ballistic missile defenses poses new testing and training challenges. These and other trends generate increased range requirements in order to test our equipment and train our forces, while, at the same time, our existing ranges are becoming increasingly constrained.⁵⁵

In addition, the Army has already realized that that many Army installations “do not have sufficient land to support training to doctrinal standards. . . . For example, only 22 percent of active duty stateside installations have enough land to support their light maneuver training needs, and only 42 percent of active duty installations have enough land to support their heavy maneuver training needs.” These installations are already expected to use work-arounds to meet training requirements.⁵⁶

Thus, in the future, training space will likely be strained to the limits or be in short supply, and encroachment from sprawl and biodiversity loss will increase. Given such trends, DoD needs to develop a strategy to help address and stop this increasing encroachment problem.

⁵⁵ Angello (2001).

⁵⁶ U.S. General Accounting Office (2002, p. 19).

How Encroachment Is Being Addressed

This chapter explains what DoD and nonmilitary organizations are doing to address encroachment. First, the main OSD and Service activities are explained. Then, the chapter briefly describes how other organizations, including NGOs and other federal, state, and local agencies, are also addressing the fundamental causes of encroachment.

DoD's Activities to Address Encroachment

Congress and DoD have recognized the need to deal with encroachment. OSD and the Services have a number of programs and activities designed to do so. OSD's most overarching activity to address encroachment is the Sustainable Ranges Initiative (SRI), which focuses on the sustainability of military testing and training ranges. The REPI program falls directly under SRI. This section briefly describes SRI and REPI. Other OSD programs and activities also help to support SRI's and REPI's activities to address encroachment. The main ones are discussed next. Finally, this section provides an overview of Service activities to address encroachment and how the Services implement conservation buffering using REPI funds and the authority of 10 USC §2684a.

OSD's Sustainable Ranges Initiative

Since quality testing and training ranges are critical to military readiness, DoD created SRI. As further described in its annual Sustainable Ranges Reports to Congress,¹ DoD has developed a comprehensive plan as part of its evolving SRI to ensure the sustainability of military ranges and installations and to protect the environment while concurrently assuring the availability of resources for Service-specific as well as joint training and testing.

The overarching policy for this initiative is set out in DoD Directive 3200.15, *Sustainment of Ranges and Operating Areas*, signed in January 2003. SRI's overall goal is to "manage and operate ranges and OPAREAs [Operating Areas] to support their long-term viability and utility to meet the national defense mission." This multilevel initiative includes policy, programming, outreach, legislative clarification, and a suite of internal changes to foster range sustainment and address encroachment challenges. SRI requires that DoD components identify concerns about encroachment on ranges and Operating Areas, environmental considerations, financial obligations, and safety factors that may influence current or future range activities and uses.

¹ See Office of the Secretary of Defense (2006c).

The main program under SRI that focuses on addressing encroachment problems is REPI, which helps ranges and installations work with communities and other stakeholders to develop compatible land use strategies and to preserve open space near installations. REPI is discussed in more depth below.

Other SRI activities also help support REPI and its efforts to assess and address encroachment. A main focus of SRI is partnerships and stakeholder outreach, which improves stakeholder understanding of readiness needs; addresses the concerns of state, local, and tribal governments and surrounding communities; works with NGOs on areas of common interest; and involves groups outside DoD to reach common goals. An example of a partnership project is the Southeast Regional Partnership for Planning and Sustainability (SERPPAS). SERPPAS is a pilot effort to develop a working regional partnership among DoD, Florida, Georgia, Alabama, South Carolina, North Carolina, and other stakeholders. Their agreed upon mission is “To seize opportunities and solve problems in value-adding ways that provide mutual and multiple benefits to the partners, and sustain the mission and secure the future for all the partners, the region, and the nation.”² This partnership has been using Geographic Information System (GIS)³ data to strategically identify conservation corridors, installation buffering areas, and other open space areas to help develop land and conservation protection across the four states.

Another main activity under SRI is the sustainable ranges inventory, which provides DoD-wide quantifiable GIS-based data about the extent and health of the ranges. Such information is used to help assess training space supply, capabilities, and potential encroachment concerns.

SRI’s activities, including REPI, also take advantage of other OSD programs, such as the Strategic Environmental Research and Development Program (SERDP) and the OSD Legacy Resource Management Program. SERDP is DoD’s environmental science and technology research and development program for addressing environmental problems. The development and application of innovative environmental technologies and science research support the long-term sustainability of DoD’s training and testing ranges, including activities that help address encroachment concerns, such as installation ecosystem management research.⁴ The OSD Legacy Resource Management Program works to protect, enhance, and conserve natural and cultural resources on DoD lands through stewardship, leadership, and partnership. The program funds projects at universities and other organizations that involve regional ecosystem management initiatives, habitat preservation efforts, archaeological investigations, invasive species control, Native American consultations, or monitoring and predicting the migratory patterns of birds and animals. The program helps fund ecosystem and natural resource management initiatives in broad regional areas, such as projects supporting the Sonoran Ecosystem Management Initiative, the Gulf Coast Plain Ecosystem Partnership, the Great Basin Initiative, and the Chesapeake Bay Program.⁵

² Southeast Regional Partnership for Planning and Sustainability, meeting summary, January 11–12, 2006.

³ GIS is a class of software for managing, storing, manipulating, analyzing, visualizing, and using digital geospatial data.

⁴ For more information, see “SERDP: Strategic Environmental Research and Development Program” (n.d.).

⁵ For more information, see “Legacy Resource Management Program” (n.d.).

Three other main OSD and DoD-wide programs that also help support efforts to address encroachment concerns are discussed below after the overview of REPI.

OSD's Readiness and Environmental Protection Initiative

REPI provides funding to the Services for implementing compatible land use partnering projects that relieve encroachment pressures on training, testing, and support operations at military ranges and installations within the United States, its territories, possessions, and coastal waters.

The program objective is to protect military training and testing operations and readiness through strong Service partnerships with nonfederal organizations that share an interest in preserving and protecting land not under military control where incompatible development or loss of natural habitat does or could affect operations and readiness. Such organizations include state and local governments, and land and conservation NGOs. Program funding will support Service partnering agreements that, as authorized by 10 USC §2684a, seek to accomplish the following:

1. limit any development or use of property that would be incompatible with the mission of the installation or
2. preserve off-base habitat to relieve current or avoid future environmental restrictions on military operations.⁶

The purpose of REPI is to provide a framework for, and assist in, allocating funding to Service projects that meet the requirements and objectives of the authority of 10 USC §2684a. The framework is designed to provide an appropriate and constructive level of management, oversight, and coordination over such funding decisions and their implementation. It also provides a basis for OSD, the Joint Staff, and Joint Forces Command to encourage and support conservation buffer projects that promote joint readiness activities and protect against encroachment in areas not specifically within the responsibility of a single Service. At the same time, OSD has supported the Services developing their own approaches to conservation buffering that best meet their individual missions. It further encourages the sharing of lessons learned among the Services, with consideration for the different approaches taken by each Service.⁷

REPI provides funding for individual installations to implement buffering projects that meet these objectives. Buffering projects cost-share the acquisition of land or easements to support testing and training operations. OSD started funding projects in 2004. In three years, OSD has provided over \$40 million to installation projects and partners have contributed over \$86 million for these projects.⁸ REPI-funded projects have been implemented at 24 different installations. Table 3.1 lists installations that have had REPI projects and which years they had active projects.

⁶ Note that the authority to enter into agreements under 10 USC §2684a, although designed primarily for the protection of land, also extends to agreements that support the protection of water rights when necessary to protect an installation's mission. Thus, references made to land should be assumed to apply to water rights as well.

⁷ Office of the Secretary of Defense (2006e). So far, this OSD guide mostly provides information about how to submit REPI proposals and criteria used for selecting proposals, not details about how to implement the program.

⁸ Data are current as of January 2007 (Office of the Secretary of Defense, 2007).

Table 3.1
Installations with REPI-Funded Projects During 2004–2006

Component	Installation Name	State	2004 Project	2005 Project	2006 Project
Air Force	Eglin AFB ^a	Florida	Yes	No	No
Army	Aberdeen Test Center	Maryland	No	No	Yes
	Camp Blanding	Florida	Yes	No	Yes
	Camp Ripley	Minnesota	No	Yes	Yes
	Camp San Luis Obispo	California	No	No	Yes
	Fort A.P. Hill	Virginia	No	No	Yes
	Fort Benning	Georgia	No	No	Yes
	Fort Bragg	North Carolina	No	No	Yes
	Fort Campbell	Kentucky	No	No	Yes
	Fort Carson	Colorado	No	Yes	Yes
	Fort Custer	Michigan	No	No	Yes
	Fort Hood	Texas	No	No	Yes
	Fort Lewis	Washington	No	No	Yes
	Fort Riley	Kansas	No	No	Yes
	Fort Sill	Oklahoma	No	No	Yes
	Fort Stewart	Georgia	No	No	Yes
	USAG Hawaii	Hawaii	No	Yes	Yes
Navy	La Posta Mountain Training Warfare Range	California	No	Yes	No
	NAS Fallon	Nevada	No	No	Yes
	NAS Whiting Field	Florida	No	No	Yes
	Outlying Landing Field Whitehouse	Florida	No	Yes	No
USMC	MCAS Beaufort	South Carolina	No	Yes	Yes
	Marine Corps Base Camp Lejeune	North Carolina	No	Yes	No
	MCB Camp Pendleton	California	No	No	Yes

SOURCE: Data courtesy of REPI staff, March 2007.

^a Technically, the Eglin AFB project used OSD funding rather than REPI-appropriated funds. However, REPI staff and management actively supported and helped to ensure that this project was completed, so it counts as a REPI-supported project.

Several other installations, such as NAS Pensacola, Florida, used the 10 USC §2684a authority using Service funds rather than REPI funds. In addition, as will be illustrated by the case study discussions, some of these installations had buffering projects in other years that received Service funds or partner funds but not REPI funds.

Installation and Service requests for buffering projects and REPI funds are increasing. For FY 2007, REPI received 54 project submissions from the Services at 40 different installations. The total funds requested amounted to \$156.8 million. For FY 2007, REPI had less than \$40 million to allocate to these potential buffering projects.

Buffering projects often involve purchasing a restrictive easement or a conservation easement. Projects may also involve the partner purchasing the property fee simple.⁹ A restrictive easement is a condition placed on land by its owner or by government that in some way limits its use, usually regarding the types of structures that may be built there or what may be done with the ground itself. Restrictive easements to prevent encroachment often restrict the construction of buildings; subdividing land; building cell towers, antennas, and other tall structures (such as structures more than 120 feet high)¹⁰; using floodlights and searchlights; and restricting other activities that may interfere with military testing and training operations. With the REPI program, such restrictive easements are voluntary ones where the landowners choose to sell the development rights of their property.

A conservation easement is a deed restriction landowners voluntarily place on their property to protect resources, such as productive agricultural land, ground and surface water, wildlife habitat, historic sites or scenic views. They are usually by landowners (“grantors”) to authorize a qualified conservation organization or public agency (“grantee”) to monitor and enforce the restrictions set forth in the agreement. Conservation easements are flexible documents tailored to each property and the needs of individual landowners. They may cover an entire parcel or portions of a property. The landowner usually works with the prospective grantee to decide which activities should be limited, to protect specific resources.¹¹

Conservation easements to prevent encroachment often restrict the same activities as restrictive easements do; in addition, they contain special provisions for protecting conservation values, such as not allowing the following: activities that risk causing significant water pollution or soil erosion; oil, gas, or mineral extraction; building of new roads; and timber harvesting or agricultural operations in sensitive areas containing federally or state protected species. They may also include management responsibilities to maintain the land or habitat or restore it to a particular condition to support conservation purposes. Conservation easements often have tax benefits: There is a federal tax incentive for conservation easement donations and some states, such as Colorado, provide additional tax benefits for conservation easements. The federal tax incentive was expanded for 2007, which gives an extra incentive for landowners to complete conservation easement donations in 2007.

Other DoD-Wide Programs and Activities That Help Address Encroachment

A number of OSD and other DoD-wide activities can potentially help address encroachment concerns. The three main DoD-wide programs are the Air Installation Compatible Use Zones (AICUZ) program, the Integrated Natural Resources Management Plan (INRMP), and the Joint Land Use Study (JLUS) program. The AICUZ program represents the military’s first major response to encroachment effects on military installations and the recognition of the need to engage communities in cooperative land use planning. INRMPs represent a conceptual framework and a tool for military installations to integrate their conservation responsibilities with military operational requirements. The JLUS program provides an analysis and col-

⁹ Fee simple means absolute ownership of the land which is free from other claims against the title.

¹⁰ The choice of height restriction is included and set to protect approaches to and departures from airfields.

¹¹ American Farmland Trust (1998).

laboration process for communities and military installations to work jointly to ensure future compatible development around the installations. Details for each follow.

Air Installation Compatible Use Zones Program. DoD created the AICUZ program in 1973 to balance the need for aircraft operations and community concerns over aircraft noise and accident potential. The program is designed to protect the public's health, safety, and welfare and to prevent civilian encroachment from degrading the operational capacity of military air installations. The AICUZ program recommends community land uses that are compatible with noise levels, accident potential, and flight clearance requirements associated with military airfield operations. It is an important tool for addressing encroachment.

Air installations conduct an AICUZ study to analyze and quantify aircraft noise and accident potential, land use compatibility, operational alternatives, noise reduction strategies, and potential solutions to existing and potential incompatible land use problems. If operations change significantly at an installation, such as different aircraft and low-level flight patterns, an updated AICUZ study is conducted.

In the AICUZ study, the installation identifies noise zones, the clear zone, and Accident Potential Zones (APZs). The clear zone is the area immediately beyond the end of a runway where the potential for accidents is highest. There are two types of APZs. APZ-I lies beyond the clear zone and has a significant potential for accidents so that compatible land uses typically exclude residential and commercial developments. APZ-II is an area beyond APZ-I with a measurable potential for accidents but here a wider range of compatible land uses is generally permitted.

An installation uses the AICUZ study to evaluate existing land uses, identify potential conflicts between growth and military flight operations, and recommend compatible growth patterns. Using AICUZ information, installations and the Services also encourage local governments to manage growth and develop in a manner compatible with existing and future military installation flight operations. For example, local governments include AICUZ study zones in their comprehensive plans and enact and enforce zoning to restrict incompatible development in those zones.

Integrated Natural Resources Management Plan. The Sikes Act requires that the Secretary of Defense carry out a program to provide for the conservation and rehabilitation of natural resources on lands used for military mission activities.¹² The result is an Integrated Natural Resources Management Plan that DoD requires every military installation—except those lacking significant natural resources—to prepare and implement.¹³ INRMPs must outline management strategies for natural resources and endangered species management; identify timeframes; and set priorities for natural resource protection, improvement, and restoration. Installations use INRMPs to help identify, manage, and prioritize activities to conserve natural resources, fish, and wildlife and to help plan and manage forestry, outdoor recreation, and other land use activities. Such activities can help address environmental encroachment. For example, an INRMP helps an installation identify current federally and state protected species

¹² For more on the Sikes Act, see U.S. Fish and Wildlife Service (n.d.).

¹³ Generally, an INRMP is required if an installation undertakes more than one of these activities: (1) fish and wildlife management, (2) land management, (3) forest management, and (4) natural-resources-based outdoor recreation; or any of these activities: (1) threatened and endangered species management, (2) commercial forestry activities, and (3) hunting and fishing management.

issues. Ecosystem management and T&ES habitat protection and enhancement are often parts of INRMPs that help address biodiversity loss and T&ES encroachment concerns.

Amendments to the Sikes Act require that INRMPs be developed with state and federal agency input, review, and approval and also in cooperation with the U.S. Fish and Wildlife Service and the fish and wildlife agency of the state in which the military installation is located. The public must also have an opportunity to comment on an installation INRMP. In 2002, DoD issued a memo to emphasize coordination with stakeholders, to improve the efficiency of the review process, and to increase the ties between natural resources and military readiness in the preparation and implementation of INRMPs.¹⁴ Given this emphasis, an INRMP can help give an installation an opportunity to collaborate with outside organizations on environmental concerns, such as conservation buffering to help preserve T&ES habitat. DoD is also starting efforts to integrate INRMPs with the State Wildlife Conservation Strategies.

The Joint Land Use Study Program. The JLUS program is a cooperative land use planning effort designed to promote development that is compatible with the training and operational missions of military installations, while simultaneously protecting public health, safety, and welfare. JLUS, managed by the DoD Office of Economic Adjustment, was initiated in 1985. The JLUS program provides technical and financial assistance to state and local governments that participate in the program.¹⁵

The JLUS process has two basic steps. The first is the completion of a JLUS study to identify compatible land use and growth management guidelines and recommendations, which may include the military choosing to make changes to military operations. This study is a collaboration of relevant local governments and the installation. The second step implements the JLUS recommendations; this implementation places the responsibility for developing and enacting specific land use regulations and land management programs on local governments. This may involve revisions to a community's comprehensive plan and traditional land use and development controls, e.g., notification, zoning, subdivision regulations, structural height restrictions, and the promotion of planned unit development concepts. Other actions may include amending local building codes to require increased sound attenuation in existing and new buildings, land exchanges, transfer of development rights, and real estate disclosure requirements.

Between 1985 and 2005, the JLUS program was implemented at 43 military installations involving all four Services.¹⁶ However, local governments do not always follow through on JLUS recommendations as will be discussed below.

Service Programs to Address Encroachment

Each Service has developed its own programs and activities in response to encroachment. Service responses build on the DoD-wide programs described above, including Service-funded conservation buffering projects that use the authority of 10 USC §2684a and projects that receive REPI funds. To receive REPI installation buffering funds, each Service submits annual proposals to REPI. These submissions originate at the installations. Each Service reviews its installation submissions and then chooses a set of proposals to submit to OSD in response to

¹⁴ See Office of the Secretary of Defense (2006c, Chapter 4, p. 17).

¹⁵ Grants are made under 10 USC §2391. See Department of Defense, Office of Economic Adjustment (2004, p. 2).

¹⁶ See Department of Defense, Office of Economic Adjustment (2004, p. 2). This number has increased since 2004; see Department of Defense, Office of Economic Adjustment (2006).

the REPI request memo from the Assistant Deputy Under Secretary of Defense (Environment, Safety and Occupational Health) (ADUSD (ESOH)) to the Services requesting REPI submissions.

Each Service's main encroachment activities and approach to conservation buffering is briefly described below. Readers familiar with these activities may choose to skip this section or selected subsections unless they want more information.

U.S. Air Force. The USAF does not have a formal program for projects using the authority in 10 USC §2684a. Instead of building an entire program, the Air Force considers the authority granted in 10 USC §2684a as another tool in its encroachment tool box. REPI provides an opportunity to use this authority when installations could not otherwise afford to pursue these projects. The Air Force's primary tool for its installations is the AICUZ program, the Air Force's Sustainable Range Program, the Natural Infrastructure Management (NIM) program, and the Interagency and Intergovernmental Coordination for Environmental Planning (IICEP).

Until FY 2007, the USAF relied mainly on the AICUZ program to address encroachment concerns. Major commands and installation civil engineers are required to prepare, release, and maintain AICUZ studies for each installation and auxiliary airfield with active runways.

Analyses and recommendations from AICUZ studies support the Air Force in JLUS processes involving local communities and other stakeholders to promote compatible development through comprehensive land use planning in the community and the purchase of real property interest in fee or appropriate restrictive easements by the Air Force.

The AICUZ policy requires that installations acquire, through fee or an appropriate restrictive easement, all real property interests within the designated clear zones when it is necessary to prevent incompatible land use or to prohibit uses generating incompatibility in the clear zone.

The Air Force has also developed a Sustainable Range Program that also helps to address encroachment issues. Relevant activities in this program include identifying and quantifying the resources needed to perform Air Force and joint training missions and the readiness impairments resulting from encroachment; instituting routine discussions with other federal agencies to develop regulatory and administrative improvements that address encroachment issues; and communicating with states, tribes, local governments, and other interested organizations regarding how the unintended consequences of resource management programs can impair military readiness.

More recently, the Air Force began to assess the availability of its natural infrastructure needed to train and perform its missions using an NIM activity called the Natural Infrastructure Assessment (NIA). The NIA quantifies air, water, and land resource requirements and availability in the areas of airspace, air emissions, water supply, water discharge, surface land and sea space, energy, and frequency spectrum. The loss of these assets is quantified and subtracted from the total resource baseline to determine the remaining amount available. The resource availability is then compared to the amount required, and the resulting resource deficiency or opportunity is measured. With this tool, the Air Force can incorporate the issues of urban encroachment, infrastructure limits, and other operating constraints into an assessment process to quantify the ability of land, air, and water infrastructure to support mission needs on a range or installation.

The Air Force developed the IICEP to foster more effective coordination in environmental planning among federal agencies and between the federal government and local citizens.

Air Force installations face a number of concerns including airfield encroachment, noise, air-space demand, preventive and remedial hazardous waste actions, air and water pollution, solid waste disposal, environmental and economic effects in nearby communities, natural resources, historic preservation, and transportation and land use conflicts. The IICEP process helps Air Force installations work on these issues in collaboration with regional, state, and local government agencies in addition to other federal agencies.¹⁷

Although existing Air Force programs and tools have been effective, they do have limitations. When necessary, the Air Force uses other strategies, such as land swaps with other federal agencies, acquisition of easements, etc. In 2007, the Air Force began to submit projects for REPI funding. For FY2007 funds, the Air Force submitted 13 project requests to REPI for 12 installations, including Edwards AFB, California, and Warren Grove Gunnery Range, New Jersey. However, until recently it had relied almost exclusively on these other programs, using REPI or OSD funds at only one installation, Eglin AFB.

U.S. Army. The Army Compatible Use Buffer (ACUB) program is the Army's implementation of the 10 USC §2684a buffering authority. The Army also uses JLUS, implements environmental management activities, and has a sustainable ranges program to help address encroachment problems. ACUB was introduced in 2003 after the adoption of 10 USC §2684a to support the Army's mission in training and testing.

The overall goal of the ACUB program is to support an installation's testing and training mission. Using cooperative partnerships, the partner purchases land or interest in the land or water rights from willing sellers to buffer areas around installations to maintain current land uses or protect habitat. These buffers help limit the effects of encroachment and maximize the land resources that support the installation's mission. In addition to creating these buffers, the Army ACUB creates partnerships between the Army and state, regional, and local governments and conservation organizations.

Buffer areas are established around Army installations to limit the effects of encroachment by preventing commercial and residential activities along installation boundaries and by maximizing use of land inside the installation to support training and testing needs. In addition, ACUB activities support the Army's effort to comply with all federal environmental regulations, such as the Endangered Species Act, and to prevent future threatened and endangered species listings, which could further restrict training and testing missions.

Another major feature of the ACUB program is its emphasis on using partnerships with government and private organizations to establish buffers around active training and testing areas. An eligible partner is a state or local government or private organization whose purpose is conservation of land or natural resources. This includes land trust organizations, state agencies, nongovernmental organizations, and the private sector. Through these partnerships, the Army aims to promote habitat conservation planning at the ecosystem level, support local and regional planning and sustainability efforts, and leverage public and private funds toward common goals.

The Department of the Army uses a cooperative agreement approach to provide funds to conservation organizations and other partners to acquire off-post real estate interests. The Army's approach has its origins in the Sikes Act (16 USC §670a–§670f, as amended), which authorizes military departments to enter into natural resources cooperative agreements with

¹⁷ For more details on IICEP, see U.S. Air Force (1988).

nonfederal entities to protect and enhance wildlife habitat on or in the vicinity of a military installation.

This cooperative agreement approach provides several advantages for ACUB. First, it enables the Army to deposit annual operations and maintenance (O&M) funds into an account that the Army's conservation partners can use for the duration of the cooperative agreement to acquire pre-identified real estate interests. Funds can accumulate in the account until they reach the amount needed to acquire a parcel. Second, the account enables the Army's conservation partners to shift their focus quickly from acquiring one parcel to acquiring another if negotiations failed for the first parcel. Third, the multiyear nature of the account reduces pressure on the Army and its partners to acquire a parcel before the end of the current fiscal year.

The cooperative agreement approach is particularly useful for large, multiparcel, multi-year base buffering projects where the Army and its conservation partners desire flexibility in the timing and phasing of their individual parcel acquisitions. Under this approach, Army's conservation partners have the primary responsibility for appraising, negotiating, purchasing, and managing the parcels they acquire and for enforcing the terms of the conservation easements they obtain from landowners. The cooperative agreements include transfer limitations and requirements on the Army's conservation partners to ensure that the property will continue to be used for purposes compatible with Army needs if it is conveyed to another entity.

The Army usually does not participate in the appraisal of real estate interests or negotiate with landowners, nor does it have a primary role in enforcing the terms of easements acquired by its partners. Cooperative agreements typically include a "contingent right" by the Army to enforce easement terms and to prevent transfers of land to uses that are incompatible with military requirements. This contingent right fulfills the requirement of 10 USC §2684a that conservation partners grant all or a portion of the real estate interests they acquire under this authority to the secretary of a military department, on request, and protect the interests of the United States.

Because ACUB was started immediately after the 10 USC §2684a authority was passed and because the Army had initiated a Private Lands Initiative under authority of the Sikes Act in the 1990s, the Army has the longest history of pursuing and using REPI funds for buffering projects. Since 2003, 17 Army installations have used REPI funds and other installation projects have used the authority with Army funds.

The Army also has other programs that help support these conservation buffering activities, including INRMP, JLUS, the Army Sustainable Range Program, and installation sustainability plans.

The Army Sustainable Range Program (SRP)¹⁸ is the Army's overall approach for improving the way it designs, manages, and uses its ranges to ensure long-term sustainability. SRP helps the Army more effectively monitor, assess, use, and manage ranges to ensure that they will be realistic and operational over the long term by developing tools and practices to help with range management. An example of a tool is the Encroachment Condition Module (ECM). ECM, which is being developed by the Army Environmental Command (AEC), is a GIS-based system used to measure the effects of encroachment on Army training. ECM is designed to track the effect on training of various encroachment factors, including T&ES, critical habitat, and wetlands, by time and specific location. The tool tracks a range of restrictions on activities

¹⁸ For more information on the Army SRP, see U.S. Army Headquarters (2005).

including digging, training, bivouacking, live fire, heavy maneuver, light maneuver, smoke, pyrotechnics, dismount, and flyover. To ensure the accessibility and availability of Army ranges and training land, SRP activities are integrated with the facilities management, environmental management, munitions management, and safety program functions supporting the doctrinal capability. SRP activities and tools help the Army assess encroachment concerns and identify training land requirements and potential buffering needs.¹⁹

An installation sustainability plan is a strategic planning process for individual installations that focuses on creating sustainable, enduring installations by addressing mission, community, and environmental issues. The plan can involve working with local communities on growth management and ecosystem concerns. Such plans are being developed at about 20 Army installations, including Fort Bragg, Fort Carson, Fort Lewis, and Fort Stewart. Installation sustainability plans help to reinforce ACUB buffering activities and vice versa.

U.S. Navy. The Navy uses the AICUZ program to work with local governments to enact compatible land use zoning to help address encroachment. The Navy also has the Navy's Encroachment Management Program as an adjunct to the AICUZ program. The Encroachment Management Program is an overarching program that includes development of Encroachment Action Plans (EAPs) as the blueprint for the Regional and Installation Commanding Officers to evaluate potential encroachment challenges. Chief of Naval Operations (OPNAV) Instruction 11010.40 spells out the details of the Navy's encroachment program.²⁰

The EAP is a strategic and comprehensive document that identifies and quantifies encroachment challenges to an installation, ranges, airspace, and training areas. It also assesses the effectiveness of current response actions and delineates short-, mid-, and long-term strategies to address or prevent the identified encroachment effects. The EAP, thus, is the key planning document for an installation's activities to address encroachment. EAPs are primarily internal Navy documents albeit parts may be shared with the local community. One potential outcome of an EAP is the recommendation to acquire land. The reason for the internal focus concerns any recommendations for potential land acquisition under Military Construction (MILCON) or via Encroachment Partnering (2684a) and the risk of artificially inflating real estate prices.

Each Navy Range Complex also develops a Range Complex Management Plan (RCMP) that details its current ability to meet mission requirements. Analyses help to determine whether training currently available is at low, medium, or high risk of encroachment. Mission Component Commands, in turn, are responsible for identifying operational, training, and test requirements and the potential effects of encroachment on readiness. The RCMP then supports the development of an installation EAP.

The EAP also may include Encroachment Partnering (EP) initiatives. Launched in January 2003, EP implements the acquisition authority laid out in 10 USC §2684a by allowing the Navy to partner with local and state agencies and private conservation organizations to acquire a recordable interest in a property to limit development to specific compatible uses or densities. EP proposals must demonstrate the need in terms of military operations, existence of partners, and contribution amount from both partners and DoD.

¹⁹ For more information on SRP, see U.S. Army (n.d.b).

²⁰ See U.S. Navy (2007). In February 2007, the final version of this instruction was awaiting Chief of Naval Operations (CNO) (N4) signature.

In the allocation of Navy funds for EP proposals coming from across the country, the Navy requires the establishment of a consolidated integrated priority list based on encroachment challenges identified by installations, ranges, Navy regions, and Mission Component Commands in the EAPs. In addition, Navy Regional Commanders are responsible for executing the Encroachment Management program within their region, and for coordinating with other Services in addressing encroachment.

The Navy uses a real-estate-based process for executing Navy EP activities. This approach reflects the Navy's 25-year history of undertaking fee-simple land acquisitions and restrictive easements to support the AICUZ program. The Navy's EP program is executed by the real estate staff once planners have thoroughly investigated the encroachment potentials at the installation or range and Operating Areas and have worked through a detailed strategic plan to address the encroachment challenges. The team implementing the EAP also includes natural resource and environmental planners, so natural resource and environmental issues are considered in EAPs when necessary.

Similar to the AICUZ program, the terms of the Navy's Encroachment Partnering easements are individually tailored to the specific operational requirements of the installations they support. Easements for air installations, for example, may include prohibitions against tall antennas or light sources that could interfere with landing patterns or night flight training. Easements for ground installations may include restrictions on residential development that could otherwise lead to noise complaints about live-fire combat training.

Unlike the Army's cooperative agreement approach, the Navy's real estate approach keeps with the Navy much of the responsibility to develop and execute easement deals, including appraising the property and monitoring and enforcing the easements. However, the Navy usually relies on the partner to approach the landowner and negotiate the deals.

Encroachment Partnering easements give the Navy the explicit right to enforce its terms against the landowner. If its EP partner acquires fee title to the property, the Navy will obtain a restrictive easement from the partner to ensure the use restrictions and enforcement rights that the Navy desires. If the partner acquires only a restrictive easement, the Navy will define its role in advance for enforcing these restrictions. In addition, the Navy usually expects its partners to provide 50 percent or more of the total project costs, which include title searches, appraisals, and the real estate acquisition costs. Although the goal of the Navy's EP program is a 50-50 cost-sharing, it is not a program requirement. The Navy evaluates each potential EP project on its own merits; however, the Navy's interpretation of the legal requirements means that it cannot pay more than the fair market value of the interest it receives.

Navy Encroachment Partnering projects are linked to specific parcels of land identified in the installation EAP. These individual projects are ranked and funded in priority order and are approved by the Navy Secretariat. This process allows the Navy to evaluate the site-specific value of each EP project and its strategic contribution to encroachment control at the installation and to the Service as a whole. The Navy EP project analysis focuses primarily on preventing incompatible land use, rather than on natural resource benefits. Therefore, the Navy usually uses restrictive easements instead of conservation easements.

Because O&M funds expire annually, the Navy must screen and monitor each EP project to ensure that it can be completed within the fiscal year that is funded. EP funds can be shifted from one Navy project to another, if a selected project cannot be executed within the fiscal year. The Navy works closely with its EP partners to encourage the use of purchase options and other agreements to ensure that property interests can be acquired within their projected cost

estimates and timeframes. In late 2006, the Navy added a new tool, the multiyear agreement, which allows funds to be obligated in one year and expensed over the life of the agreement.

In addition, the Navy also develops Range Air Installations Compatible Use Zones (RAICUZs)—an extension of AICUZ—for air-to-ground ranges to determine current and proposed range use, restricted airspace, range safety zones including weapons impact areas, aircraft noise, land use compatibility, risk areas, and mitigation alternatives for air-to-ground ordnance activities at ranges. RAICUZ, like AICUZ, results in land use recommendations to support collaborative planning efforts with state, local, regional, and tribal governments.

U.S. Marine Corps. Because of the authority granted in 10 USC §2684a and the USMC encroachment policy,²¹ the Marine Corps established an EP program.

The Encroachment Control Plan (ECP) is the primary tool used by USMC installations to address encroachment concerns within the EP program. The ECP has two major parts; the first is an analysis of the current and future encroachment threats at an installation and the second part is an action plan that includes strategies and actions that the installation can use to guide its decisionmaking with regards to encroachment pressures and working with local communities.

A major focus of the EP process is education and outreach to the local community. These outreach efforts include information briefings to installation and community employees; interviews with decisionmakers in the local communities; an analysis of the economic, social, and political trends near the installation; an analysis of environmental issues and effects on training; and a review of available tools. In addition, the Marine Corps enters into agreements with state and local agencies and private environmental organizations by participating in conservation forums led by state or NGOs. Through these forums, the Marine Corps and its partners can identify mutually agreeable criteria for land acquisition and land available for acquisition, develop a real estate process that meets all participants' legal requirements for property acquisition, and bring together interested members of the forum to conclude real estate transactions.

The USMC also has a well-defined installation personnel structure for implementing installation EP outreach and other activities. Installation commanders serve as the primary advocates for encroachment projects with their staffs, the local community, and their superiors at USMC headquarters. Many installations also have a full-time Community Planning and Liaison Officer (CP&LO) who spends a large percentage of time on EP activities. The CP&LO represents the installation in discussions with elected officials and the professional staff of local governments, with landowners and developers, and with EP partners. At installations with an active EP program, the CP&LO also spends a large amount of time developing and implementing specific EP projects.²²

As with the Navy, the Marine Corps uses a real-estate-based approach to EP, which means that the USMC usually keeps many of the responsibilities having to do with developing and executing easement deals, including conducting the appraisal process and monitoring and enforcing the easements. The partner negotiates deals with the landowners. USMC installations usually acquire land through fee-simple acquisitions and restrictive easements with partners that support the Marine Corps mission and training requirements. Restrictive easements are designed to limit incompatible land use development. In the event that the USMC instal-

²¹ The Marine Corps policy on encroachment is outlined in U.S. Marine Corps (n.d.).

²² For more information, see U.S. Marine Corps (2006).

lation mission need requires that it obtain a conservation easement, it would, and the USMC would have the partner manage the easement through a separate agreement.

Marine Corps EP projects are linked to specific parcels of land identified in the installation encroachment control plan. The review process includes discussion with potential partners. As with the Navy, the Marine Corps generally limits its financial involvement to less than 50 percent of the total project costs. The USMC objective is to pursue 50-50 deals; however, USMC headquarters will consider putting in more or less money, depending on the particulars of the individual project and limited to the fair market value of the interest being acquired by the U.S. government.

As with the Navy, annually expiring O&M funds require that the Marine Corps monitor and review potential EP projects during the fiscal year. Although funds can be shifted between projects, the project receiving the funding must be executable within the fiscal year. The Marine Corps works closely with its EP partners to ensure that approved projects will be completed before the end of the fiscal year. In late 2006, the USMC, like the Navy, added a new tool, the multiyear agreement, which allows funds to be obligated in one year and expensed over the life of the agreement. The use of this instrument will depend on the ability to work with the partner with a portfolio of projects that have a high probability of being executed.

The Marine Corps, like the Navy, also develops RAICUZ and RCMPs to provide detailed analyses of each range's current ability to meet mission requirements and to support the development of ECPs that, like the Navy's EAPs, provide a roadmap for action.

Other Organizations' Activities to Address the Fundamental Causes of Encroachment

Rapid land development and declining biodiversity are also major concerns for communities and the nation. Many nonmilitary organizations are working to address the fundamental causes of encroachment because of current and potential future problems associated with them. This section briefly discusses some of the main activities that are most relevant to DoD's conservation buffering activities. However, first, why these communities and other organizations are so concerned about these issues is briefly discussed, to help explain their motivations and interests in addressing them.

Suburban sprawl and rural sprawl have significant societal costs.²³ These costs include the environmental ones, as discussed above, and other financial and social costs. The costs of sprawl include more traffic congestion, deteriorating roads, loss of agricultural lands and open space, and more expensive and declining public services, including schools, fire, police, ambulance, water, transportation, and utility infrastructure. Each year, the United States loses two million acres of farms, forests, and open spaces.²⁴ Police cars, ambulances, fire trucks, and school buses have to travel longer distances to serve fewer people, increasing the costs of providing such services. Schools become overcrowded. Extending water and sewer systems over such long distances is expensive and rarely paid for by the new development. Suburban and rural sprawl often has a relatively slow growth in the tax base compared with the growth in public spend-

²³ For good discussions of the costs of sprawl, see Burchell and Mukherji (2003), Ewing, Pendall, and Chen (2002), and Sierra Club (2000).

²⁴ Land Trust Alliance (2006).

ing needs, resulting in the need for higher taxes to achieve the same quality of service. Some research has shown that human health is affected by sprawl, for example, by contributing to chronic health problems.²⁵ All of these issues have made addressing sprawl a concern for state and local governments, environmental groups, university scientists, and federal agencies, such as the U.S. Environmental Protection Agency (EPA).

As briefly discussed above, and in more detail in Appendix A, declining biodiversity concerns scientists, communities, and the nation because of its economic, environmental, genetic, and aesthetic importance.

Given all these concerns, many organizations, including NGOs, state and local governments, federal agencies, and universities are working in different ways to help address sprawl and declining biodiversity throughout the United States. The rest of this section provides a brief overview of some of these activities because of their relevance to DoD in addressing installation encroachment. These organizations and their activities offer many different partnership opportunities for the military. Military installations need the help of these groups, and even private sector activities, to address the fundamental causes of encroachment—sprawl and the loss of biodiversity.

Land Trusts, Environmental Groups, and Other NGOs

Land trusts, environmental groups, and other NGOs are working actively to help address sprawl and the loss of biodiversity.

A land trust is “a nonprofit organization that, as all or part of its mission, actively works to conserve land by undertaking or assisting direct land transactions—primarily the purchase or acceptance of donations of land or conservation easements.”²⁶ As noted in this definition, land trusts also purchase lands directly and may donate such lands to federal, state, or local governments to manage for conservation purposes, such as parklands. There are numerous national, regional, and local land trusts because these conservation easement and land acquisition approaches have become so popular in helping address sprawl problems. In 2005, according to the Land Trust Alliance (LTA),²⁷ there were 1,667 land trusts in operation in the United States, a 32 percent increase from 2000. These organizations have had some impressive results. Total acres conserved by U.S. land trusts increased 54 percent to 37 million acres from 2000 to 2005.²⁸ National land trust examples are The Trust for Public Land (TPL), American Farmland Trust, The Conservation Fund, and The Nature Conservancy (TNC).

Land and environmental advocacy groups lobby, protest, educate, and litigate in favor of setting aside parks and wilderness areas and protecting species and habitat and against rezoning farmland for high-density residential development and cutting old-growth forests. For example, the Wilderness Society lobbies to protect land for wilderness and to preserve more wilderness areas on BLM, FS, and other federal lands, and the Sierra Club works to educate

²⁵ Examples of these chronic health problems include emphysema, migraines, and arthritis (Sturm and Cohen, 2004, pp. 494–495). See this article for a good discussion of research about the relationship between sprawl and human health.

²⁶ Land Trust Alliance (2001).

²⁷ Founded in 1982 as a national alliance of land trust organizations, LTA provides resources and training to nonprofit land trusts in the United States. For more information, see the LTA web site. As of April 11, 2007, <http://www.lta.org/>.

²⁸ Land Trust Alliance (2006).

the public about the costs of sprawl²⁹ and lobbies to help protect species and habitat on Forest Service and other federal lands.

Other environmental groups, university scientists, and other organizations work to protect biodiversity by assessing, inventorying, and classifying species, biodiversity, and ecosystem processes. The Central Shortgrass Prairie Ecoregion is a primary example in which scientists from TNC, universities, and other organizations have partnered to conduct an ecoregional assessment. Their purpose has been to promote the long-term sustainability of all native species, plant communities, and ecosystems within the ecoregion through the collaborative design and conservation of a network of areas and implementation of species conservation guidelines. Such organizations have also worked with communities and military installations to help with ecosystem management and efforts to manage habitat for species of concern. For example, Auburn University and TNC have helped work on species and ecosystem management activities at Fort Benning, such as researching gopher tortoises and how to better manage the installation's long-leaf pine ecosystem.

State and Local Governments

State and local governments have taken a number of different approaches to address sprawl and to preserve federally and state protected species habitat at the regional and community level. Two that are most relevant for addressing encroachment concerns are growth management and land acquisition and preservation approaches. These are discussed below.

Many states, such as Maryland and Washington, and local governments are trying to develop smart growth or growth management plans. Growth management refers to a planning and administrative approach that focuses on supporting and coordinating the development process. The concept is oriented toward guiding community development rather than restricting growth. Most growth management plans of local, state, and regional governments are focused on accommodating development while maintaining communities' quality of life and economic base and preserving environmental qualities. A practical definition of growth management is "a dynamic process in which governments anticipate and seek to accommodate community development in ways that balance competing land use goals and coordinate local and regional interests."³⁰

In the United States, local governments generally have the most direct authority to implement growth management because of their ability to regulate local development.³¹ Local governments' four most basic planning tools used to manage growth are comprehensive plans, zoning ordinances, subdivision regulations, and capital improvement projects. However, many other innovative approaches are used to manage growth, including tax policies, administrative approaches, and review procedures. Specific examples of diverse approaches and techniques used for growth management include promotion of infill and redevelopment, development policy areas, urban growth boundaries, conservation planning/zoning, development of greenways, delineation of critical areas, agricultural land protection, water quality/erosion control regulations, adequate public facility requirements, transportation demand and congestion

²⁹ Sierra Club (2000).

³⁰ Porter (1997).

³¹ It is important to note that state and local laws and policies determine the degree of authority local governments have to implement growth management, and this differs from state to state and local government to local government.

management programs, design reviews, incentive and performance zoning, historic and architectural preservation, neighborhood conservation and revitalization of declining areas, landscape ordinances, economic development incentives, and affordable housing programs.³² An example of a local government growth management activity is the combined comprehensive plan of the town of Jackson and Teton County, Wyoming, which focuses on allowing private development while maintaining community character; preserving wildlife habitat, environmental quality, and scenic vistas; improving transportation; and providing affordable housing. The county tries to cluster residential development projects and preserve open spaces to help maintain rural character, so that agriculture and ranching can remain viable, and to help preserve natural habitats.³³

States also affect specific local jurisdiction development activities, most notably with comprehensive state growth management acts. At least nine states have enacted statutes that call for comprehensive statewide planning for growth management that place additional requirements on local government and private property development activities. These statutes focus on planning at state, regional, and local levels and on having consistency and coordination between the different government plans. Most of the states also direct regional and local governments to adopt growth management mechanisms that designate urban and rural areas to induce more compact development and to protect rural areas, that require more efficient infrastructure planning and financing for development, and that include special provisions to address large-scale development and protection of critical areas, such as wildlife habitat.³⁴ Maryland's Smart Growth legislation allows state agencies to direct Maryland's programs and funding to support locally designated growth areas and protect agricultural and natural resource areas. Most of Maryland's infrastructure funding and economic development, housing, and other state program funds are limited to "Smart Growth Areas"—areas designated for growth by local governments. In addition, other states have laws and activities that try to manage growth, especially in coastal areas, such as the California Coastal Commission, which reviews coastal development projects.

Some state and local governments also have ambitious land acquisition programs to purchase lands and conservation easements to preserve key natural and cultural areas, to protect T&ES habitat, for parks, and to create greenways. Florida is acquiring land through the Florida Forever land acquisition program, a 10-year, \$3 billion land conservation program established by the governor and the Florida legislature. A local example is the Beaufort County Rural and Critical Land Preservation (RCLP) program for acquiring land and conservation easements for conservation, parks, buffers, and scenic vistas. In 2000, voters approved \$40 million for this program, which has protected over 10,000 acres, and in November 2006, the voters passed a bond to supply this program with another \$50 million. Numerous state and local governments are funding such programs, often through bond initiatives. "In 2006 alone, 133 ballot initia-

³² See Porter (1997, pp. 43–53) for a good overview of growth management approaches and techniques and for a good reference about growth management issues.

³³ Teton County Planning Department (1999).

³⁴ Porter (1997); see especially pp. 243–260 for a good overview of these state growth management mechanisms and approaches and the problems and successes that they have encountered.

tives nationwide from California to Georgia, New Jersey, Texas, and North Carolina raised \$6.7 billion in public funding for land conservation.”³⁵

Other Federal Agencies

Other federal agencies also work to help prevent declining biodiversity and to counter the effects of sprawl. The National Park Service, Forest Service, and BLM manage other federal lands, including wilderness and wilderness study areas, which help protect U.S. biodiversity. FWS manages National Wildlife Refuges and oversees the implementation and enforcement of the ESA to help recover T&ES. As discussed above, how much these agencies do or do not do to help protect biodiversity can have a large effect on military T&ES encroachment problems.

The U.S. Department of Agriculture (USDA) has a number of programs to help protect farmland from sprawl and to help farmers and ranchers be better stewards of the land, which can help address sprawl and declining biodiversity and other environmental problems. These conservation programs include the Farm and Ranch Lands Protection Program, the Grassland Reserve Program, the Healthy Forests Reserve Program, the Wetlands Reserve Program, the Wildlife Habitat Incentives Program, and the Environmental Quality Incentives Program.³⁶ Through these programs, the USDA NRCS works with farmers and ranchers to help them plan and implement conservation measures that help improve the environment, protect habitat and species, and prevent agricultural lands from becoming suburban and rural sprawl. For example, the Farm and Ranch Lands Protection Program provides matching funds to help purchase development rights to keep productive farmland and ranch land in agricultural uses.³⁷ Similarly, the Healthy Forests Reserve Program is a voluntary program to help restore and enhance forest ecosystems by promoting the recovery of T&ES, improving biodiversity, and enhancing carbon sequestration.³⁸

These programs are a result of the Farm Security and Rural Investment Act of 2002, more commonly known as the Farm Bill. Up for reauthorization in 2007, the Farm Bill provides critical funding to these programs, which provide important opportunities for military installations in addressing encroachment problems.³⁹

The U.S. Environmental Protection Agency also provides information to help communities develop, so that they do not have environmental problems resulting from sprawl. U.S. EPA’s Smart Growth Program offers publications, research, tools, grants, and other resources to help communities improve their development practices.⁴⁰

³⁵ Clayton (2006).

³⁶ For more information about these and other relevant Natural Resources Conservation Service (NRCS) programs, see U.S. Department of Agriculture (n.d.b).

³⁷ For more information, see U.S. Department of Agriculture (n.d.a).

³⁸ For more information, see U.S. Department of Agriculture (2007).

³⁹ For a good discussion of how these programs are important to preserving land and of the importance of the 2007 Farm Bill, see Soto (2007).

⁴⁰ For more information, see U.S. Environmental Protection Agency (2006).

Methodology and Criteria for Assessing the Accomplishments of the Buffering Activities

This chapter presents an overview of the study methodology. Then it describes the criteria for assessing the accomplishments of the installation buffering activities described here. The criteria include both effectiveness and efficiency measures.

Study Methodology

The methodology for this study comprised three main parts: a literature review, buffering project installation case studies, and interviews with other experts. The case studies were of two types: in-depth case studies including installation site visits and telephone interviews at other installations. There also was a limited analysis of changes in land and conservation easement values over time.

As part of this analysis process, RAND analysts developed criteria for assessing the effectiveness and efficiency of the buffering projects for the REPI program and other buffering projects at installations. RAND analysts assessed the progress of the programs using these criteria, informing this process with the material collected from the interviews and installation visits and from other experts in addition to what was learned from the literature reviews.

Literature Review

Throughout the course of this study, the RAND team reviewed a range of relevant literature, dealing with such topics as installation encroachment, sprawl, conservation easements, transfer of development rights (TDR), land trusts, and biodiversity. Installation and Service documents were also reviewed. Articles in the public press about installation buffering activities and relationships were also reviewed. An important part of the case study analyses was reviewing relevant installation, buffering program, public press, and partner documents, such as the final easement documents, INRMPs, and JLUSs.

The Case Studies Examined in Depth

The study examined six installations on site and in depth. These case studies included one- to two-day site visits at the installations where the RAND team met with and interviewed installation staff and partners in the region. Most interviews lasted one to three hours. Eight to ten people were interviewed at each installation except at one, where only five people were interviewed. These site visits also included driving tours of the installation and surrounding area to review current and future encroachment issues in the field.

The study originally was chartered to visit four installations. However, the team was able to visit six installations, because some were close to the four originally chosen for visits. The following six installations were visited and examined as in-depth case studies:

- Eglin Air Force Base, Florida
- Fort Carson, Colorado
- Fort Stewart, Georgia
- Marine Corps Air Station Beaufort, South Carolina
- Naval Air Station Fallon, Nevada
- Naval Air Station Whiting Field, Florida.

These installations were chosen for a variety of reasons. First, because of different Service approaches, visiting one installation for each Service was important. Second, because installation circumstances differ considerably, they reflect a wide range of diversity and innovation, and the RAND team wanted to capture a range of experiences. Third, it was important to examine the accomplishments of installations that had had programs in place for at least two years and were considered more mature. Since the study focused on effectiveness, it was important to visit installations that had had a chance to show concrete results. Installations that were just getting started or had not achieved as much were also worthwhile to visit because of lessons learned, but they were not a high priority for visiting as were installations with more mature programs. Such installations were examined through phone interviews and the literature review to address any selection bias in the choice of the six in-depth case studies. Fourth, the RAND team wanted to focus on buffering programs that were considered strategic, such as those with a long-term focus on buffering around the entire installation, not just at a few key locations, and those that took into account both current and future buffering needs. Fifth, it was important to examine installations in different parts of the country, in different states, and with different environmental and local conditions. Since such issues as development pressures, community attitudes, and environmental concerns differ by location, it was important to have diversity in location. Last, having installation personnel available to meet with the RAND team was also a factor.¹ Service, OSD, and other expert opinion input was solicited to help determine which installations to visit.

It is important to note that the in-depth case studies that were selected tended to focus strongly on environmental issues, since the focus was on the more advanced and strategic projects. For example, RAND decided to visit Eglin AFB to include a USAF installation in the set of case studies. Since two Navy installations with buffering projects, NAS Whiting Field and Pensacola NAS, were nearby, one of them—NAS Whiting Field—was chosen because it showed a more strategic effort. Pensacola NAS had focused on buffering around only one runway and was not considering environmental issues. A bias toward environmental issues and more strategic approaches in the in-depth cases was part of the reason why additional case studies and interviews were conducted, namely, to offset any potential selection bias in the six in-depth case studies.

¹ Given short project timelines and travel schedules, some installations were not feasible to visit. However, they were contacted through phone interviews to offset any selection bias.

Other Case Studies and Expert Interviews

Capturing all the dimensions discussed above in such a small sample of on-site visits was not possible, which is why the RAND team supplemented the case studies with phone interviews at other installations and with interviews of headquarters and regional Service and partner experts who had insights across multiple installations. For example, RAND researchers wanted to be sure to include input from National Guard installations, so two were included as case studies. RAND researchers interviewed by phone installation staff and partners at Camp Blanding, Florida; MCB Camp Lejeune, North Carolina; Camp Ripley, Minnesota; U.S. Army Garrison, Hawaii; and NAS Whidbey Island, Washington.

These other case studies involved telephone interviews that were usually one to two hours in length and a review of installation, buffering program, public press, and partner literature. One to four people were interviewed at each installation. Most interviews were with buffering staff, although some involved other installation staff and even nonmilitary partners. Some other installations were also examined through discussions with headquarters and regional staff. For example, Service headquarters staff discussed issues relating to numerous installations; a Florida Department of Environmental Protection (DEP) employee who was interviewed commented about different installations in Florida; and a headquarters TNC employee discussed all the installations that had TNC as a participating partner.

In addition, for some other installations with buffering programs, RAND researchers reviewed documentation and conducted interviews with Service headquarters staff and other experts about such installations. For example, the researchers reviewed the legal easement document, OSD project summaries, and installation documentation for NAS Pensacola.

RAND researchers talked with over 60 experts and buffering program participants during this study, in site visits, during in-person headquarters staff interviews, and in telephone interviews. These experts included Service encroachment, planning, environmental, real estate and training staff at installations, regions, and headquarters. Such staff also included six current, former, and acting installation commanders. Diverse partners were interviewed, including state and local government partners and nongovernmental organization partners. NGOs include TPL, TNC, and state and land trusts, such as Colorado Open Lands and Whidbey Camano Land Trust. A few landowners who participate in the buffering program were also interviewed. Finally, RAND researchers interviewed people from other relevant federal agencies, such as FWS and USDA Forest Service staff.

Analysis of Trends in Land and Conservation Easement Values

RAND researchers also briefly analyzed some of the trends in land and conservation easement prices and how they had changed. Where possible, information about land prices was acquired near the six installations studied in depth. After the site visits, it became clear that such an analysis was needed to confirm the cost savings from buffering sooner rather than later. This analysis was outside the original scope of the study, but a limited one was conducted. Given the time remaining to complete this study, RAND analysts were not able to acquire or assess much land price data, given the complexities of doing so. However, the RAND team acquired what was readily available and did some limited assessments. More research is needed on this topic.

For each of the in-depth case studies, we assessed the accomplishments of the installation buffering activities so far. To do this, RAND researchers interviewed installation and partner

staff and examined relevant information about the base activities, encroachment threats, and activities to address encroachment.

Next, the criteria for assessing the accomplishments of the installation encroachment activities are discussed.

Criteria for Assessing the Effectiveness of the Conservation Partnering Projects

To assess the effectiveness of the conservation partnering projects, RAND analysts developed criteria based on REPI's goals. These criteria were developed to assess current benefits and accomplishments of the projects and to determine whether they are helping to address encroachment and meet the goals of REPI. The criteria fall into five categories based on the different types of accomplishments:

- promoting military readiness and other mission benefits
- addressing sprawl and limiting other incompatible land use
- preserving habitat and other environmental benefits
- fostering community relations and partnership benefits
- promoting additional community benefits.

Below, each category is explained along with the types of criteria used to assess projects' effectiveness in the category. It is important to note that, depending on the local circumstances and focus of the buffering program, some of the categories and detailed criteria within them may not have been relevant for all installations. For example, some installations do not have a JLUS program.

Promoting Military Readiness and Other Mission Benefits

This section describes the criteria for assessing military readiness and other mission benefits. Then it briefly describes how the criteria were applied.

Criteria. Since the main goal of REPI and the congressional authority is to protect military training and testing operations and readiness, the first set of criteria involved evaluating how the buffering activities help the installation's mission. Understanding installation testing and training operations and the relationships with completed and in-process projects was an important criterion. Besides looking at testing and training benefits, other operational benefits, including the effects of environmental regulatory relief, were also considered. Another set of criteria involved examining whether the buffer activities affected joint readiness activities or benefited multiple Services or installations. Buffering project effects on community noise complaints and lawsuits formed another important set of criteria.

Besides looking at specific benefits, it was also important to assess whether conservation buffering supported the goals and activities of other military missions related to long-term planning efforts, such as range sustainment and AICUZ plans. This includes looking at plans for acquiring additional training lands. It is important that buffering plans not overlap with long-term training land acquisition plans.

How the Criteria Were Applied. To assess how well the buffering activities were meeting these criteria, RAND researchers examined completed and in-process buffering projects in

terms of their physical proximity to the installation and their potential effect on testing and training missions. The research team used GIS maps of training location, APZs and other safety zones, noise contours, and buffering projects' locations to assess spatial relationships between buffering projects and the effects on potential and actual testing and training encroachment. For example, RAND researchers examined whether a buffering project was preventing a large residential development in a training area's high-noise zone, safety zone, or nighttime flight path where light pollution is a concern. Installation staff members were also interviewed about training locations, types, and times to help with this assessment. GIS maps were also used to help examine relationships with other installations, flight corridors and airspace, and joint use and training² relationships. Likely effects on future community noise complaints and lawsuits were also assessed by examining spatial relationships in the GIS maps and the installation's history and current situation regarding such issues. For example, the following questions were answered: where had noise complaints been coming from, had they increased over time, and were buffering projects located in areas that had had many noise complaints?

Expert judgment and knowledge were also an important part of this assessment. Key installation staff members, including installation commanders, trainers, and others, were asked how the buffering projects were affecting testing and training. Staff members were also asked if the projects presented other operational benefits for the installation. Key installation documents that explained current and future training and base operations, encroachment concerns, and relationships, such as AICUZ and BRAC 2005 documents, were also part of this analysis.

Addressing Sprawl and Limiting Other Incompatible Land Use

In this section, the criteria for assessing how buffering projects help address sprawl and help limit other types of incompatible land use are presented. Then it briefly discusses how the criteria were applied.

Criteria. A key objective of the authority of 10 USC §2684a and the REPI program is to limit any development or use of property that would be incompatible with the mission of the installation, so assessing whether the buffering activities were successful in restricting incompatible land use was another set of criteria. RAND researchers analyzed current and planned buffering projects and whether the activities had stopped any known encroachment and how, such as preventing a major housing development in a noise zone. The effects of buffering activities on zoning and local land use policies and planning, such as comprehensive plans, were also examined. Another part of these criteria was examining the effects of buffering activities on local population growth and development pressures. An assessment factor here was whether the buffering activities facilitated or contributed to any local or regional growth management or planning.

Besides looking at specific benefits to limit incompatible land use, it was also important to determine whether the conservation buffering supported the goals of other installation and community efforts to address incompatible land use, such as AICUZ and JLUS.

How the Criteria Were Applied. A main part of the assessment process here was ascertaining whether the buffering project or knowledge of the project had stopped any incompatible land use near testing and training areas. Installation staff, landowners, local government staff,

² Joint use is use of an installation by more than one Service. Joint training is any training involving more than one Service.

and NGO staff were interviewed about any developments planned near the installation and whether incompatible land use had been prevented by the buffering projects. Again, RAND researchers used GIS maps to examine spatial relationships to training, testing, and other key areas. The researchers reviewed the legal easement and land acquisition documents for the projects, local newspaper articles, and other relevant documents as part of this assessment.

To assess the effects of buffering activities on zoning and local land use policies and planning, where possible, local land use planners and other local government staff and elected officials were interviewed about such relationships. This assessment included examining current and past zoning policies and politics, as informed by community and local government interviews and documents, such as county zoning codes. Buffering activity effects on local population growth and development pressures were assessed by examining relationships with comprehensive plans and regional growth planning. An assessment factor here was whether the buffering activities facilitated or contributed to any local or regional growth management or planning. Other relevant documents examined as part of this analysis included local and regional comprehensive and growth management plans, zoning laws and policies, and articles from newspapers and magazines.

This assessment also included examining the relationships between buffering projects and the goals and activities of key installation and community efforts to address incompatible land use, such as in AICUZ and JLUS. Whether JLUS recommendations were implemented by local governments was also a key part of this analysis.

Preserving Habitat and Other Environmental Benefits

This section describes the criteria for assessing how buffering projects help preserve habitat and provide other environmental benefits. Then it briefly discusses how the criteria were applied.

Criteria. Another key objective of the authority and the REPI program is to preserve off-base habitat to relieve current or avoid future environmental restrictions on military operations, so this was another main assessment area. Assessment criteria here included examining if and how the buffering projects protect known habitat or populations of T&ES and other species of concern, how large an area of open space/habitat is protected, and the ecological value of the area protected—for example, determining if it is ecologically unique or a key conservation corridor. Potential accomplishments in addressing other environmental concerns that could affect installation operations, such as helping protect water and air quality, were also examined. Another consideration was assessing the cultural, historical, and natural heritage value of the land protected by the buffering projects.

The relevance of habitat and other environmental issues depended on the unique conditions and circumstance of the location. For example, some installations have many T&ES pressures but others do not. This analysis also considered some likely future environmental issues, especially the loss of biodiversity, that might affect the installation and region.

Since an important part of addressing the fundamental cause of encroachment by T&ES regulations is stopping biodiversity loss and promoting the long-term preservation and management of healthy ecological systems, such as key ecosystems, this assessment included, where relevant, examining whether the installation and the buffering activities were part of a larger landscape, ecosystem, or ecoregion collaboration. Similarly, an important consideration was looking at the coordination and other relationships between the buffering activities and installation ecosystem management, T&ES habitat protection, and other relevant activities planned in the installation INRMP.

How the Criteria Were Applied. To apply these criteria, RAND researchers examined documents pertaining to biodiversity and T&ES issues and other environmental concerns for the installation and region to understand the key environmental concerns and where they were located. GIS maps were analyzed to examine buffering project locations in relation to ecological areas of concern. The researchers analyzed legal conservation easement and land acquisition documents and partner plans to see how habitat and species were to be protected and managed. Relevant environmental documents, such as the installation INRMP and sustainability plan; federal, state, and local government species of concern web sites; and ecosystem collaboration plans, were also examined as part of this assessment. Scientific articles, ecosystem assessments, ecosystem and species GIS maps, and regional collaboration documents about broader ecosystem issues and their relation to installation buffering and environmental management activities were also analyzed to understand the relationship with broader ecosystem and biodiversity management needs and activities. For example, the Central Shortgrass Prairie (CSP) Ecoregional Assessment documents and partnership plans were examined in relation to Fort Carson's buffering and environmental management activities.

Installation environmental staff, conservation NGO partners, such as TNC, and other relevant regional environmental experts, such as FWS staff, were interviewed about such issues as part of this assessment.

Fostering Community Relations and Partnership Benefits

Next the criteria for assessing how buffering projects help improve community relations and working partnerships are discussed. Then this section describes how the criteria were applied.

Criteria. Since an important part of the REPI program is its focus on partnerships and working with communities, another assessment category was to understand the projects' accomplishments with respect to community relations and partnerships. If the installation is not effectively working with partners and the community, then the program is less likely to succeed in its objectives. Key assessment criteria here were whether the partners were satisfied with the relationship and whether the buffering activities had helped improve stakeholder relationships, including with local and state governments, conservation NGOs, and local landowners. Community relations also involved examining relationships internal to the installation, such as improving relationships between environmental and training staff.

Another consideration was to examine whether the buffering activities facilitated other strategic or beneficial activities, such as other community buffering projects and partnerships.

How the Criteria Were Applied. To apply these criteria, installation staff, partners, and community members were asked about how the buffering activities affected community relations and partnership activities. For example, local governments were asked about how the local community viewed the buffering. Partners and participating landowners were asked about their satisfaction with the installation buffering program. Another measure examined was how many landowners were interested in participating in the program.

This assessment also included examining partnership contracts and documentation and public and NGO press, such as editorials about the buffering program in the local paper.

Promoting Additional Community Benefits

This section discusses the criteria for assessing how buffering projects provided additional community benefits. Then it briefly describes how the criteria were applied.

Criteria. Since addressing the causes of encroachment, such as sprawl, is also a community concern and partners often had other community benefits as motivation to participate, it was important to understand if there were synergistic community benefits in addition to the environmental ones. Even though this topic is not a focus of the program, it is important to acknowledge these accomplishments as well. For example, saving agricultural lands, protecting open space, and preserving community character and quality of life are important community benefits. Some of these can also positively affect the military indirectly, since it is also part of the community. For example, if buffering activities help maintain the community quality of life for a region, it can also benefit soldiers and their families who live there.

Since willing landowners are needed to make the program work, it was also important to understand the benefits to landowners as part of the community.

How the Criteria Were Applied. To apply these criteria, RAND researchers asked state and local governments, community members, landowners, NGOs, and other partners about what they viewed as the benefits of the buffering activities to the community and their organizations. This analysis included examining the plans and activities for the lands and easements that were purchased and the activities permitted as stated in the legal easements. For example, if a state partner purchased the land, RAND researchers examined what the land was being used for and the community benefits from that use, such as parkland that was being used for hunting, fishing, and hiking. In addition, partner articles and documentation, such as an NGO web site that discusses the benefits of the buffering project, were reviewed.

Criteria for Examining the Efficiency of the Conservation Partnering Projects and Program

The main charter for the RAND study was to assess the effectiveness of the projects. However, since being efficient can be an important part of a program's accomplishments and being inefficient can indicate a need for improvement, and since a study objective was to make recommendations on how to improve the program, some efficiency criteria were also examined. Criteria used to assess the efficiency of the program included the costs to the military of the program and partners' contributions, in terms of dollars, manpower, and other resources; how long the projects take to complete; policy implementation efficiency; and monitoring and reporting requirements about the buffering projects and program. RAND researchers also examined the importance of these criteria in terms of their relationship to effectiveness benefits and the overall objectives of the study. In other words, RAND researchers looked at whether an emphasis on efficiency enhanced or harmed the effectiveness of the program.

What follows next is an assessment across all case studies. Appendices B through G contain the detailed assessments for each of the six case studies examined in depth. For each case study, there is a brief overview of the installation mission and activities, location and encroachment concerns, encroachment program, sample buffering projects, analysis of the accomplishments so far, and then a conclusion about the installation's buffering activities.

Assessing Accomplishments Across All the Buffering Projects

This chapter assesses accomplishments across all of the case studies, first, by analyzing the effectiveness of the buffering projects and then by analyzing their efficiency. These analyses looked across the buffering activities in all six in-depth case studies, and some common themes emerged in terms of effectiveness and efficiency. Results of these analyses were consistent and were confirmed by other cases examined, including information learned during phone interviews with staff and partners at Camp Blanding, Florida; MCB Camp Lejeune, North Carolina; Camp Ripley, Minnesota; U.S. Army Garrison, Hawaii; and NAS Whidbey Island, Washington.¹ In addition to being informed by the case studies, this assessment also incorporated information from other interviews and document and literature reviews. For example, regional and headquarters Service and partner staff provided useful insights across multiple installations. The common themes that emerged were consistent with these other installation buffering activities with a few minor exceptions as noted in the discussion that follows.

For individual assessments of each of the six in-depth case studies, see Appendices B through G. These assessments also provide more detailed examples of the benefits summarized in this chapter.

Effectiveness of the Buffering Projects

Assessing the effectiveness of installation buffering projects and the overall programs is complex, because an installation can take several buffering actions that benefit it in addressing sprawl encroachment concerns. However, major housing and other developments could take place on land that is not yet buffered, and this might cause additional major encroachment problems. Furthermore, even if an installation has restrictive easements to buffer all around the installation against sprawl, it still might be encroached on by T&ES problems because of biodiversity and habitat loss in the ecoregion. In other words, it is difficult to assess if and when buffering is totally effective at stopping and preventing all future encroachment.

That said, the effectiveness analysis is presented by each of the main criteria categories, as described in Chapter Four:

- promoting military readiness and other mission benefits
- addressing sprawl and limiting other incompatible land use

¹ For some background information about these and some other installations examined, see Appendix H.

- preserving habitat and other environmental benefits
- fostering community relations and partnership benefits
- promoting additional community benefits.

The results presented here are largely drawn from the six cases studied in depth and interviews with the other experts. All the tables of benefits presented in this section are for the six in-depth case studies only, but the discussions about the analysis of the accomplishments draw on the wider-range interviews, documents, and cases examined and include some examples from the other cases.

Promoting Military Readiness and Other Mission Benefits

The case study research found that the REPI projects and other installation buffering activities are helping to promote military readiness. They provide buffers around key training and testing activities and help sustain training and testing missions and other base operations. The buffering also helps preserve long-term operational flexibility. Table 5.1 summarizes these benefits. Similar benefits were found at the other installations examined.

In interviewing installation commanders and training and other installation staff, almost all stated that the buffering activities helped support and enhance their missions. In some cases, such as at NAS Fallon and Fort Stewart, it was a little too early for respondents to judge, since not many of their buffering projects had been completed yet. However, as a commander from NAS Fallon stated, “The ultimate benefit will be to ensure no restrictions on flight operations and training,” and commenting that the program was making progress in this direction.

At all six installations, installation staff felt that the buffering projects were helping preserve key testing and training spaces. The assessment of the GIS maps and installation documents showed that most buffering projects were in strategic areas, such as in the safety and noise zones of air and ground training operations. By preventing housing and other incompatible developments in AICUZ and near ground training, installation operations are supported.

Many installation projects were in areas near the installation, but benefits can also accrue in areas not directly adjacent to the installation, such as Eglin AFB, which is trying to protect a 100-mile-long, low-level flight corridor. More benefits could accrue if more installations considered such strategic acts as protecting useful space that is not necessarily contiguous to the installation, such as flight paths and airspace. For example, the assessment of the geospatial relationships showed that MCAS Beaufort could do more to help buffer low-level flight corridors to nearby bombing ranges, such as those near Townsend Bombing Range. In some cases, installations wanted to consider buffering such areas, but they did not think that Service headquarters and OSD would accept proposals for projects there.

At most of the in-depth case study installations, the buffering program enables more of the installation to be used for training. For example, at Fort Stewart, training and environmental staff stated that the buffering enables the installation to be used more intensively for testing and training. At Eglin AFB, Fort Carson, MCAS Beaufort, and NAS Fallon, staff mentioned that buffering helped accommodate new additional testing and training requirements, resulting mainly from BRAC 2005 or new equipment changes. For example, MCAS Beaufort staff stated that buffering enables future expansion for the joint strike fighter.

Table 5.1
Promoting Military Readiness and Other Mission Benefits from the Buffering Activities at the Six Case Study Installations Examined in Depth

Benefit Categories	Sample Benefits
Direct testing and training benefits	- Helps sustain the installation mission - Protects and enhances the mission by protecting operational flexibility - Helps preserve testing and training space - Allows more training to be conducted at the base - Enables future expansion for the Joint Strike Fighter (JSF) - Enhances the maneuver capability of air and ground forces - Helps protect night training - Helps protect low-level flight corridors and training space - Helps facilitate use of joint training space - Where landowners want it, offers the potential to use buffering lands for low-impact training maneuvers
Minimizing community complaints and interference	- Minimizes the effects on surrounding communities and thereby minimizes neighbor complaints about noise, smoke, and other effects and the costs of dealing with the complaints - Helps minimize adjacent landowner and community dissatisfaction with installation operations - Helps prevent lawsuits and noise complaints - Minimizes light interference, allowing night training - Minimizes the risk of wildfires from installation training spreading to and affecting nearby homes - Helps minimize radio frequency interference - Minimizes development near safety zones
Other installation operational benefits	- Increases operational flexibility - Has increased regulatory flexibility - Has provided operational flexibility from protecting wildlife in conservation easements - May help reduce bird air strike hazard (BASH) - Lets installation management deal with only a limited number of landowners as neighbors

At the majority of the in-depth case study installations, buffering helps support night training both for ground and air operations. Nighttime training is important to many installations, and having houses nearby, and other incompatible development, can cause light interference or restrictions on nighttime training because of noise complaints. Therefore, protecting the ability to train at night is a key objective. The GIS maps showed that buffering projects are in areas that help prevent light pollution near testing and training operations. As an installation commander from Fort Carson stated, the buffering program “allows me to train all times of day and night.”

The program also helps protect low-level flight corridors and training spaces, such as key flight approaches to Eglin AFB, Fort Carson, MCAS Beaufort, NAS Fallon, and NAS Whiting Field. The Northwest Florida Greenway effort to protect the 100-mile, low-level flight corridor near Eglin AFB is the largest and most strategic example of such protection efforts.² However, even though some benefits are accruing, given current investments, it is unclear whether large flight corridors, such as the Northwest Florida Greenway, can be sufficiently protected from encroachment given the size and cost of such ambitious projects and local development pressures.

Some of the projects have helped with joint readiness activities and other activities across multiple Services. Given that joint use and training takes place at all six installations, the buffering helps support such training. Some projects have helped improve strategic planning and collaboration about long-range joint training spaces, most notably in Florida, with joint planning by Eglin AFB, NAS Whiting Field, and other military installations about airspace and runways. However, many of the installations examined were not significantly considering regional training space buffering or coordinating buffering with other installations. More benefits would accrue if strategic and regional planning was undertaken for cross-Service and joint training space buffering. For example, Tyndall AFB could be more engaged in such a collaboration to realize more cross-installation benefit, especially regarding the Northwest Florida Greenway. More could also be done between Fort Stewart and MCAS Beaufort to strategically examine joint long-term use, training, and buffering activities. Similarly, more joint use and training analysis could be done between Fort Carson and other Colorado installations. Fort Carson has had some initial collaboration with some USAF installations, but more could be done, especially on the Air Force side.

A few buffering projects have also helped provide regulatory flexibility and operational relief from federally and state protected species. Eglin AFB and Fort Carson are two out of the six in-depth case studies that have experienced benefits in this area. At Fort Carson, staff probably will not have to restrict training because protection of four unique plants species is afforded on the Walker Ranch through the ACUB conservation easement.³ Eglin AFB's buffering and ecosystem management activities help reduce staff consultation time with environmental regulators regarding tests and risks to federally and state protected species. Similarly, Fort Bragg has had some regulatory flexibility and operational relief by protecting RCW habitat through buffering. These were the only cases out of all the installations examined that clearly had such benefits. More such benefits could be realized if there were more focus on strategic and regional ecosystem and habitat issues, as will be discussed further below in the section on the environment.

The buffering projects at these six installations also help support other military planning efforts, such as range sustainment and AICUZ.⁴ However, only some of the installations were comparing buffering plans with long-range plans for acquiring additional training lands. For example, an Army installation was not planning to buffer in areas where there were some long-range plans to acquire lands next to the installation for additional training lands. It is impor-

² For more details, see Appendix B.

³ This assessment is based on the expert opinions of FWS and conservation NGO staff.

⁴ This assessment was made after comparing the buffering projects and plans with other military plans, such as the AICUZ documents.

tant that areas being buffered do not overlap long-term plans to acquire training land. At other installations, buffering staff seemed unaware of long-term plans to acquire training land even though they cited the need for additional training lands at the installation. Part of this may be because the long-term plans are not developed yet. In sum, not enough attention is being paid to assessing and comparing installation buffering plans and long-term strategic training land acquisition needs and plans.

In very limited cases, there is also the potential to use buffering lands for low-impact training maneuvers. For example, at Fort Stewart and Fort Bragg, nearby landowners like having the opportunity to potentially rent land to the installation for low-impact training maneuvers. Some conservation easements at Fort Stewart specifically allow activities by large organized groups, including “use by Fort Stewart for low-impact training maneuvers” as long as they do not “significantly impair the Conservation Values of the Property.”⁵ It is important to note that this option has been included in a buffering agreement only when the landowner wished it.

One main benefit to the test and training mission is to minimize community complaints and interference in installation operations. As discussed above, a main encroachment problem is that testing and training operations need to be changed to accommodate community concerns because of nearby incompatible land use.

At all six installations, installation and community staff thought that the buffering activities were helping to minimize community complaints. Noise from air and ground training is a main concern. Too many noise complaints cause significant political, community relations, and operational constraints for an installation. An assessment using the GIS maps and other installation documentation shows that for all six installations, the buffering projects help to minimize noise and other complaints by preventing construction of more houses nearby, especially in the AICUZ and ground training noise zones. As one installation commander stated, the buffering program “promotes the ability to train without hindrance from community politics and noise complaints.” Similar benefits were found at most of the other installations examined.

Effects from training smoke, fires, and ground training vibrations were another area of concern. For example, at Fort Carson, minimizing the risk of wildfires (accidentally started by live-fire training) spreading to nearby communities is a benefit of the buffering program keeping housing developments away from the installation fence line.

Complaints often lead to lawsuits, which can use up installation time and resources, so minimizing the number of lawsuits is another benefit. This benefit was one that MCAS Beaufort has experienced. Because of nearby retirement and resort developments, MCAS Beaufort has had a problem with lawsuits regarding training operations noise issues and their effects on property values. The buffering program, both Encroachment Partnering (EP) outreach and the projects, helps minimize the number of lawsuits besides reducing noise complaints.

At only one installation, NAS Whiting Field, installation staff stated that the buffering program helps minimize radio frequency interference. By preventing construction of a commercial runway, some cell towers, and major housing developments near the installation, some private sector radio interference has been minimized.

⁵ The Trust for Public Land (2006b, p. 7).

The buffering program helps to reduce the number of people residing in the training safety zones, which helps both the military mission and public safety. For example, if a training aircraft were to crash and injure civilians, it would have significant political, community, and installation effects that could restrict installation operations.

Many buffering projects also benefit other installation operations besides testing and training. If the program helps increase operational and regulatory flexibility, other installation operations are helped, such as siting a new installation facility. For example, environmental regulatory flexibility can help when constructing a new building on an installation. Eglin AFB does not need to consult with regulators as much when building new office buildings and training facilities for the Army Special Forces (SF) group because of its buffering and ecosystem management activities.

Some other operational benefits were installation-specific and depended on local conditions at the installation and its program. For example, because of buffering projects protecting nearby marshes and wetlands, an environmental staff member at MCAS Beaufort stated that the buffering projects may also help reduce bird air-strike hazards, since the birds have these other areas to inhabit. Similarly, at Fort Carson, since large tracts of land are owned by just a few landowners, installation management needs to deal with only a few neighbors rather than a great many, as would be the case with nearby suburban sprawl.

In conclusion, installation buffering projects have had some effect in promoting military readiness. They are helping to protect and preserve testing and training operations by preventing incompatible land use. There have been some benefits to joint use and training, but more could be done to realize more benefits in joint use and training buffering planning and coordination. Installation buffering projects are helping to minimize community noise and other complaints and have provided other operational benefits to the installation. However, it is too early to tell at most installations how significant these accomplishments will be in preventing encroachment threats. Given the ambitious plans to buffer the perimeters of installations and other key areas, such as low-level flight paths, most installations will need to undertake many more individual buffering projects to complete the buffering plans. Only then will someone be able to judge an installation's effectiveness at stopping significant encroachment problems to promote military readiness.

Addressing Sprawl and Limiting Other Incompatible Land Use

This case study research found that the REPI projects and other installation buffering activities are helping to limit incompatible land use near installations. Examination of spatial relationships using GIS maps, interview comments, and examination of acquisition documents and other relevant documentation shows that the buffering activities at all of the in-depth case study installations have prevented known and likely incompatible development encroachment near the installation by preventing known subdivisions of land and residential developments and helping to prevent higher-density development. Some of the projects have also helped prevent resort and other large-scale developments. For example, incompatible development, especially home and resort development, has been prevented near Eglin AFB through its buffering projects. MCAS Beaufort has even prevented a high-rise bridge from being built in the APZ. Some additional examples are presented in Table 5.2 for each case study installation examined

in depth.⁶ Case studies of other installations provided similar examples of preventing incompatible land use. For example, at MCB Camp Lejeune, North Carolina, the buffering program prevented construction of 3,000 homes on 2,500 acres in the middle of a training range area.

Table 5.2
Benefits to Limiting Sprawl and Other Incompatible Land Uses from the Buffering Activities at the Six Case Study Installations Examined in Depth

Benefit Categories	Sample Benefits
Preventing Incompatible Land Use	
Eglin AFB	Stopped subdivision and development of Yellow River Ravines' 11,313 acres Helped prevent housing and resort development on 1,166 acres of Escribano Point near Choctaw runway
Fort Carson	Preventing high-density development in five-mile strip 1.5 miles east of the installation Prevented construction of an additional 250 new homes next to the eastern fence line Helping to prevent Pueblo West suburban sprawl from spreading to the southern part of the post
Fort Stewart	Stopped potential development on 107 acres
MCAS Beaufort	Prevented housing developments on 140 acres near the runway Most likely prevented residential development on 63.55 acres Prevented high-rise bridge from being built in the APZ
NAS Fallon	Developer stopped a 40-acre cluster development off the end of the runway County stopped a cluster development under the base flight path Prevented subdivision and development of a 50-acre farm
NAS Whiting Field	Stopped three apartment complexes from being built near the end of the runway Residential developments most likely stopped by county purchase of 268 acres
Helping Local and Regional Growth Management and Planning	
	Helps control sprawl and prevent unwanted growth in the county County has focused on concentrating development away from the installation Helped create collaboration between the county and the installation over long-range land use planning Helps support and facilitate county growth management activities Has helped local governments become more interested in protecting open space and managing growth Transfers knowledge about sustainability and growth management to local governments Helps provide a buffer between Colorado Springs and Pueblo so that the area does not become one large suburban area

⁶ Unlike many of the other benefits that were fairly consistent across installations, the specific details of how much and what type of incompatible development was prevented differed between installations, so installation names were provided for this table only. For more examples, see the appendices discussing individual installations.

As can be seen on GIS maps of AICUZ study zones, all the projects with AICUZ study zones have helped to prevent incompatible land use in the noise and safety zones, and the buffering activities support the AICUZ.

Buffering projects also help support and complement other DoD activities to address incompatible land use, such as the JLUS process and other efforts to work with local governments on zoning and land use controls. Collaborating with local governments on zoning and land use is another important way that DoD works to address encroachment. However, this study's analysis found that many local governments, even when they had conducted JLUS studies and wanted to support the installation, had not done much to change zoning and land use policies, especially when development pressures were strong. This determination comes primarily from examination of JLUS studies and local zoning, comprehensive plans, and other land use documentation. Therefore, few projects have helped local governments develop favorable zoning and local land use policies. Two installations—NAS Fallon and NAS Whiting Field—saw strong measures by local government to help the installation through land use zoning and policies. Churchill County has implemented a number of zoning and planning steps to help protect NAS Fallon from encroachment. For example, the County Master Plan and Development Codes have focused on concentrating development away from NAS Fallon. Churchill County also stopped a proposed cluster development under the NAS flight path because of safety concerns and knowledge and support of the buffering program. Santa Rosa County, Florida, also has changed zoning and has been directing growth to help stop encroachment around NAS Whiting Field and its outlying fields. This county has a strong JLUS that established military airport zones (MAZs) near the NAS and outlying fields; the county will not allow upzoning in the MAZs and focuses on clustering away from the NAS if the development project is near the installation AICUZ.

However, even at these two installations that enjoy significant county support, local government officials stated that the installations could not rely on the zoning to be permanent, because it can change with the next election or exemptions can be made to it. It can also differ by local jurisdiction within a region. In many cases, cities and counties have different policies. In Churchill County, the city of Fallon was not as active as the county in supporting policies to keep development away from the installation and did not take action to preclude development to the east near the installation. In fact, at all six case study installations examined in depth, installation and local government staff pointed out that local zoning does not help to stop encroachment over the long term because it can be so easily changed or overturned in the face of increasing development pressures. The analysis also revealed examples where zoning exemptions had been made that increased encroachment problems. For example, at Fort Stewart and Eglin AFB, nearby counties, facing development pressures, made zoning changes that allowed higher-density residential development near these installations.

Some projects have helped local governments and communities concentrate development away from the base, consider base needs in land use planning, and focus more on growth management issues. Some examples are presented in Table 5.2. However, these benefits have not been widespread, with significant benefits at only two installations, NAS Fallon and NAS Whiting Field, which helped create collaboration between the county and base over long-range land use planning. There have also been some growth management benefits at MCAS Beaufort. Near MCAS Beaufort, Beaufort County had already begun to try to manage growth as the installation EP program started. MCAS Beaufort buffering has contributed to these efforts by helping to control sprawl and preventing some unwanted growth in the county.

Unlike these three, Eglin AFB, Fort Carson, and Fort Stewart are all larger installations that need to deal with multiple counties and municipalities, of which at least some are very pro-growth. Some of these counties' officials also lack detailed knowledge about the advantages of growth management and how to implement it. Because of their buffering programs, these installations are starting to educate or influence local governments into thinking more about the benefits of growth management, but more could be done. For example, Fort Carson's buffering activities have helped local governments become more interested in protecting open space and managing growth near Colorado Springs, but the region's cities and counties have yet to come together to coordinate planning and to manage regional growth. Almost none of the other cases examined has any focus or influence on regional growth management.

To successfully address encroachment, more could be done to help local governments focus on growth management within a region. To do this, more knowledge, education, and analysis are needed about likely growth and growth management approaches. A couple of installations have tried to do this. Fort Stewart's buffering program helps to transfer knowledge about sustainability and growth management to local governments. Fort Stewart and partner staff stated that more needs to be done to help local governments learn about the importance and benefits of local and regional growth management both for the installation and for the community. Other case study installation and partner staff expressed such a need as well, such as Eglin AFB staff and partners suggesting a need to help educate counties in the Northwest Florida Greenway. Such education and outreach would benefit other installations as well.

In addition, several interviewees at different installations stated that more analysis was needed about the likely effect of growth, such as highway expansions, on the installation, environment, and community, to help show communities the need for more growth management and planning. They also felt that this was needed to help installations' Encroachment Partnering planning and approaches.

More development of installation sustainability plans, and coordinating them with installation buffering, would also help with regional growth management, as Fort Bragg is working to do. Fort Bragg is working with local governments to analyze and consider the implications of growth in their sustainable installation plan⁷ and is part of a broader regional sustainability planning activity, the Sustainable Sandhills.⁸ In fact, one of Fort Bragg's sustainability objectives is to "initiate and lead state and regional planning forums."⁹

In summary, most of the buffering activities have successfully prevented some incompatible land use, especially home construction, from encroaching on installations. Progress is being made but at most installations, it is too early to tell how much of such development can be prevented. In addition, most installation EP activities have not been effective at influencing local zoning, with a couple of noteworthy exceptions. However, some are helping to get local governments to think more about growth management and consider installation needs. Yet, more could be done in this area with more support of growth analysis and outreach to local governments about growth management and its benefits.

⁷ For more information on Fort Bragg's sustainability efforts, see "Sustainable Fort Bragg" (2006a).

⁸ For more information, see "Sustainable Sandhills: Our Mission and Our Vision" (n.d.).

⁹ "Sustainable Fort Bragg: Goal 5: Compatible Land Use Objectives" (2006b).

Preserving Habitat and Other Environmental Benefits

All of the case study buffering projects examined in depth have had some environmental accomplishments, as illustrated in Table 5.3. The assessment of these accomplishments was based on interviews of diverse environmental experts (such as conservation NGO, FWS, state and local environmental, and installation environmental staff), review of INRMPs, analysis of environmental and buffering GIS maps, and review of ecological assessments and other scientific environmental literature and documentation for the installations and ecoregions.¹⁰ A discussion of the assessment of these accomplishments follows.

Some of the projects are preserving habitat and providing other environmental benefits that help installation operations. All of the six in-depth case studies except one focused on environmental issues. The only exception, NAS Fallon, initially focused on preserving agricultural lands. However, it also had some minimal environmental benefits related to water issues, as discussed below.

As discussed in Chapter Four, the in-depth case study installations focused more on environmental issues, since they were installations that had developed more strategic activities. To offset this potential bias of cases that focused more on environmental issues, the

Table 5.3
Preserving Habitat and Other Environmental Benefits from the Buffering Activities at the Six Case Study Installations Examined in Depth

Benefit Categories	Sample Benefits
Preserving habitat, biodiversity, and T&ES	Helping to protect habitat, biodiversity, and ecosystems Protects key conservation and wildlife travel corridors Helps protect and sustain T&ES off base Helps keep the black bear off the federal T&ES list Helping to preserve plant species of concern and making a case for not listing them as T&ES Helping to preserve large pieces of property with conservation value Helps preserve and protect wetlands and marshes
Water benefits	Helps protect watersheds Helps with water quality and quantity concerns Helps protect the aquifer
Strategic landscape, regional, and ecosystem management and planning	Helps protect broader ecosystem through the Gulf Coastal Plain Ecosystem Partnership Helps protect ecological systems, such as Central Shortgrass Prairie (CSP) habitat, in eastern Colorado Helped the Peak to Prairie region do more long-range and strategic planning
Other environmental benefits	Improves installation environmental management Helps the installation share environmental management skills and resources with landowners Helps educate local governments and communities about the need for ecosystem protection and management

¹⁰ For more details on this analysis process, see Chapter Four.

environmental analysis here draws heavily on interviews and reviews of other installation projects and documentation. For example, environmental experts interviewed through the course of this study, including Florida DEP; local, state, and national conservation NGO partners; and FWS staff, discussed environmental issues at numerous installations, not just the in-depth case study installations.

Since the Navy and USMC buffering programs tend to focus more on real estate issues and sprawl pressures than on environmental concerns, their installations often had less environmental focus and benefits than Army installations, whose buffering programs focused more on environmental issues. That does not mean that the Navy and USMC do not address environmental issues as part of their buffering programs. For example, with the Navy EAP program, the team working on the EAP includes the natural resource and environmental planners, so environmental issues are considered in EAPs. Also, Navy and USMC installations, such as NAS Whiting Field, experience significant environmental benefits. However, many times within program implementation, the Navy and USMC focus less on environmental issues than the Army and rely on partners to address them. This became clear from talking with regional and installation staff, as well as conservation NGO partners, and from reviewing implementation documentation.

In five of the six in-depth cases, buffering activities were helping to preserve habitat, biodiversity, and ecosystems. For instance, Fort Stewart and Eglin AFB were helping to protect longleaf pine (LLP) ecosystems, whereas Fort Carson was helping to protect the Central Short-grass Prairie ecoregion. MCAS Beaufort, Eglin AFB, Fort Stewart, and NAS Whiting Field all were helping to protect wetlands, marshes, or sensitive watershed areas around rivers and streams. Most of these five were helping to protect ecologically unique areas. These five also were helping to protect conservation corridors for wildlife. However, two of the five installations, MCAS Beaufort and NAS Whiting Field, focused on such issues mainly because their partners were interested in them. In addition, some other installation buffering projects that were examined, such as those at NAS Fallon and NAS Pensacola, have not focused on environmental issues, but others have, such as Camp Ripley and Camp Blanding. For example, at Camp Ripley, a conservation easement on 315 acres helped protect forest and wetlands, home to five native orchid species.

In five of the six in-depth cases, buffering activities were also helping to protect and sustain T&ES and other species of concern off the installation.¹¹ Two installations, Eglin AFB and Fort Carson, had operational and regulatory flexibility benefits from protecting such species. At Eglin AFB, according to a conservation NGO staff member, the buffering activities, which had preserved large corridors of habitat, were helping to prevent the listing of the black bear as a federal T&ES. At Fort Carson, the conservation easement that buffers the southern portion of the installation protects four unique or rare plant species, which would help make the case for keeping these species off the federal T&ES list and enables training to continue without any restrictions because of these sensitive plants. Similarly, at MCAS Beaufort, habitat protected through a buffering project next to the installation is likely helping to preserve habi-

¹¹ Not all testing and training installations have species and habitat issues that appear to affect the current or future mission, so protecting habitat and species with buffering projects is not always relevant. However, most major testing and training installations have protected species or other species of concern that are currently an encroachment issue or may become one in the future, given national trends in biodiversity loss, so it is important to consider such issues in buffering activities.

tat for an endangered plant specie. However, in this case, the protection status is not as great as it could be, since there is only a restrictive easement not a conservation easement on this property. Two other USMC installations, Camp Lejeune and Camp Pendleton, are currently working with FWS to develop a plan for protecting T&ES habitat through buffering, which would lift some of the T&ES training restrictions at these installations. Fort Bragg has already received such a benefit from its buffering activities; this installation has had RCW training restrictions lifted, partly because of its conservation buffering, which helps protect RCW habitat and breeding colonies.¹²

MCAS Beaufort, as well as other USMC and Navy installations, could help protect species and habitat more by focusing more on conservation issues and acquiring conservation easements instead of restrictive easements. Camp Lejeune staff members have learned this and are now trying to do some conservation easements instead of restrictive easements. A Camp Lejeune buffering staff member stated how a conservation easement would be a valuable tool in efforts to support buffering and prevent encroachment, because it would “formally recognize conservation values” and allow Camp Lejeune to leverage conservation resources and get credit for the conservation values produced by its activities. Another advantage of conservation easements worth noting here is that it is easier to find partner funds for conservation easements than for restrictive easements, because more funding sources are available for protecting land for conservation.

Buffering activities at these five installations examined in depth also help support the installation INRMP. In addition, where installations were conducting ecosystem management, such as at Fort Stewart and Eglin AFB, buffering activities help support these activities.

Water issues were of concern at all six in-depth case study installations. Concerns about water supply and quality are evident everywhere, not just in the arid West. In all of the in-depth cases studied, buffering activities help protect watersheds, water quality, and water quantity. For example, NAS Whiting Field buffering has helped protect Clear and Coldwater Creeks, and Fort Stewart buffering is helping to protect the Ogeechee River. Some installation buffering activities, such as those at MCAS Beaufort, also helped protect the aquifer. MCAS Beaufort buffering was viewed by partners and installation staff as helping to protect local water quality and the local aquifer, which is a drinking water source, by preventing development. NAS Fallon’s agricultural buffering projects help with ground water recharge.

None of the installations examined had air quality issues associated with buffering activities, because most were not in areas where air quality was a significant issue. However, sprawl can increase such problems. For example, given the atmospheric and geographic conditions near Colorado Springs, a significant increase in sprawl in this region could potentially cause air quality encroachment concerns for Fort Carson.

Very few of the projects examined were helping to protect the key cultural and historical value of lands. If they did, actions tended to result more from a partner’s concern and as a fringe benefit from the buffering project. For example, buffering to protect Escribano Point area near Choctaw Field, which is a joint Eglin AFB–NAS Whiting Field buffering project, helps protect cultural resources. As discussed in Appendix B, this area is very rich in archaeological and historical resources, containing nine recorded archaeological sites and two historic structures. The U.S. Army Garrison, Hawaii, is an exception; native Hawaiians and others living

¹² The conservation easements on private land helped the installation reach the RCW population recovery goal. Strong installation LLP ecosystem management and RCW recovery activities also helped.

in Hawaii value protecting the rich and numerous cultural resources and historic sites of their islands. Because of this interest, especially among partners, the ACUB program in Hawaii also emphasizes protecting cultural resources in its buffering projects. For example, the Waimea Valley buffering project completed in March 2006 protects 1,875 acres containing significant historical, cultural, and archaeological sites, as well as world-class botanical collections.¹³

Another key environmental assessment criterion was whether the buffering activities relate to the installation's involvement in a larger ecological system approach to help preserve species and stop the loss of biodiversity by collaborating to protect large landscape or ecosystem areas. Few of the installations are part of such a larger landscape, ecosystem, or ecoregion collaboration. These strategic activities provide the opportunity to recover T&ES and prevent new T&ES listings and to preserve biodiversity. Only two, Eglin AFB and Fort Carson, were actively involved in such strategic initiatives. Eglin AFB is involved with many other large landowners in the Gulf Coastal Plain Ecosystem Partnership (GCPEP), which helps manage, conserve, and restore the longleaf pine ecosystem and the unique aquatic resources of north-west Florida and south Alabama. Fort Carson is part of the CSP partnership to help assess, manage, protect, and restore the CSP ecoregion. Of all the other cases examined, none were actively involved in larger ecological system strategic initiatives. However, Camp Ripley comes close by partnering with the Minnesota, TNC, and other organizations to address some concerns about the regional forest and prairie ecosystem.

Other installations, such as Fort Stewart and MCAS Beaufort, are only slightly involved in strategic environmental partnerships, such as SERPPAS, but their buffering programs could do more to help support such activities by looking more broadly at regional collaboration needs and synergies with buffering. In fact, given all the installations in the Southeast that are working to help protect and restore LLP ecosystems (including Eglin AFB, Fort Stewart, Fort Bragg, Fort Benning, and MCB Camp Lejeune), along with the collaboration of other federal, state, and private land managers through GCPEP, SERPPAS, and other initiatives, there is a strong chance that the LLP ecosystems and species such as the RCW will eventually recover. In that case, no T&ES would encroach on installations because of this LLP ecosystem.¹⁴ Such a recovery would be a tremendous environmental and encroachment success story, contributed to by all the installation LLP ecosystem management activities, installation buffering activities, and the REPI program. However, REPI and installation buffering projects could do more to help with LLP recovery by more installations actively engaging in collaborations and ensuring that future buffering initiatives support such activities. More activities like SERPPAS, CSP, and GCPEP, which look at broader regional ecosystem collaboration and management, are needed to accrue more habitat preservation and T&ES protection benefits.

Army installations are involved in another strategic environmental activity—installation sustainability plans. An installation sustainability plan is a strategic planning process for individual installations that focuses on creating sustainable, enduring installations by addressing mission, community, and environmental issues. Buffering activities seem to support such installation sustainability plans, but more could be done, especially in working with communities on regional growth management and concerns about biodiversity and ecosystem pres-

¹³ More information is available on the Waimea Valley. As of April 6, 2007, <http://waimea.audubon.org/>.

¹⁴ This statement is based on interviews, literature reviews, and assessments made during this study, as well as on previous RAND research that assessed and examined LLP ecosystem management activities at Fort Benning, Eglin AFB, and other installations and organizations throughout the Southeast.

ervation. In addition, more installation buffering programs could benefit if the installation developed and implemented a sustainable installation plan. A USMC Encroachment Partnering expert, who was familiar with Fort Jackson's sustainability process, pointed out this fact for USMC installations.

As stated above, many installation projects focus on buffering areas next to the installation, but other areas can be important in addressing environmental encroachment problems, especially those concerning federally and state protected species, biodiversity, and ecosystems. More benefits can also accrue from having buffering projects in areas not directly adjacent to the installation, such as protecting key pieces of habitat. For example, installations such as Fort Bragg, Fort Benning, Fort Stewart, and Eglin AFB benefit from conservation buffering projects that protect large portions of the LLP ecosystem even if they are not adjacent to their installations. Similarly, efforts to protect large tracts of land with healthy habitats within the CSP ecoregion are useful for Fort Carson's ACUB. Such tracts of land need not be private lands. For example, protecting CSP on USDA Forest Service property, such as Cimarron and Comanche National Grasslands, helps Fort Carson as well.

The buffering projects have provided other environmental benefits, mostly related to environmental management, education, and information and technology sharing. Most of these types of benefits were found at only a few installations. Four examples are presented here for illustration.

First, according to environmental staff at Fort Stewart, buffering has helped improve Fort Stewart's conservation and environmental management. For example, they can more easily do controlled burns to help the LLP ecosystem by having a buffer next to the fence line rather than homes. Second, Eglin AFB natural resources staff members have started sharing ecosystem management expertise, technology, and resources with a private landowner to help restore habitat in his conservation buffer area. Base staff members have agreed to share management experiences, equipment, and even LLP seedlings to help the Nokuse Plantation in its LLP ecosystem recovery efforts. Third, according to Camp Lejeune staff, because of its buffering program, Camp Lejeune also has been sharing ecosystem management practices with local landowners, such as practices having to do with prescribed burns. Fourth, Fort Carson's buffering program has started to help educate local governments about the need for ecosystem protection and management.

In conclusion, buffering projects have a wide range of environmental benefits, including helping to preserve habitat, biodiversity, and T&ES; protecting wildlife corridors; and helping with concerns about water quality and supply. A few even had regulatory benefits. However, few were part of larger ecosystem collaborations and not many focused on cultural resources. Even more long-term benefits could accrue if installation activities focused more on strategic conservation issues, especially larger ecosystem and regional concerns. Such focus is needed to address biodiversity loss. Not enough installation buffering programs are focusing on the fact that biodiversity loss and ecological system declines are the key drivers for T&ES and other environmental encroachment. Only by strategically assessing, managing, and collaborating to help these fundamental ecological systems, such as the LLP ecosystem and CSP ecoregion, can environmental encroachment be prevented. If such collaborations can be implemented successfully for all installation ecological systems, so that T&ES recover and are no longer listed as threatened or endangered, then T&ES encroachment would not restrict installations in the future. Given the trends in biodiversity loss and ongoing threats to ecological systems, accomplishing this would not be easy. However, these strategic activities offer an approach for how

to prevent T&ES pressures on the military while providing important benefits to communities, states, and the nation by helping to address this national problem of biodiversity loss and decline in ecological system health.

Fostering Community Relations and Partnership Benefits

All the buffering activities also have had accomplishments that help improve community relations and working partnerships. Examples of such benefits are presented in Table 5.4, and the assessment of these accomplishments follows. This assessment was based on partner, landowner, and community member views; number of land owners interested in participating in the program; and relevant documentation and articles in the public press, such as editorials about the buffering program in local papers.¹⁵

At all installations examined, community outreach was an important part of the buffering process. The installation buffering programs are helping to improve installation community relations with many different stakeholders in the surrounding communities and regions.

Table 5.4
Benefits to Fostering Community Relations and Partnerships from the Buffering Activities at the Six Case Study Installations Examined in Depth

Benefit Categories	Sample Benefits
Community relations benefits for the installation and military	Has improved relations with environmental and conservation NGOs, regulators, and the community
	Has helped community relations with state and local governments
	Has improved relations with the community and local landowners
	Improved installation public communications process
	Installation perceived as a contributor to the community
	Installation and military viewed as a partner in conservation
	Improves the environmental and overall reputation of the installation
Working partnerships benefits	Improves working relationship with partners, both in buffering projects and in other activities
	Helps reinforce the county's commitment to and cooperation with the installation
	Helps foster more collaborative approaches to conservation in the region
	Helped improve the community visibility and collaboration within the Peak to Prairie project
	Helped launch the CSP partnership
	Military funds have been leveraged with state and local funds to acquire conservation easements and land
Benefits regarding internal installation collaboration and management	Data, expertise, and other resources are shared for conservation
	Improved installation management's attitudes about collaboration with nonmilitary organizations
	Has helped improve collaboration and relationships between training and environmental staff

¹⁵ For more details about this analysis process, see Chapter Four.

Buffering activities at all six case study installations examined in depth have helped to improve community relations, benefiting the program and other installation activities. First, in most of the projects, community relations have been improved with environmental and conservation NGOs, regulators, and others in the environmental community. For example, Eglin's buffering activities have helped community relations with regulators and the environmental community. Eglin's strong focus on ecosystem management and conservation buffering to protect large tracts of land, conservation corridors, and habitat has demonstrated to the environmental community that Eglin and DoD are environmental partners.

Second, community relations have improved with state and local governments and other community members. For example, at NAS Fallon, the EP program has improved relations with the community, which includes county planning staff, county commissioners, county economic development staff, farmers, other landowners, the Lahontan Valley Environmental Alliance (LVEA), USDA NRCS, BLM, and water conservation districts. Churchill County staff members now understand better what needs to be done to protect the military mission and they consider installation needs in their decisionmaking processes. County staff members stated that the program has also "increased the NAS visibility with the local community."

Most of the cases examined experienced improved relations with local governments, but a few could have been even more effective in this area with more outreach to local governments, especially early in the process. Camp Blanding demonstrates this point the most, because its buffering program effectively improved relationships with state organizations, NGOs, and others, but not with Clay County. A Camp Blanding staff member said that he learned he should have spent more effort earlier in the process on explaining to Clay County officials the objectives and benefits of the Camp Blanding program because many in the county saw it as an Army National Guard "land grab." In some cases, such as at Eglin AFB, local government outreach for buffering is not as effective as it could be because of the lack of sufficient staff and management support.¹⁶

Third, all case study installations examined in depth have helped to improved relations with some of the landowners surrounding the installation. Many landowners around the installations dislike the fact that land was taken from their parents in the 1940s to make way for the installation and that their property values have been reduced. By being able to sell development rights, they now feel that the installation can actually give them something back.

One installation, MCAS Beaufort, has helped to improve relations with the local realtor's association because of its EP program. Realtors pass out a brochure from the installation that shows the APZ and noise footprint overlaid on a Beaufort County map.

These improvements in relations between communities and installations were found in most of the other cases examined. However, a couple of installations, such as Camp Blanding in Clay County, helped to improve relations with some but not all stakeholder groups. Some difficulties developed at another installation between Service staff and the NGO partner because of Service policies; as a result, the program has not helped to improve relations with the conservation NGO community.

¹⁶ This statement is based on interviews with installation and partner staff and on comparisons with other installation case studies, such as nearby NAS Whiting Field. However, it is important to note that because of its size, Eglin AFB has a large number of nearby relevant local governments, which makes it a more difficult job for Eglin AFB to reach out to all these organizations about buffering (see Appendix B for more details).

For most of the installations studied in depth, buffering activities have also helped to improve the installation's public communications process. Installations such as NAS Fallon, NAS Whiting Field, and MCAS Beaufort have invested a large amount of time conducting outreach to partners and the public about their buffering programs, and this has improved their communications with the community. A conservation buffering road show coordinated with partners and with the help of an installation commander was one of the most effective communications tool. Giving the road show to many different local community groups was an important part of this process.

Also, at most of the installations studied in depth, the buffering activities have helped improve the installation's overall image as a community member and as helping to protect the environment. For example, at NAS Fallon, the installation is perceived by local government officials as a "contributor to the community." At Fort Stewart, MCAS Beaufort, and NAS Whiting Field, buffering programs have helped the installations and the military be viewed as partners in conservation.

At all of the case study installations examined in depth, partners were quite satisfied with the buffering program collaboration, often using phrases such as "win-win" to describe the program and relationships. As a Beaufort County councilman stated, the buffering partnership is a "wonderful program of joint effort" between the county and MCAS Beaufort to preserve and protect properties of mutual interest and benefit. A conservation NGO partner stated that the buffering program is a "wonderful asset and tool" for conservation and the community. Such satisfaction was evident at all the other cases examined except one, where the NGO partner was less satisfied with the partnership because of the Navy's 50-50 matching funds requirement; slow appraisal, deal development, and review process; and focus on restrictive easements.

For all six case study installations examined in depth, having REPI improved the visibility of the installation buffering program, giving it more credibility and helping with partnership relations.

Installation buffering activities have helped improve working relations with different partners. The buffering projects and other installation operations have benefited from the improved relationships. Building trust and understanding through buffering projects helps the installation work with partners on other issues. For example, at Fort Stewart, working with Ducks Unlimited and TNC on buffering projects also helps the installation work with them on environmental management and habitat restoration projects of mutual interest. It has even helped increase collaboration between the training staff and local conservation groups. At NAS Whiting Field and MCAS Beaufort, both installation staff and county staff stated how the buffering collaboration helps reinforce the county's commitment to and its cooperation with the installation.

A couple of installations' buffering programs are helping to foster more collaborative approaches to conservation in the region, such as at Eglin AFB and Fort Carson. Of the cases examined, Fort Carson is the best example of this. Fort Carson buffering has helped bring state and local government and community support for the Peak to Prairie and CSP collaborations. As one land trust representative put it: "The Army and U.S. military getting behind the long term vision of protecting these natural resources [such as the CSP ecoregion] helps get community and non-partisan political support to protect them. The US military helps to reach non-conservation audiences, such as state and local organizations within Colorado."

Another important partnership benefit is leveraging partner resources, as was accomplished at all the case study installations examined in depth and at other installations examined. This issue will be discussed more below, but it is worth noting here as well. Conservation NGOs', state governments', and local governments' representatives stated the benefit of leveraging military funds with state or local funds for acquiring conservation easements and land. As a Florida environmental staff person stated, "every dollar the military" contributes to buffering with Florida Forever funds gives the state "one more dollar" to spend on conservation acquisitions elsewhere.

In examining partnership relations, this assessment found that cooperative agreements with partners enable installations to more effectively and efficiently outsource key functions, such as the appraisal process, rather than having them conducted by the military. Land trust NGO organizations can often do things that the military cannot do or can do them faster and more efficiently, such as negotiate deals with landowners who distrust the installation, conduct a faster appraisal process, monitor and enforce conservation easements, and accept donations of conservation easements. This finding is explained more in the next chapter.

Another collaboration and relationship category that was assessed had to do with internal relations and collaboration attitudes. Such benefits were found at four of the six installations studied in depth. First, the buffering program has helped improve installation management attitudes toward collaborating with nonmilitary organizations on issues of mutual concern. This benefit was found in the three Navy and USMC case studies. Second, at Fort Stewart, the buffering program was cited by both training and environmental staff as helping to improve collaboration and relations between training and environmental staff.

Some projects have also helped facilitate other buffering projects and partnerships near the installation, which is a strategic consideration. Buffering activities in the Florida Panhandle near Eglin AFB and NAS Whiting Field are good examples of such synergistic effects.

In conclusion, buffering projects have had some strong community relations and partnership benefits. These benefits help the installations' buffering and environmental programs but also help the overall installation's reputation and image within the community. However, more could be accomplished at some installations, especially with more staff focused on outreach. In addition, most of the partners are quite satisfied with the partnership arrangements. Partnerships that are based on cooperative agreements accrue effectiveness and efficiency benefits from outsourcing key functions, such as the appraisal and monitoring and enforcement processes, as will be discussed more in the next chapter.

Promoting Additional Community Benefits

The assessment, especially that based on interviews of local governments, landowners, and other partner staff, shows that the buffering projects also provide a diverse set of other community benefits besides the environmental ones. Examples of such benefits are presented in Table 5.5, which is followed by the assessment of these accomplishments. The assessment is based primarily on local government and other partner interviews, analysis of the planned use of lands purchased, and review of easements and other relevant documents.¹⁷

In all the cases examined in depth, local economic benefits were a primary accomplishment of the program according to community stakeholders. Many local governments value

¹⁷ For more details about this analysis process, see Chapter Four.

Table 5.5
Other Community Benefits from the Buffering Activities at the Six Case Study Installations
Examined in Depth

Benefit Categories	Sample Benefits
Economic benefits	Helps keep the installation as an economic force in the county and region Helps local ecotourism Helps maintain or even increase local land values Provides economic benefit to farmers, ranchers, and other landowners Has helped states and counties leverage conservation funds
Land preservation and outdoor recreation benefits	Helps preserve agricultural lands, ranch lands, forest lands, and family farms Provides scenic open space Provides parklands and other local outdoor recreation areas and facilities, such as trails Helps provide additional state forest and parklands Helps provide recreational access on private and public lands, such as for hunting, fishing, and hiking
Improving quality of life	Helps preserve the agricultural way of life Helps maintain community sense of place Contributes to local and regional quality of life Helps prevent traffic congestion and helps with emergency evacuation

the economic contribution of the installations to their community and many were concerned about the 2005 BRAC. This helped motivate many to help with buffering and to see the value of buffering to the economy of the community. Significant economic value comes from installations' being in the region, from high-paying installation and contractor jobs at installations, and from the perceived stability of military jobs, especially in tourist and hurricane-prone areas, such as the Florida Panhandle. As local government staff pointed out at NAS Whiting Field, buffering helps to protect the "largest and most stable economic contributor to Santa Rosa County." Such benefits were confirmed in the other cases examined.

Another economic benefit, evident in all case studies examined in depth, was to landowners who sold conservation or restrictive easements for buffering. Such projects provide economic benefit to landowners so that they can keep their land and still get economic benefit from it beyond farming and ranching. As one landowner near MCAS Beaufort said, the buffering program was "Like a dream come true. I got to get money out of my farm and did not have to sell it." Such benefits were especially important to communities near NAS Fallon, MCAS Beaufort, Fort Carson, and Fort Stewart, which valued helping family farmers and ranchers.

In a couple of cases, such as MCAS Beaufort and Fort Carson, the buffering program was viewed as helping to maintain or even increase property values. For example, at Fort Carson, local land prices went up near Walker Ranch after the first conservation easement was announced on this property. A couple of interviewees stated that because of all the development in the region, property values were expected to increase near buffering areas where open space was protected.

There were also community benefits related to land preservation and outdoor recreation from the buffering programs. First, a main community benefit was preserving productive lands by helping to preserve agricultural, forest, and ranch lands. Helping to preserve family farms was often cited as an important benefit to the community. At most of the installations studied in depth, community members mentioned these benefits. Near Fort Carson, ranch land is being preserved. Preserving agricultural land near NAS Fallon and Fort Sill is important. Near Fort Stewart, MCAS Beaufort, and NAS Whiting Field, buffering is helping preserve both agricultural and forestry land.

Second, lands acquired through buffering partnerships contribute to state and local forest and parkland acquisition and preservation. An analysis of what partner land acquisitions were being used for shows that such benefits were accruing in three of the case studies examined in depth: Eglin AFB, MCAS Beaufort, and NAS Whiting Field, as well as in several other conservation buffering projects reviewed, such as those at Camp Ripley and Camp Blanding. For example, a buffering project near Eglin AFB is becoming part of the Blackwater River State Forest, and lands acquired near MCAS Beaufort are becoming Beaufort County parklands. Similarly, a buffering project that involved purchasing 8,700 acres near Camp Blanding is becoming part of a state park.

Third, a related benefit is that buffering projects help to provide public parklands and other local outdoor recreation areas and facilities, such as for trails and ball fields. Land acquisition and even some conservation easements were being used to add new trails to the community near Eglin AFB, MCAS Beaufort, and NAS Whiting Field. For example, projects buffering NAS Whiting Field help provide canoe and hiking trails as well as recreational facilities, including a hiking trail around the entire perimeter of the NAS and a house that will become a trail office. Such benefits were also found in some of the other case studies examined, such as at Camp Ripley, where part of the Paul Bunyan State Trail will go through a buffering project.

Fourth buffering projects help provide recreational access on private and public lands, such as for hunting, fishing, and hiking. Such benefits were cited by partners and installation staff at four of the six cases studied in depth: Eglin AFB, Fort Stewart, MCAS Beaufort, and NAS Whiting Field. In one of the Fort Stewart buffering projects, TNC acquired land that will be protected from development but open to hunting. It will most likely be sold to a hunting club. Some of the conservation easements at Fort Stewart state that activities by large organized groups are allowed as long as they do not “significantly impair the Conservation Values of the Property.” “Such activities include, but are not limited to, concerts, scout jamboree, revival meetings, corporate training outings, and use by Fort Stewart for low impact training maneuvers.”¹⁸

Another important community benefit was contributing to local and regional quality of life. This accomplishment was cited at four of the six installations studied in depth. State and local government and NGO partners mentioned different types of quality of life benefits from the buffering program, such as helping to preserve the rural or other community way of life. For example, in Churchill County, according to a Churchill County official, NAS Fallon “buffering is very important to help preserve the economic diversity, stability, and local agricultural way of life.” Helping to preserve local and regional quality of life by preventing sprawl was also cited as important benefits from buffering at MCAS Beaufort and Fort Carson.

¹⁸ The Trust for Public Land (2006b, p. 7).

According to local government staff, by protecting open space, scenic views, and agricultural lands around MCAS Beaufort, the program helps preserve the “rural character of the county” and local quality of life. Such quality of life contributions also benefit soldiers, their families, and installation staff who also live in the community.

Several local government and NGO partners also mentioned that buffering helped protect community open space and views. For example, at Fort Carson, helping to protect scenic viewsheds of ranch land and the mountains along the quickly developing I-25 corridor was considered an important benefit to the community and region.

Another important community benefit that contributes to local quality of life and emergency preparedness was found only at MCAS Beaufort. By preventing sprawl, the buffering projects help prevent traffic congestion, which helps during emergency evacuations. MCAS Beaufort and the city of Beaufort are on an island with only a couple of main access roads and bridges, so traffic issues are a major concern, especially during hurricanes. As explained in Appendix E, which discusses MCAS Beaufort, the Beaufort County Director of Emergency Management stated that the MCAS Beaufort buffering program even helps with emergency evacuation. This benefit is important to the community, as well as to the installation, since MCAS Beaufort personnel also need to evacuate during hurricanes and other emergencies.

In conclusion, the buffering projects have provided many other benefits to communities, including economic ones, especially to landowners, and have helped provide parkland, trails, and other recreational facilities. They have also helped preserve agricultural, forest, and ranch lands and helped maintain the local and regional quality of life. Many of these benefits are important to both the local community and the installation, since installation staff and soldiers and their families also take advantage of parklands, trails, recreational facilities, and quality of life improvements.

Efficiency of the Buffering Projects

This section presents the assessment of the efficiency issues relating to the case studies. Even though the study charter was to focus on the effectiveness of the projects, this study examined some efficiency issues, since being efficient can be an important part of a program’s accomplishments, and not being efficient can indicate a need for improvement, and since a study objective was to make recommendations for improving the program, some efficiency criteria were examined. Efficiency criteria are grouped into the following categories:

- financial and other resource issues
- timing
- policy implementation guidance
- project oversight, reporting, and monitoring requirements.

The results here are drawn from the six case studies examined in depth, additional interviews, additional case study analyses, and review of the professional literature and other public sources.

Financial and Other Resource Issues

A range of resource issues came up in the course of this study's analysis, including issues relating to financial, manpower, and information resources. This subsection presents the analysis of the efficiency of such resources.

Projects Efficiently Leverage Partner Resources. The buffering projects have been cost efficient and are leveraging the resources of partners. Leveraging resources has been an important funding criterion for REPI, since there are not enough funds for all the buffering projects. There is leveraging of direct funding from state, local, and other federal agencies and NGOs to acquire easements. Where they can, most projects leverage funds as much as possible. In many cases, partners contribute 50 percent or more of the funds, such as at NAS Fallon, MCAS Beaufort, and military installations in Florida. In fact, in buffering activities that benefit Eglin AFB, NAS Whiting Field, and many other Florida installations, the state has paid more than 50 percent of the land acquisition costs. Table 5.6 shows the lands acquired by the state of Florida and water management districts that help buffer military installations and how much these organizations contributed. Their total contribution was \$785.4 million; military contributions were only a few million dollars.

It is important to note that in Florida, even in cases where REPI funds were not used in buffering, the existence of REPI and the fact that OSD staff had met with state officials about the program has helped give visibility and more state and local support to buffering. This finding was consistent in the other cases examined; namely, having an official OSD buffering program helps installation buffering activities acquire funding and partner support even when individual installation projects have not used REPI funds.

Florida is an unusual case; other states are not as financially able to provide as much support as Florida.

Too Much Emphasis on Cost Efficiency Hurts Effectiveness. However, REPI and some of the Service programs place so much emphasis on some aspects of cost efficiency that it has reduced effectiveness. This study found that program policies and implementation place too much emphasis, especially in the Navy and USMC, on requiring partners' direct funding contributions. Namely, expecting large matching funds has caused some undesirable consequences. First, where the military expects partners to contribute a great deal of funding, such as in Florida, there have been some missed opportunities, because there has not been enough partner funding to meet high military funding expectations. Military installation buffering projects have to compete with other conservation projects for Florida Forever and other state funds and, in some cases, the land being acquired was less desirable than land elsewhere, so deals were not completed in time before the property was sold for development.

This study found that the Navy and USMC usually expected partners to contribute at least 50 percent of the funding for land acquisition. It was an unwritten policy at nearly all Navy and USMC installations where staff members were interviewed.¹⁹ As one Navy buffering staff member said, "if a proposal goes up [the Navy buffering program approval chain] asking for more than 50 percent Navy input, it will be returned." This policy has caused tensions in partner relations and missed opportunities from lack of immediate matching funds; it also has

¹⁹ At a couple of Navy installations, Navy staff insisted on the "fair share" from the partners, considering the benefit to the Navy and partner. Namely, if it can be demonstrated that the Navy will benefit more than 50 percent of the value of the acquisition, it will pay more than that share. For example, for a conservation buffering project at NAS Whidbey Island, the Navy paid over 53 percent of the acquisition cost.

Table 5.6
State of Florida and Water Management District Acquisition Projects That Help Buffer Florida
Military Installations

Project	Nearby Base	Acres Acquired ^a	Cost (Millions) ^a	No. of Acres to Be Acquired
Baldwin Bay/St. Marys ^b	Navy Whitehouse Field	0	0	9,500
Bear Creek ^b	Northwest Florida Greenway	0	0	104,461
Bombing Range Ridge	Avon Park Bombing Range	10,524	\$18.95	33,916
Camp Blanding–Osceola Greenway	Camp Blanding	0	0	153,000
Caravelle Ranch ^c	Rodman Bomb Target	11,636	\$6.32	0
Clear Creek/Whiting Field ^b	Naval Air Station Whiting Field	0	0	5,843
Dade County Archipelago ^d	Homestead Air Reserve Base	100	\$1.68	TBD
Escribano Point	Eglin Air Force Base, Navy Choctaw Field	4,582	\$6.80	1,753
Etoniah Creek ^d	Rodman Bomb Target	21,683	\$18.73	TBD
Florida Keys Ecosystem and Coupon Bight/Key Deer: Sugarloaf, Cudjoe, Torch, Big Pine, etc. ^d	Naval Air Station Key West and Cudjoe Air Force Site	2,192	\$42.55	TBD
Garcon Ecosystem	Eglin Air Force Base	3,966	\$3.35	3,855
Goldhead Branch ^c and Lake Santa Fe	Camp Blanding	926	\$1.67	10,735
Heather Island/Oklawaha River	Ocala National Forest (Pinecastle Bombing Range)	4,400	\$8.20	19,828
Jennings State Forest (Upper Black Creek) ^c	Camp Blanding	11,346	\$13.26	0
Kingsley Plantation/Fort George and Talbot Islands ^c	Mayport Naval Station	2,185	\$26.03	0
Kissimmee Prairie and River ^c and Pine Island Slough	Avon Park Bombing Range	89,792	\$44.80	49,583
Lake Arbuckle ^c	Avon Park Bombing Range	13,746	\$8.85	0
Lake Wales Ridge (Walk in Water)	Avon Park Bombing Range	6,894	\$10.12	TBD
Lower Perdido River Buffer ^b	Naval Air Station Pensacola, Saufley Field	0	0	7,800
Nokuse Plantation	Eglin Air Force Base	18,880	\$17.25	16,318
Northeast Florida Blueway (Phase I)	Mayport Naval Station	186	\$0.85	6,920
Northeast Florida Timberlands	Camp Blanding, Navy Whitehouse Field	50,931	\$111.12	92,568
Perdido Pitcher Plant Prairie	Naval Air Station Pensacola	4,215	\$27.20	3,952
Pumpkin Hill Creek	Mayport Naval Station	4,175	\$9.39	19,126
Sand Mountain	Northwest Florida Greenway	19,326	\$26.64	15,035
S. Andrews (and Shell Island) ^c	Tyndall Air Force Base	285	\$12.23	0
St. Joseph Peninsula and Bay Buffer	Eglin Air Force Base	8,279	\$13.64	819
St. Joe Timberland ^e	Tyndall Air Force Base, Eglin Air Force Base (Northwest Florida Greenway), Naval Air Station Whiting Field	7,598	\$15.00	55,600
South Walton Co. Ecosystem: Topsail Hill/Grayton Dunes/Deer Lake/Point Washington	Eglin Air Force Base	20,597	\$186.80	3,072
Tate's Hell/Carrabelle Tract	Northwest Florida Greenway	195,840	\$136.80	0

Table 5.6—continued

Project	Nearby Base	Acres Acquired ^a	Cost (Millions) ^a	No. of Acres to Be Acquired
Tiger Island ^b /Amelia Island/Fort Clinch/Nassau River ^c	Kings Bay Naval Base	1,040	\$13.45	1,175
Upper Shoals	Eglin Air Force Base	0	0	12,035
Yellow River Ravines ^b and Yellow River Water Management Area ^c	Eglin Air Force Base, Navy Harold Field	5,729	\$3.68	16,652
Total		521,053	\$785.40	643,546

SOURCE: Data courtesy of Florida, DEP, September 2006.

^a Includes acres acquired and dollars spent (or value of state property if acquired through a land exchange) by the state of Florida and water management districts since 1968. Does not include acreage acquired by local or federal governments or other public entities or acres donated to the state or districts.

^b New project—no acres acquired yet or acquisition dollars spent.

^c Completed project no longer on a state or water management district land acquisition list (or at least completed in the area near the military installation).

^d Additional properties proposed to be acquired but as a component of a larger project of which the acreage and property appraiser's values have not been determined.

^e Project is composed of St. Joe Co. properties that the company is willing to sell to the state, many of which are in several other Florida Forever projects (e.g., Sand Mountain and St. Joseph Bay Buffer).

the potential to cause problems in the future. All the partners and usually the installation staff mentioned that a 50 percent match requirement hurt the Encroachment Partnering Program. For example, at one installation, a land trust partner said that the 50-50 cost share arrangement did not seem fair and would cause difficulty with future projects. At NAS Fallon, this requirement is already causing problems. Since the recent slowdown in real estate nationwide has caused developers to be hesitant to move forward with large developments, Churchill County was able to come up with only \$600,000 in 2006, and some NAS Fallon buffering projects have had to wait for funding. Waiting for funding hurts the credibility of the program, and some landowners will not wait to participate and eventually sell to developers.

Another issue is that some areas do not have readily available state, county, or other partners to tap into for funding, such as at Fort Stewart. In such places, effectiveness would be damaged by waiting until partner funds can be found. Installations where buffering can be done more cheaply and easily now, because there are fewer sprawl problems, also tend not to have as many partner funding opportunities. State and local governments usually do not invest much in land conservation until sprawl becomes a significant problem, which also means increased land values. At other installations, the opportunity is sometimes so great that it is better to act immediately to close a deal with significantly more military funds than to wait to acquire partner funds, such as at Fort Carson, where there is an opportunity to buffer large tracts of land.

Some efficiency concerns can cause DoD to lose sight of the purpose of the program. As long as the military is protecting property that helps buffer the installation, the amount of funding that partners contribute is not a major concern. Leveraging funds to save taxpayers some money and stretch resources is important, but there should not be a 50-50 percent requirement, and saving money should not be done at the expense of losing deals waiting for partner funds. Also, if there is benefit to the military, it is worth the cost, even if the military needs to pay all of it, especially if the military most likely would have to pay more for such

deals in the future. In short, the military can save money in the long run by investing more in buffering projects now, such as at Fort Carson and Fort Stewart, because waiting for partner matching funds may cause installations to miss an opportunity to buffer or may cost the military even more, as discussed more in the next chapter.

Diverse Partner Contributions Are Important to Program Effectiveness and Efficiency.

Partners contribute in many other valuable ways besides providing funding for property acquisitions, and these contributions need to be given more weight in considering the leveraging of resources, rather than focusing so much on direct acquisition funding.

Some of this leveraging is not directly in dollars but in acquiring property at less than the fair market value. For example, NGOs, such as land trusts, have negotiated easement donations in cases where the landowner was willing, often so that the landowner could receive the tax benefits.

Projects leverage other key partner resources, including staff time, technical expertise and resources, operational flexibility that partners can use in deal making, and goodwill and community relations. These contributions provide both efficiency and effectiveness benefits. Technical expertise and resources include negotiation skills, conservation easement development infrastructure, and GIS and biological analysis skills. For example, as explained in Appendix G, which discusses NAS Whiting Field, Santa Rosa County has enacted and enforced special zoning for the NAS, clustered development, purchased buffering lands without any military funds, provided GIS analysis and support, and invested numerous staff hours and time.

OSD does not give enough credit to installation buffering projects that leverage partner contributions that entail something other than direct funding. Some of these contributions are invaluable and difficult to even quantify, especially goodwill and connections with landowners. For example, TNC arranged a deal to acquire 218,000 acres of forest land from International Paper throughout the Southeast; this land provided buffering benefits for a number of military installations including MCAS Beaufort's Townsend Bombing Range, Fort Stewart, and Eglin AFB.²⁰

Other OSD organizations also can be important contributing partners in conservation buffering activities, especially in helping fund useful analysis projects. For example, OSD Office of Economic Adjustment (OEA) JLUS and other grants have been used to help with activities that support buffering, such as at MCAS Beaufort. Here, the Lowcountry Council of Governments received a grant from OEA to examine implementing a transfer of development rights (TDR) program²¹ that could benefit MCAS Beaufort buffering activities. Similarly, OSD Legacy funds helped pay for the CSP assessment and partnership, with benefits to Fort Carson's buffering activities. OSD staff who work in the REPI program and also under SRI have engaged with SERDP and other OSD program staff in some activities that help address encroachment, which benefits buffering activities. For example, SRI staff members partnered

²⁰ For more details, see The Nature Conservancy (2006c, 2006d).

²¹ A TDR is the process by which development rights are transferred from one lot, parcel, or area of land in a sending district to another lot, parcel, or area of land in one or more receiving districts. Local governments implement a TDR program to concentrate development in the "receiving district," often allowing higher density there, and conserve land in the "sending district," which has reduced development densities. TDR programs usually establish some method of valuing the development rights that are to be transferred from the sending to the receiving district. Some communities establish development rights "banks," which purchase development rights from landowners in sending districts and sell them to landowners in receiving districts. In some cases, local governments use the sale of such rights as a way to generate funds for land conservation purchases; see the NAS Fallon case study in Appendix F for an example.

with SERDP and Environmental Security Technology Certification Program staff to co-sponsor a workshop in April 2007 on regional planning and sustainability in the Southeast. Similarly, REPI staff have helped ensure that some 2005–2006 OSD Legacy funding focused on REPI concerns. However, more such leveraging of other OSD funds and programs could help improve the REPI program's effectiveness and efficiency.

More Leveraging of Other Federal Agency Resources and Activities Could Improve Efficiency and Effectiveness. The RAND team found that there is not enough leveraging of the assets of other federal agency partners and their resources. More efficiency and effectiveness benefits could accrue if this were changed. Other federal agencies, such as USDA and FWS, have financial and technical resources that could be exploited more to help with installation conservation buffering. A few installations, such as Fort Carson, NAS Whiting Field, and Fort Sill, are taking advantage of such resources. For example, NAS Whiting Field and Fort Sill are leveraging USDA funds to help with conservation buffering. Fort Carson takes advantage of FWS environmental expertise to help in its buffering projects and in the CSP partnership. But even here more could be done. For example, a Forest Service employee stated that Fort Carson could collaborate more with the Pike and San Isabel National Forests and Cimarron & Comanche National Grasslands in regional planning as the Forest Service develops the forest plan and with local governments as they develop their comprehensive plans. In addition, as discussed in Appendix F, NAS Fallon could do more to collaborate with FWS for mutual benefit. REPI and OSD staff members have also been working to leverage some other federal resources for REPI projects. For example, DoD and USDA NRCS entered into a Memorandum of Understanding (MOU) in November 2006 that gives priority to REPI projects in some NRCS programs. More of such activities could improve buffering effectiveness and efficiency.

In addition, other federal agencies also have land that can be used to help with conservation buffering, especially in helping to protect biodiversity and stop T&ES encroachment. This federal land need not be contiguous to the installation, especially when it comes to protecting habitat. For example, the Cimarron & Comanche National Grasslands in Colorado could be used to help protect habitat within the CSP ecoregion; preserving this ecoregion would benefit Fort Carson's efforts to stop environmental encroachment. Looking at other federal lands is currently not part of the REPI program. However, given the potential synergistic benefits, OSD needs to consider doing so to help improve the buffering program's effectiveness.

Other federal agency policies and activities can also potentially help or hurt installation efforts to address encroachment problems, especially environmental encroachment. For example, if BLM and USDA Forest Service allow more road building and oil and natural gas drilling and other extraction activities that fragment and degrade habitat, this can potentially hurt military conservation buffering activities. As discussed in Chapter Two and Appendix A, scientific evidence shows that DoD, BLM, and Forest Service lands have more biodiversity and more of it is at risk than on other federal lands. If activities on these other federal lands degrade habitat and cause loss of biodiversity, military installations' conservation buffering will be hurt and installations will become even more important for protecting biodiversity. An example that illustrates how this problem could affect NAS Fallon and the Fallon Range Training Complex (as well as other installations in the West) can be seen from BLM activities in Wyoming. BLM oversees 41 million acres in Wyoming and, since 2000, has approved 17,000 oil and gas drilling permits on these lands. Recent evidence shows that oil and gas fields cause significant declines in the sage grouse population, because it degrades the sagebrush steppe

ecosystem that this bird depends on.²² The sage grouse inhabits NAS Fallon training range lands. If such declines continue, the sage grouse could be added to the T&ES list, causing new T&ES encroachment concerns for NAS Fallon operations.

However, if more of these other federal lands can be used to protect biodiversity and ecosystems, such as the LLP, CSP, and sage grouse habitats, this helps keep DoD installations from becoming the islands for protecting biodiversity, helps preserve and manage healthy ecosystems, and helps stop T&ES encroachment problems. Thus, other federal agency policies and activities can either help improve or hurt conservation buffering effectiveness and efficiency. More could be done to ensure that their policies and activities help and not hinder conservation buffering, especially in activities to preserve ecosystems.

Too Much Emphasis on a Narrow Definition of Fair Market Value Hurts Project Efficiency and Effectiveness. Another financial resource issue arises when some DoD agencies interpret the legal requirements that the property acquired with military conservation buffering funds be bought at fair market value. DoD defines fair market value through the land appraisal process, and the purchase price must be no more or no less than that value. The statute that governs federal (or federally funded, in whole or part) real estate transactions is the Uniform Relocation Assistance and Real Property Acquisition Policy Act, first passed in 1972 and codified at 42 USC §4651. The provision requires that the owner be notified of and “offered” the fair market value (as determined by an appraisal). In addition, the last amendment to 10 USC §2684a stated that Service contribution was limited to the fair market value of the minimal interest it could legally transfer. RAND researchers found confusion and inconsistencies in the interpretation of these legal requirements. Installations and the Services interpret these requirements differently and some are very focused on offering only fair market value. Many interpret the laws to mean that the federal government need not pay fair market value if the owner accepts a lower figure (which can result in tax advantages to the seller) or wants to donate property. Some people, but not many, also interpreted the laws to mean that the government could offer more after stating the appraised value. The result is that the program places too much emphasis on the DoD-defined fair market value in its implementation, which has caused some efficiency and effectiveness problems. This emphasis has made it difficult for the military to participate in deals where the landowner wanted to sell or donate conservation easements at less than fair market value, such as at the Nokuse Plantation near Eglin AFB. In this case, the deal had to be set up so that the state of Florida paid for the donated conservation easement on part of the property and the military paid the full fair market price of a conservation easement on another piece of the property. This arrangement complicated the process unnecessarily, creating extra work for those involved because of the fair market value requirement.

This fair market value requirement also makes it difficult for installations to compete with developers. Deals have fallen through, such as at MCAS Beaufort, because the landowner did not think the military’s fair market value estimate was high enough and he could sell his property, especially waterfront property in Beaufort County, for more money to a developer. Similarly, at Camp Lejeune, a deal for 1,500 acres fell through when the owner decided to sell it at a higher price to a developer (and a faster closing) to raise funds for his mother’s medical bills. As a general rule, the fair market value concept seems reasonable to ensure that the government is not being taken advantage of; however, when there is a chance to acquire property

²² For an example of such evidence about BLM lands in Wyoming, see Kloor (2007).

below fair market value or where there is a competitive higher bid on the table, exceptions could be made.

Currently, Resources Are Not Spread Too Thin. A concern that has been expressed about the REPI program is that OSD has spread its limited funding among too many different installations, which could hurt program effectiveness and efficiency. The result might then be that none of the installations could stop encroachment over the long term because funding was not concentrated on just one installation. Some of those interviewed have suggested that prioritizing resources to focus on only a few installations would be more efficient and effective. Namely, why not invest all \$40 million into the same two or three installations each year until they have addressed and solved their encroachment problems? Given the effectiveness of so many installation projects, as demonstrated above, how they have leveraged limited funds, and how REPI support helps energize local programs, the RAND team analysis does not support this concern. However, it could be a problem in the long run if the program does not receive more resources.

In addition, other problems arise when trying to focus on only a few installations. It would cause tension among installations and hurt Service buffering efforts at multiple installations. No matter which installations were chosen, unique opportunities would be missed at others.

Also, the most difficult part would be choosing which installations to support. Five suggestions were made for prioritization schemes by people interviewed for this study. Each is discussed here. First, REPI could prioritize installations by which had partner matching funds, but this could result in missed opportunities at other installations, especially where development pressures are not as strong yet. Where development pressures are not as strong, the military can buy land interests at a lower price, but such opportunities often are in poor counties without sources for matching funds, such as near Fort Stewart. Money could be saved by buffering at some of these installations now, so there are efficiency benefits to focusing on these installations also.

Second, suggestions were made to choose the most important testing and training installations and buffer them first. However, prioritizing installations this way hurts community relations and causes tensions across installations. As several interviewees mentioned, it would be like the BRAC process experience: Making such choices would hurt buffering activities under way at other installations and perhaps community and installation relations, because it would seem that DoD did not value their installation enough to help stop encroachment.

The third idea expressed was to give priority to buffering around installations with the least development, so that the program can buffer areas more cheaply. However, this might cause DoD to miss the opportunity to buffer installations already experiencing development pressures but where there are still large tracts of land and good potential for success in stopping encroachment, such as at Fort Carson.

Fourth, suggestions were made to give priority to buffering around installations with the largest encroachment threats. However, buffering these installations is often more expensive and difficult, and DoD could miss the opportunity to buffer a base that has less development pressures, but development is still under way.

Fifth, suggestions were made to buffer at installations with the most chance of successfully stopping encroachment with buffering projects. It is difficult to judge which installations these might be, and conditions around installations can change, given local uncertainties, such as local development pressures and landowners' willingness to participate in the program.

Thus, focusing funds on only a few installations would not be as efficient or effective as the current approach. However, a more limited prioritization scheme could be effective, as will be discussed in Chapter Seven.

Insufficient Manpower Causes Some Efficiency and Effectiveness Problems. Another key efficiency issue is program manpower and staff support. Existing conservation buffering staffs are very effective and efficient given the amount of time and effort they need to develop and implement a successful installation buffering program. Installation Encroachment Partnering staff members are very dedicated and work many hours, because the buffering programs need significant staff support to conduct public outreach, manage the programs, work with partners, submit proposals, and help develop, review, and close buffering deals. At many installations, especially Army and USAF installations, which tend not to have full-time buffering staff, there is not enough staff support for the buffering activities, which has caused some efficiency and effectiveness issues. For example, Eglin AFB could have an even more effective and efficient buffering program if it had more buffering staff to help with buffering outreach to the many local governments surrounding this installation. At U.S. Army Garrison, Hawaii, a staff member felt that having at least a half-time buffering person was “critical” to having an effective buffering program. In addition, qualified Service support staff members, such as legal, environmental, and real estate experts, are needed to help with program and project analyses, development, review, and implementation. This assessment is based on comparing across installations that had full-time staff and those that did not, from examining the various skills needed and functions performed for a buffering program, and from the interviews.

Improving Information-Sharing Would Improve Efficiency. Another important resource issue is information. This analysis found that the buffering programs were less efficient because of insufficient information sharing. Many installation staff members said that they would like additional information about how to implement the program. They said that they had to learn on the job as they went along and that they would have been more efficient if they had been able to learn from other installations’ experiences. There has been informal information sharing, such as at Camp Blanding, where buffering staff share their experiences with Camp Ripley staff, but more formal documentation of lessons learned and guidance was lacking. Additional technical support in such key areas as environmental, legal, and real estate was also needed at many installations. Also, staff turnover creates a need for helping educate new staff members, as illustrated at MCAS Beaufort. In spring 2006, at MCAS Beaufort, the CP&LO person was transferred to a headquarters position in Washington, D.C., and the new CP&LO was learning on the job. She could have benefited from more formal information, guidance, documentation, and training about how to conduct buffering activities.

Timing

Another efficiency criterion examined was the timing to develop and complete the buffering projects. Project timelines need improvement. Many projects are taking a long time to complete, which has caused some efficiency and effectiveness problems. However, the timing and timelines for such projects are complex issues.

Just because a project takes a long time, even as long as a few years to complete, does not mean that it is inefficient. In some cases, a project takes a long time to develop and complete because of the need to develop a relationship with local landowners and because of their desires in the process. For example, the different buffering projects at Fort Carson have usually taken a couple years to complete when the initial discussions with landowners are factored into the

calculation. Some of this process could possibly be streamlined, such as during the project appraisal and review process. However, the final timeline is not unrealistic, given that some of the landowners involved did not want to complete the deals quickly in one year. Because of tax reasons, it was more beneficial to them to spread the process out for several years. In addition, as one partner with a state land trust said, it takes a long time meeting around kitchen tables, gaining trust and discussing options, before many landowners are ready to even consider a deal. He said that he has been meeting with some landowners about conservation easements within the region for six to eight years. In such cases, a longer timeline is needed and is reasonable.

In other cases, the process has taken a long time because of a learning curve for the first few projects of the new buffering program at an installation. The learning curve factor shortens as more projects are implemented. This factor could be shortened as new installation buffering programs are started, by transferring more of the lessons learned from more experienced installations.

However, in other cases, especially where landowners are anxious to sell their property, a faster process is needed. Then, and even in cases where a longer timeline is reasonable, the process is too slow because of a slow military bureaucratic process for requesting, acquiring, and receiving funds and for developing, assessing, completing, and approving deals.

First, the several-month REPI proposal process for requesting funds and having them approved is too slow and having it occur only once a year causes timing problems, especially when new, unexpected opportunities for deals may come up in the middle of the year.

Second, in most cases, the military project approval, appraisal, and development process needs to be streamlined, especially for the Navy and USMC, where it can take up to a year.²³ Staff and partners at all the six installations studied in depth stated that such processes were too slow and needed to be streamlined. At NAS Fallon, one interviewee stated that the appraisals there had to be repeated because the review and approval process “was so slow that prices had changed between the time of appraisal, final review, and offer.” Requiring that many different organizations, such as multiple levels of legal, environmental, and real estate experts, review deals has also slowed the Navy process. At NAS Whiting Field, the legal review alone usually takes two to three months. The Navy requirement for different regional and headquarters reviews and approvals has contributed to this slow process, which the Navy is currently working to change, given the timeline problems. However, this will not address the problem of a slow appraisal process. At some installations, such as MCAS Beaufort, projects have been lost to developers because landowners did not want to wait out the slow military process. This problem was not as significant at Fort Stewart, because the partner, TPL, handled the appraisals much faster and the Army review process was fairly efficient. However, even here an interviewee stated that it should be streamlined to better compete in the real estate market, especially when a developer is also making offers to the landowner.

Third, the time to acquire the funding after approval has been lengthy and has caused some problems in the system. In some cases, it has been difficult to negotiate deals when the installation buffering program does not yet have the funding in hand. This slow funding process, along with insufficient funding, has also delayed project completion and most likely has

²³ At every Navy and USMC installation examined, at least two people interviewed stated that the appraisal, deal development, and review process to final offer was too slow. Such interviewees included installation staff, service real estate staff, state and local government and NGO partners, and landowners who were participating in the program.

contributed to lost opportunities. Such processes need to be improved or the military will miss some buffering opportunities.

Policy Implementation Guidance

REPI is a fairly new program and it lacks OSD implementation guidance. In summer 2006, REPI issued “The Department of Defense Conservation Partnering Program Guide”²⁴ to begin to provide some guidance. However, so far this OSD guide mostly provides information about how to submit REPI proposals and criteria used for selecting proposals, not details about how to implement the program. It needs to be built on and expanded to include more guidance about successful approaches to implement buffering activities.

The lack of implementation guidance has allowed the Services to experiment and create their own approaches based on local needs and Service cultures. This approach has fostered innovation and has also helped program staff learn what works and what does not. However, the lack of implementation guidance has caused some efficiency problems. First it has caused extra time and money to be spent to redo things and to resolve difference of opinions in implementation and has caused confusion among installation and Service staff. For example, buffering staff at one installation said that Service legal experts slowed down the process and spent too much time debating among themselves how to implement the program because of the lack of implementation guidance. Second, it has caused confusion with partners and joint efforts, because of inconsistency in implementation across the Services. For example, Florida partners have had to deal with different Service requirements when partnering with different Service installations throughout the state, which has caused extra staff time and effort. The result is that some projects and the overall program have been less efficient than if more policy guidance had been available. REPI policy guidance needs to be expanded to focus more on implementation.

Project Oversight, Reporting, and Monitoring Requirements

Another important efficiency measure is to review how ongoing installation programs are managed, monitored, and reported on over time.

Project management seems fairly efficient. Buffering project oversight was usually implemented at the local installation with regional and headquarters review as the buffering deals were developed, approved, and implemented. This oversight process was fairly efficient, except for the problems mentioned above relating to the timelines for reviewing and approving projects. However, the Navy had one additional problem area. There is inconsistency and confusion about whether the Navy requires a 50-50 percent funding match with partners. Headquarters Navy staff said that this was not a requirement, but almost everyone that the RAND team interviewed at the installation and regional level said that it was an unwritten Navy requirement. Managers at Navy headquarters need to ensure that personnel at all levels of the Navy understand that this is not a requirement.

Another important oversight function occurs after the projects are completed. Important assessment criteria here were determining who has responsibility to ensure that the conservation and restrictive easements, and other encroachment protection arrangements, are monitored and enforced over time, and what plans are in place to do this. This area appeared to have

²⁴ See Office of the Secretary of Defense (2006e).

some potential problems. Army installations mostly rely on the land trust and other partners for such monitoring and enforcement, which can be effective with an experienced land trust that has set aside stewardship funds for such purposes and has implemented approved land trust industry standards for such functions. However, even with land trusts, some problems have arisen because of insufficient monitoring of the easements.²⁵ The Navy and USMC both rely on their partners and monitor easements themselves. For example, NAS Fallon has relied on county staff, but EP staff would also do some monitoring and if there was a problem with enforcement, Navy legal staff would assist. However, at many installations, the RAND team found that plans for monitoring and enforcement among county and military partners were fairly minimal. For example, at one installation, a buffering staff member said that he would do it, but it was clear that he had little time for such an activity. Many installations did not seem to be giving the issue much attention. In addition, the language in the easement itself can contribute to this problem. At one Navy installation examined, a land trust partner's attorney said that the Navy's restrictive easement agreement was "not very good" because it lacked sufficient language on indemnity, monitoring, and enforcement.

Land trusts, since this is their business, tend to have more formal plans in place for easement monitoring and enforcement. The literature shows that monitoring and enforcement of easements is crucial to the long-term effectiveness of such easements, because easement violations are inevitable.²⁶ Some land trusts have already found that more violations occur as property changes hands and new owners try to challenge the easements and many anticipate more such problems in the future with second and third property owners. In fact, some experts think that some future property owners

will buy easement-protected land in the full expectation of breaking the easement so that they can do what they want with the land. Properties in the path of development that are worth a couple of hundred thousand dollars as restricted but millions without the easement will attract such speculators.²⁷

Some land trust experts have even expressed concerns that land trusts are focusing too much on conservation easements and should focus more on buying and owning land instead, because of such concerns about future easement challenges.²⁸ Given these reasons, it is important that easement language be as strong as possible (in case of a court challenge) and that strong monitoring and enforcement procedures be in place.

Reporting requirements were another efficiency factor examined to determine the quality and timeliness of project documentation. Since OSD and the Services have had minimal

²⁵ For example, in one study of land trust monitoring in the San Francisco Bay area, researchers found that only about half of the conservation easements were being monitored (Brewer, 2003, p. 167).

²⁶ For a good example of the potential problems with violations and enforcing a conservation easement, see Gustanski and Squires (2000, pp. 157–165), a case study about the Wildlands Conservancy experience with a landowner in Berks County, Pennsylvania. For more on easement violations, see Brewer (2003), Byers (2004), and Gustanski and Squires (2000).

²⁷ Brewer (2003, p. 171).

²⁸ Such experts argue that owning land is the best way to protect it because of potential legal challenges to easements in the future. For example, see Brewer (2003), which provides some valid concerns about easements being broken in the future. As the author states, "land trusts have begun to rely too much on a single land-protection device whose durability had yet to be established. . . . Renewed attention to protecting land in fee would, at least, add some diversity and may turn out to be essential to the cause of private land protection" (p. 175).

reporting requirements, not much information was available. Insufficient documentation has caused some efficiency issues. The documentation that does exist tends to be out of date and inconsistent, since the activities are so dynamic and project details evolve and change. Given the shortage of installation staffing at many installations, it is unrealistic to expect up-to-date detailed reports on projects. However, because of this lack of up-to-date documentation it has been more difficult for the REPI program to track project status and report back to Congress on the program's progress. In addition, documentation needs to be improved to help transfer lessons learned to improve other installation programs and to document the successes. For example, installation staff at several installations stated that more documentation from other installations about their buffering programs would benefit them in their own program development. As one installation staff member stated, it would help them "not to reinvent the wheel."

Project reporting requirements clearly need improvement. Those in the REPI program know that this is a problem and are working on developing more formalized reporting requirements for the projects.

Conclusions: REPI Shows Promise

The RAND team assessment shows that so far REPI appears to be an effective program judging by what buffering projects have accomplished. In fact, given the program's limited resources, installations have accomplished a lot. However, more could be done to make REPI more effective. However, it is too early to judge if the buffering projects at many installations can significantly address encroachment, because they have completed only a few projects so far. But the potential benefits are significant. Some installations, such as Fort Carson, have the potential to prevent almost all of their encroachment problems. At all installations examined, benefits are accruing in a range of strategic areas that help address encroachment, including addressing rapid land development near the installation, addressing declining biodiversity, and helping with community relations. Projects are preventing some incompatible land use and promoting military readiness by helping testing and training areas and other mission operations. Projects have also had other important community benefits, such as helping to improve local and regional quality of life and providing parks, trails, and other outdoor recreational facilities. The buffering projects that have been completed are effective.

However, more needs to be done to improve program effectiveness so that installations have a better chance of preventing most of their main encroachment problems through buffering and other DoD activities to address encroachment. At most installations, more needs to be done to strategically help preserve habitat and address declining biodiversity, otherwise environmental encroachment will not be prevented. Some efficiency issues, such as addressing manpower, funding, and policy guidance needs, need to be addressed to make the program more effective and efficient. The next chapter discusses the findings regarding these needs and Chapter Seven provides recommendations on how to address these needs.

Findings

This chapter describes the study findings. These findings are based on the analysis of the in-depth and other case studies and the interviews conducted as part of those studies. They were also informed by other interviews, literature review, and analyses of additional sources. One key finding is that the REPI program appears, thus far, to be effective, but it could be even more effective by addressing a number of effectiveness and efficiency issues. Since this finding was discussed in great depth in the previous chapter, it is not discussed further here.

For discussion purposes, these findings are grouped into the following 10 categories:

- the need to address fundamental causes of encroachment problems: sprawl and loss of biodiversity
- urgency for action: buffer before it is too late
- local government support is useful, but installations cannot rely on it for the long term
- program policy guidance and focus
- financial issues
- implementation process
- development of partnerships and working with partners
- community relations and outreach
- staffing and management issues
- information sharing and technical support needs.

The Fundamental Causes of Encroachment Problems Need to Be Addressed

Only by addressing the true causes of encroachment can installations prevent most of these problems.

Sprawl and the Loss of Biodiversity Cause Most Encroachment Problems

As discussed in Chapter Two, this study found that the fundamental causes of most installation encroachment problems are sprawl and the loss of biodiversity. Sprawl includes three main types of land development: suburban and rural sprawl as homeowners commute longer and longer distances to cities and towns, retirement communities, and resort development. Such land developments are occurring throughout the United States more and more often next to installations. The result is more encroachment problems including community noise complaints, public safety concerns near testing and training operations, water and air quality concerns, T&ES problems, and competition for air and maritime space.

Biodiversity loss mostly causes one type of encroachment, more federally and state protected species problems. Given development pressures, fragmentation of landscapes, invasive species, and the other issues discussed in Chapter Two, the country is experiencing more and more biodiversity loss. Military installations are increasingly becoming the remaining islands for protecting biodiversity and T&ES, causing more T&ES encroachment problems. Many installations are mostly focused on addressing sprawl problems in their buffering activities. An installation may solve most of its sprawl encroachment problems but over the long term may have major T&ES problems because of the loss of biodiversity.

DoD Needs to Address the Fundamental Causes of Encroachment Strategically

Installations need to be strategic in how they buffer to address these fundamental causes of encroachment. An installation needs to work both locally and regionally. To work locally, for example, is to look at and address the open space next to the fence line; to work regionally is to recognize and address broader regional trends, such as extensive regional development, since significant development in a region can cause biodiversity loss and new T&ES encroachment. As an example, consider NAS Fallon and the Fallon Range Training Complex (FRTC). All the development pressures and population growth in Northern Nevada is likely to place additional pressures on the ecosystems and more species may decline and be placed on the T&ES list, which could encroach on the FRTC.

Strategically addressing the fundamental causes of encroachment can be done only in collaboration with the local and regional community and other key stakeholders. First, installations need to work with local governments to focus on regional growth management to help address sprawl and loss of biodiversity and other environmental problems. Second, regional ecosystem activities, such as the GCPEP and other LLP ecosystem management efforts and the CSP partnership effort, are key to helping stop biodiversity loss and maintain healthy functioning ecosystems to prevent federally and state protected species encroachment problems. Both land and aquatic ecosystems need to be considered.

In addition, installations that today are in remote areas and not being encroached on might still need buffering. Given the national trends with sprawl, biodiversity loss, and the fact that land is a finite resource, this isolation will likely change. The military needs to strategically buffer remote area installations as well. In fact, it is easier and cheaper for the military to buffer before major encroachment problems develop.

To ensure that installations address such issues, OSD and the Services need to ensure that the installation buffering programs focus on such issues by providing guidance and financial, staffing, and other resource support, as is discussed more in Chapter Seven.

Urgency for Action: Buffer Before It Is Too Late

A common installation priority is a need to act swiftly before losing an opportunity to buffer as surrounding lands are subdivided and developed. It is urgent to buffer as soon as possible, or it will become more costly or impossible to do so in the future. Once land is subdivided, it becomes too expensive and owned by too many different entities to use for buffering. It is much easier to buffer 1,000 acres owned by one landowner than to try to buffer 1,000 acres owned by 50 landowners, each with 20-acre plots. If these tracts of land are even further subdivided, such as one house per five acres or one house per acre, then 200 or 1,000 landowners

would need to be dealt with. At this point, it becomes nearly impossible or impossible to buffer an installation.

Fort Carson has a unique opportunity to buffer, because one rancher who owns over 30,000 acres is the only neighbor directly south of the installation. Similarly, being able to place a conservation easement on 18,500 acres near Eglin AFB on the Nokuse Plantation is a unique opportunity. The military needs to take advantage of such opportunities while it still can. However, buffering on such large tracts of land would take significant financial investments now.

Major investments need to be made over the next few years or else the military will miss the opportunity to address encroachment at many installations. As discussed above, pressures are strong to continue development of the last remaining tracts of private land in this country. Most large tracts of land historically were owned and managed as ranch lands, working forests, and agricultural farms. Many of these lands are being lost to development as historical activities become less profitable and as commuter homes, resorts, and retirement communities have become more profitable to develop. Many landowners are finding it is much more profitable to sell to a resort or retirement developer than to log, ranch, or farm their land.

It is important to note that given development pressures and the fact that this program relies on willing landowners, not every deal will go through and not every piece of desirable property can be acquired for buffering. The installation buffering programs are taking advantage of what buffering opportunities they can while they can and recognize that a 100 percent solution to encroachment may not be possible. A 100 percent solution is not necessarily needed, if most of the encroachment pressures can be stopped; then an installation can manage what encroachment it has with minimal effect on its operations. Even though a 100 percent solution can probably not be achieved, much can be done, especially with more investments in buffering now and with other DoD activities to address encroachment, such as installation AICUZ and natural resource and environmental management activities.

Another part of this sense of urgency is that individual project deals need to be completed before landowners lose interest or prices increase. Many deals, given federal approval processes, can take several months or more. Many landowners are not willing to wait that long, especially if a developer is making them an offer today.

Significant Buffering Investments Made Now Will Save Money in the Long Run

Once land is subdivided, besides being more difficult to procure, it also becomes more expensive to try to use for buffering. Cost per acre of suburban tract homes is much higher than the cost per acre of agricultural lands. It is cheaper and easier to buffer before land is subdivided; even if the agricultural land has not yet been subdivided, land prices continue to increase because of the potential to develop and the fact that large tracts of land are becoming more scarce and valuable in most parts of the United States. Large tracts of land, whether ranch, farmlands, or forest lands, have increased significantly in value over the last 10 to 15 years in most of the United States. For example, the American Farmland Trust, which works to preserve farmland, found that in 1999 the national average cost for an agricultural conservation easement was \$1,519 per acre; in 2004, it was \$2,899 per acre. This is a compound annual growth rate (CAGR) of 14 percent.¹

¹ Kirchhoff (2006).

Part of this land value increase in the past few years came about because of the real estate boom, and even though the national real estate market has slowed, this trend has not significantly affected undeveloped land prices and land prices near most of the military installations examined. Places such as Beaufort County, South Carolina, and El Paso County, Colorado, are still experiencing increases in undeveloped property values and development pressures. Growth may have slowed a little or leveled off temporarily, but it is expected to increase over the long run.² In fact, a slight slowdown is an opportunity for the military to close some buffering deals before the next real estate market boom.

For large tracts of land, investing now rather than waiting a few years can result in significant savings for the military. To help demonstrate such savings, an analytical case is presented for ranch land in southern Colorado near Fort Carson and the two conservation easement appraisals on the Walker Ranch conducted in 2002 and 2006, respectively. The first parcel was appraised in 2002 at an easement cost of \$360 per acre. Not quite four years later the other parcel, albeit much smaller, was appraised at nearly \$1,085 per acre, a CAGR of 37 percent, which means that in 2006, Fort Carson would have to pay 316 percent more than in 2002 for a conservation easement on the Walker Ranch.³ If inflation and the cost of leasing the 30,000 acres⁴ are taken into account, purchasing a 30,000-acre easement on this property at the end of a five-year period could cost DoD nearly \$21 million more for the easement—300 percent more in real terms (using the GDP deflator) (see Appendix I for the details of this calculation).

These trends also appear in other parts of the country and near other installations. For example, near NAS Whiting Field, Santa Rosa County, real property values saw a CAGR between 2002 and 2005 of 15.4 percent.⁵ Given the Santa Rosa County growth rate, waiting four years (2002 to 2006) may add more than another 75 percent to the cost of the conservation easement or other land purchases in real terms. Such growth rates also affect nearby Eglin AFB. In addition, near Eglin AFB, Walton County experienced compound annual growth rates of 34.2 percent between 2002 and 2005, so the cost of waiting to gain an easement in Walton County for the Northwest Greenway would rise to 225 percent.⁶ Even if prices do not increase at as high a rate given the market slowdown, it is still likely to cost DoD more by waiting, especially in these areas where property values have recently been growing faster than the national average.

In addition, other associated transaction costs will likely be higher if the military waits to acquire property interests, because of dealing with more landowners once land is subdivided, e.g., acquiring property from one large tract owner now versus acquiring land from 50 owners of smaller tracts in the future. Transaction costs include the appraisals; staff time to negotiate, review, and close the deal; legal fees and reviews; and monitoring the easement. Such costs

² This is according to most of the local government land appraisers and other experts that RAND researchers interviewed.

³ For more details on these calculations, see Appendix I.

⁴ Fort Carson is leasing some of this ranch land until it acquires sufficient funds to purchase more conservation easements. See Appendix C for more details. It is important to note that the lease amount is minor compared to the overall easement costs.

⁵ Florida Department of Revenue (2006).

⁶ These values would be slightly less when corrected for inflation. These numbers are not shown, because the RAND team did not wish to imply a level of precision given the approximate nature of the entire calculation.

are nontrivial. For example, the Navy and USMC pay \$20,000 to \$30,000 for each property appraisal.⁷ Such costs can accumulate when more properties are involved.

OSD and Service Support Is Critical

Some individual Encroachment Partnering projects at some installations depend on REPI support for success, but others do not. However, to fully address encroachment at an installation, the installation program needs REPI support.

As is illustrated in the buffering projects in the in-depth case studies (see the project descriptions in Appendices B through G), some of the individual buffering projects, such as some of those at MCAS Beaufort, NAS Whiting Field, and Eglin AFB, do not use any OSD funds, and in some cases not even Service funds. However, even where the buffering projects did not use REPI funds, they used congressional authority to help implement the buffering projects and having the REPI program helped give the installation programs more visibility, legitimacy, and partner support.

In addition, given the limits in nonmilitary funding, installation staffing, and other resources, installations need Service and OSD support to successfully address encroachment problems. In some cases, installations have done a lot on their own, but Service and OSD support is critical to installations' ultimate success at preventing significant amounts of encroachment through their buffering activities.

Individual Service support of buffering needs to be continued and strengthened. In other parts of this monograph, different ways that the Services can do more in this area are discussed. A couple of illustrations are presented here but they are discussed in depth in other sections, such as the staffing and management section. The USAF needs to have more recognition and support from senior management. The Army needs to fund more full-time ACUB staff at the installation level. The Navy and USMC need to work on streamlining their appraisal and project review processes, ideally engaging in more cooperative agreements and outsourcing the appraisal function where feasible and reasonable. All Services need to increase their financial investments in buffering.

All installation buffering activities could benefit from more OSD support in four key areas:

- financial support
- policy and implementation guidance
- implementation support
- technical and information sharing assistance.

How OSD should provide such support is discussed in Chapter Seven. Since OSD works closely with the Services to develop and implement the REPI program, this discussion also mentions important Service roles.

⁷ This estimate was provided by a land trust partner, who also mentioned that NGOs spend \$5,000–\$10,000 per conservation easement.

Local Government Support Is Useful, But Installations Cannot Rely on It for the Long Term

Zoning and other local government support is useful to have, but an installation cannot rely on this support over the long term. Local politics and policies are likely to change as development pressures increase. Zoning is not a long-term solution to the encroachment problem. It can help in the near term but zoning can change over time. Installations need to take advantage of favorable local government policies while they can, such as zoning and clustering development far away from the installation. Such community support needs to be fostered and leveraged as soon as possible because policies may change.

Even in places where the local governments strongly support the installation and have worked to cluster development elsewhere, such as in Beaufort County, South Carolina; Churchill County, Nevada; and Santa Rosa County, Florida, policies can change. In fact, people within all these local governments stressed during the interviews that newly elected officials can change policies. If pro-development advocates take over a county or city board, then the zoning policies and other local government policies that help protect an installation from encroachment can change. In addition, zoning exceptions are always being made, especially when significant amounts of money are involved, as RAND researchers found at several installations and as discussed above. Developers often have a lot of money and power within an area and they can make deals that help, or at least are perceived as helping, local governments economically. In such cases, the local government might waive a zoning requirement, possibly allowing higher density development near an installation.

As more people who have no experience with an installation move near one and as the local economy becomes less dependent on it, there is likely to be less support for the installation. Some may want to see the installation close if they are bothered by the noise of testing or training operations. Such attitudes could lead to turnovers in elected officials and in zoning and other policies that favor the installation.

Program Needs More Policy Guidance and Focus

Policy guidance is inadequate. As a result, there are inefficiencies in execution. As discussed above, each Service has implemented the REPI program without clear implementation guidance from OSD, which has caused inconsistencies across the different Services. It has caused confusion with partners and with joint efforts. Such lack of guidance has also resulted in extra time and money being spent to redo things and resolve difference of opinions in implementation. OSD needs to supply consistent policy guidance to the Services about how to implement the buffering program.

REPI's initial program guidance needs to be built on and expanded to focus more on implementation issues. Policy guidance is needed in a number of key areas. First, general consistent guidance is needed across the Services about how to implement the program. Such guidance will clear up confusion so that time is not wasted as different installation staff members discuss and try to decide how to implement the program. It will also help clear up confusion with partners, such as state agencies, that work with more than one Service.

Second, there is not enough focus and guidance on strategic issues that cut across installations, Services, and regions. Too much of the program focus has been on individual projects

at individual installations. More OSD policy guidance and emphasis are needed on broader strategic perspectives and activities, such as joint training and regional planning. More policy guidance is needed for addressing joint training and cross-Service buffering and regional collaboration to increase local installation and DoD-wide benefits. Similarly, more policy focus is needed on regional planning in conservation buffering activities. As discussed above, by working more at a regional level with both local and regional governments, installations can be more effective in addressing sprawl and environmental encroachment pressures.

Third, not enough attention is being paid to strategic environmental considerations because of the lack of OSD guidance. For example, policy guidance could emphasize acquiring conservation easements rather than restrictive easements and the need to look at broader ecosystem concerns. As discussed in Chapter Five, more effectiveness benefits could accrue if installation programs, especially the Navy's and USMC's, focused more on addressing habitat preservation, biodiversity loss, and other environmental concerns.⁸

Another policy issue for OSD is to consider how other federal agency policies affect the buffering program. There is not enough assessment and consideration of the effect on buffering of other federal agency land use policies and activities. These other policies could be leveraged more to better support installation buffering. For example, USDA programs that help fund the preservation of farmland could give higher priority to farmland that also helps buffer military installations. Similarly, BLM and Forest Service could set aside wilderness and wilderness study areas in habitats and ecosystems that are beneficial to the military installations, which would help installation conservation buffering activities.

A Range of Financial Issues Need to Be Addressed for Long-Term Success

This study found that a range of financial issues need to be addressed to make conservation buffering activities more effective and efficient. These issues need to be addressed to ensure that installations can succeed in addressing most of their encroachment problems. Six main issues are described below. First, much more money is needed by REPI and the Services to execute and complete buffering projects. Second, funds need to be multiyear funds. Third, OSD and the Services need to do more to encourage state and local governments to fund land conservation programs. Fourth, more needs to be done to leverage other military and federal agency funds to help with conservation buffering activities. Fifth, OSD and the Services need to address cost efficiency concerns that are affecting program effectiveness. Last, more funding is needed for strategic analyses and partnerships.

Increased Financial Support Is Needed for REPI and Service Buffering Programs

Currently, there is not enough military funding for planned buffering projects, and it takes too long to acquire the funding. In FY 2007, REPI received \$40 million, which in many cases, given current land prices, would not be enough to complete buffering plans at one installation.

⁸ Some within DoD have expressed concern about preserving critical habitat for protected species or wilderness near installations because they fear that the environmental community or FWS might object to noise from overflight and other testing and training operations. However, although in rare instances this may be a theoretical concern, experience to date has shown that protecting habitat has the reverse effect—helping provide regulatory flexibility, such as at Eglin AFB. In addition, the strategic preservation of habitat to reduce encroachment of protected species will likely involve some property that is not adjacent to an installations' fence line.

For example, Fort Stewart has estimated that it would cost a total of \$60 million to complete conservation easements and other land acquisition deals to buffer the entire installation. In addition, in some parts of the country, land values are so high that just one effective conservation buffering project can cost \$10 million to \$15 million or more. Two examples are presented to illustrate this point, one in Florida and one in Hawaii. At Eglin AFB, the first Nokuse Plantation conservation easement on 18,500 acres cost \$18.25 million, and at U.S. Army Garrison, Hawaii, the Waimea Valley buffering project on 1,875 acres cost \$14 million. The presence of partners with ample resources meant that the military needed only to contribute \$1 million and \$3.5 million, respectively. However, in the future, the military will likely have to pay a higher percentage of such deals, as has been seen other places, such as at Fort Carson; likely rises in land price will also increase DoD's costs. In addition, at a couple of installations, staff members have not submitted REPI project proposals because of the high costs of land and lack of partners. REPI and the Services need more funding for conservation buffering projects. Without more funding, as explained above, opportunities will be missed and installations' chances to address significant encroachment problems will be lost.

REPI Needs to Have Multiyear Funds for Buffering Projects

REPI funds for buffering projects are operational funds, so they expire at the end of the fiscal year. Given the timelines for approving funds, negotiating and closing deals, and acquiring funds, this one-year timeline has been a problem. Installations have had to scramble at the end of the fiscal year to complete projects in time. Some installations, such as NAS Fallon, Fort Stewart, and MCAS Beaufort, are able to avoid this problem because procedures have been put in place that allow funds to carry over past the end of the fiscal year. All installations need to be able to do this to ensure that no deals are lost because of this timeline.

State and Local Governments Need to Be Encouraged to Fund More Land Conservation Programs

Some state and local governments have funding to help with military installation buffering, although most do not. It is unrealistic to expect many state and local governments to have funds for this activity. However, more could be done by OSD and the Services to help educate state and local governments about the advantages to funding land conservation and how other states, such as Florida, and local governments, such as Beaufort County, have helped fund such programs and how they benefit both military installations and the community.

Other Federal Funding Sources Need to Be Leveraged More

There is not enough leveraging of other military and federal agency funds to help with conservation buffering activities. Other military programs, such as OSD OEA, the OSD Legacy Resource Management Program, and SERDP, can help support research and analysis activities that benefit conservation buffering. Some installations are taking advantage of such funds but others are not. Similarly, OSD staff members who work on both SRI and REPI activities are working to leverage other OSD program resources to benefit buffering activities. However, more of these funds could be used this way, such as OSD Legacy funds helping to pay for assessments of regional growth and the expected effect on installation encroachment and buffering program needs. Some installations are taking advantage of other federal agency funds, such as using USDA farmland conservation funds to help with buffering, and OSD has also

helped to have USDA NRCS program funds benefit REPI, but more could be done. OSD and the Services need to do more to help installations leverage such funds.

An Overfocus on Cost Efficiency Can Harm Program Effectiveness

As discussed in Chapter Five, the program has placed too much emphasis on cost efficiency issues at the expense of program effectiveness. First, there is too much emphasis on having partners provide funds for conservation buffering. It is unrealistic to expect all buffering projects to have partners who can match or even come close to matching military funds. Second, there is too much emphasis in the program on fair market value as defined by DoD's appraisal process. As discussed above, such emphases have caused effectiveness problems, such as lost deals. Given that conservation buffering benefits the installation, and the evidence shows, as also discussed above, that the military saves money by completing buffering deals as early as possible, while it has the opportunity, the program should not focus so much on such cost efficiency issues. OSD and the Services need to allow some flexibility in these issues because of the long-term benefits and eventual cost savings to the military. For example, the military should be able to take more advantage of donated conservation easements, especially in 2007 with the expanded federal tax incentive for 2007, and should be able to pay more than the appraised value when a genuine competitive bid is offered for the land. However, policies and procedures will need to be established to enable responsiveness yet provide reasonable oversight and approvals to prevent waste, fraud, or abuse.

More Funding Is Needed for Strategic Analyses and Partnerships

REPI has used its funds mainly for the actual purchase of property interests, such as restrictive and conservation easements. However, military funds are needed for more than just land acquisition, such as for strategic regional analysis and ecosystem collaborations, partner support, joint use and training analysis, and stewardship monitoring and enforcement. The importance of such issues for conservation buffering has been discussed in other parts of this monograph. REPI needs to have the flexibility to use funds to help pay for such activities when there is a clear need and benefit to an installation's buffering program. Such funding needs to be used for studies and support at the national, regional, and installation levels. For example, OSD could fund a study to identify where and how to more effectively implement buffering for joint use and training across the nation, and OSD could also provide an installation with funding to participate in or start an ecoregional collaboration to help address the loss of biodiversity and T&ES problems within the installation's ecoregion. In addition, installations should be able to fund strategic habitat restoration activities on protected buffering lands with REPI funds, regardless of whether the land has been protected with REPI funds.

The Implementation Process Requires Improvement

The conservation buffering program and projects are being implemented fairly well. In addition, OSD, the Services, and installations are making further improvements based on lessons learned. However, a number of different implementation areas could be changed to improve both program efficiency and effectiveness.

First, the military's process for developing, approving, and completing deals could be improved. The analysis found that many installation buffering projects take a long time to

develop and complete. In many cases, it can take a long time to build trust with a landowner and negotiate a deal, and this is to be expected. However, as was discussed in Chapter Five in the section on timing issues, the military process, especially the Navy and USMC process, takes too long to develop, assess, approve, and fund property deals. From appraisal through deal review to final offer can take up to a year. It can be difficult to engage landowners without funding in hand. Such processes need to be streamlined and other flexibility needs to be built into the system to enable the military to respond faster to real estate opportunities. Policies and procedures will need to be established to enable responsiveness yet provide reasonable oversight and approvals to prevent waste, fraud, or abuse.

Second, plans for long-term monitoring and enforcement of easements by partners and installations are often minimal. Closing a deal achieves only part of the objective of REPI, specifically, creating a buffer, but the quality of that buffer—the conservation part—also needs to be addressed to make projects and the program a success for the Services and DoD. Often, the military and its government partners do not emphasize such issues enough. In some cases, the language of the easement documents and agreements with partners about who has responsibility for monitoring and enforcement need to be strengthened. For example, all agreements with partners who have monitoring responsibility of conservation easements need to require completion of thorough baseline documents and firm timelines for their completion. This monitoring and enforcement issue is more of a concern when the military and state and local government partners have such responsibilities than when an experienced land trust does, because experience land trusts have in place standard procedures and requirements for such functions. However, even with an experienced land trust, the military needs to ensure that proper procedures are in place and being followed. More needs to be done to ensure that sufficient monitoring and enforcement procedures are in place. Ensuring both funding and sufficient staff to perform such functions is part of this process. In addition, the military needs to make sure that legal agreements with partners allow the military to step in to perform the monitoring and enforcement functions if the partner fails to adequately do so. It is also important in cases where the partners purchase the land, that proper legal procedures are in place to ensure that the land is permanently protected from incompatible development, because partners' policies can change. For example, the land conservation literature has shown how land given for conservation purposes to federal, state, and local governments and even environmental groups (that were not land trusts) has later been developed as organizational priorities changed.⁹

Third, in the program implementation so far, most installations have focused on buffering next to the installation, but other areas may also be important in addressing encroachment problems. Areas far from the installation may help buffer a low-level training flight corridor or preserve a key habitat. For example, at U.S. Army Garrison, Hawaii, buffering staff members explained that if key species and habitat are present on a property, but the land is not contiguous or adjacent to an Army facility, they would still consider it as a buffering project because it might help to keep the installation from becoming the remaining island of habitat for a federally or state protected species. Off-installation testing and training areas over water also need to be addressed. Some installations, such as U.S. Army Garrison, Hawaii; Eglin AFB; and NAS Fallon, are strategically thinking of areas that are not next to the installation or in the AICUZ footprint. However, most start by buffering close to the installation. In addition,

⁹ For many different examples, see Brewer (2003, Chapter 4, pp. 78–96).

RAND researchers found that some installations are not submitting REPI project proposals in strategic areas that are not adjacent to the installation or in the AICUZ footprint because they do not think Service headquarters and OSD would accept proposals for projects in such areas.

Fourth, at many installations, often because of Service guidance and policies, there is not enough emphasis on environmental and conservation concerns; the emphasis is on sprawl only, with no consideration of long-term environmental consequences. The interviews and analysis revealed that at many installations, especially some Navy and USMC ones, installation staff tended to focus more on addressing sprawl in the buffering projects than on preserving habitat and addressing other environmental issues. Environmental issues were more of a concern for the partners. More headquarters staff, regional Service staff, installation buffering staff, and other staff need to be educated about the need and importance of also focusing on environmental issues, especially long-term strategic efforts to protect ecosystems and other ecological systems. Even at Fort Carson, where the buffering program and other environmental staff are very strategic at preserving habitat within the CSP ecoregion and addressing long-term environmental concerns, a conservation NGO partner stated that some of the installation staff needed more education on the importance to the program of habitat and ecological system protection.

Another example of this problem was the emphasis on using restrictive easements instead of conservation easements by the Navy and USMC.

Development of Partnerships and Working with Partners

This study found that the partnerships of most of the buffering projects have been quite successful. Partnering with NGOs and state and local governments in buffering is, as one commanding officer stated, “mutually beneficial,” as demonstrated by the many benefits for the military, the environment, and the community that were discussed in Chapter Five.

In developing and carrying out partnerships, it is important to have a partnering relationship that focuses on joint collaboration rather than on the best real estate deal for the military. Several Navy and USMC staffers at different installations stated that their partnership relations could be improved by focusing less on money and more on collaboration. A military staff person involved with buffering at Camp Lejeune stated that the 50-50 percent matching funds requirement makes it difficult to approach a partner when one is expected to get the best possible deal from the partner, and that this program should be more about cooperation and partnerships, rather than trying to get the best deal (in price) for the Service.

Projects Leverage Diverse Partners for Different Buffering Needs

Installations are leveraging diverse partners for different buffering needs around their installations. First, land around a base has different compatible use potential that different organizations will support, so installations use the land for different purposes with different partners. For example, NAS Whiting Field has leveraged TNC and state conservation partners to do buffering projects related to habitat preservation and nature trail building; USDA to preserve agricultural lands; and Santa Rosa County partners to buffer land as an offroad vehicle park and an industrial park. Potential partners also have different motivations for participating in buffering projects. TNC, for example, wants to preserve ecological unique, rare, or important

habitats for preserving biodiversity; USDA wants to help protect farmland; and a county may want to protect open space and create new outdoor recreational facilities. At four of the six installations studied in depth, the installation buffering program started by working with one partner but brought in others as the program matured and the need to acquire different types of properties arose.

Second, partners bring different expertise, skills, contacts, and resources. For example, at Fort Stewart, TPL helped with community outreach and the greenprint process¹⁰ and negotiated deals with local landowners. Furthermore, TNC negotiated a deal through contacts with International Paper, and Ducks Unlimited is working to identify buffering projects to protect wetlands and conservation easements that would help protect habitat for migratory waterfowl.

Third, different partners help to leverage diverse types of funds and funding sources. Examples of different types of funding sources that have been used to help with conservation buffering include habitat and conservation, Department of Transportation, state and local land conservation and park acquisition, and agricultural and ranch land preservation. For example, at NAS Whiting Field, Santa Rosa County helped to acquire FDA funds and TNC helped to acquire Florida Forever conservation funds.

Besides directly funding investments, partners also contribute significant time, skills, expertise, and other resources to conservation buffering. An additional point here is that partners can access diverse types of resources (not just funds, also data, expertise, etc.) from different sources. This means a much broader array of resources become indirectly available to the military, most likely more than it can access on its own. This expansion of the network is a value that should not be discounted. In addition, partners carry the costs of maintaining (and expanding) ties with entities that can contribute to the creation and maintenance of conservation buffers. This is yet another benefit to the military.

Cooperative Agreements Are a More Effective and Efficient Approach to Buffering

As discussed in Chapter Five, cooperative agreements with partners enable installations to complete buffering projects more effectively and efficiently by outsourcing key functions, such as the appraisal process.

The Army's program delegates a large amount of program authority to partners through the use of cooperative agreements with NGO partners. With the Army approach, the NGO partners approach landowners and negotiate the deals, they manage and conduct the appraisal process, and they have responsibility to monitor, manage, and enforce the easements. The Navy's approach, by comparison, has focused more on real estate transactions and partnering with local governments or NGOs, delegating some, but not as much, authority to the partners. For example, the Navy has the partner approach the landowner and negotiate the deal. In fact, it is important to note that because of unique local circumstances, some individual Navy and USMC installations have delegated more authority than others.

The delegation of authority to partners has a number of advantages. First, it often speeds up the process, especially the appraisal process, and has also made it cheaper. One NGO, for

¹⁰ TPL uses a conservation visioning and greenprint process when working with local communities and regions to help them develop and implement a conservation strategy, which includes a vision, priorities, and a plan for protecting different natural areas in a community. For more information on this process, see the Fort Stewart case study in Appendix D.

example, said that each appraisal costs them \$5,000 to \$10,000, whereas the Navy and USMC usually spend about \$20,000 to \$30,000 for each appraisal. Second, the NGO partner can often more easily approach and negotiate with some landowners than installation personnel can, especially landowners who mistrust the installation because land was taken from their family originally to create the installation. Third, NGO partners are experts in obtaining conservation easements and often can negotiate for and accept donations of land at less than the appraised fair market value. Fourth, if the property needs to be bought as part of the deal, the NGO can do that; current policy does not permit the military to acquire property through this program. Fifth, a cooperative agreement approach, with more authority shared with the partner, fosters more of a true partnership relationship, since the partner has a more significant role and more responsibilities in the buffering process. As one Navy real estate staff member stated, the Navy approach is to treat acquiring easements as real estate agreements or deals rather than as cooperative agreements, which does not help foster collaboration and partnerships as much as a cooperative agreement does. All of this means that cooperative agreement relationships have both efficiency and effectiveness advantages.

Community Relations and Outreach Are Critical to Success

Community outreach is an important part of buffering program activities.

More Successful Projects Have Built Long-Term Positive Relationships with the Community

Having and building long-term positive relationships among installation staff and the community and partners was important to success. It takes a lot of experience and time to develop the relationships to make conservation buffering work. Since buffering projects depend on willing sellers and community and NGO partners, their participation in the program depends on trust and understanding. Installation staff members who had the lead on conservation buffering were well trusted in the community. In fact, at many of the installations that had been successfully addressing encroachment, installation staff members had been at the installation for 10 years, 20 years, or more and were well known and trusted in the community.

Outreach Takes a Large Amount of Time and Effort

For a successful program, the installation and its partners need to spend a large amount of time on community outreach for a variety of reasons. They need to explain the benefits of the program to the public so that landowners and other organizations will learn about the program and help support it. Outreach is also needed to help develop and engage local government support, especially in addressing regional growth issues. It is needed to build trust and community visibility for the program. Public outreach is also needed to help overcome some landowner distrust and bad feelings toward the military because of historical land takings to create and/or expand the installation. Gaining credibility with landowners is critical to having landowners volunteer to participate in the program.

It is important to note that careful consideration needs to be taken about when to announce and publicize deals. Announcing a deal too early can cause problems with landowners. In fact, at one Army installation, a deal was kept secret for almost two years because the landowner wished it; he said that if news of it appeared in the newspaper, the deal was off. This consideration complicates installations' ability to report on buffering projects in official

Service and OSD documents that could become public. Also, land prices near the installation will sometimes increase after the public announcement of a deal, as they did at Eglin AFB and Fort Carson.

Program outreach, as discussed in Chapter Five, also provides other community relations benefits for the installation, such as improving the installation's environmental and community image.

Outreach is also important to the installation internally, in helping engage the support of senior installation management, especially the installation commander.

Installations need to provide senior installation management and buffering staff for outreach. The Navy EP program and USMC CP&LO are good models of such support. Other installations should also provide such manpower support, which is discussed more below.

Program Needs More Staffing and Management

Staffing and management issues occurred at all levels. More high-level Service headquarters support and installation commander support are needed. Having enough working staff to support buffering at the installation level is also critical to long-term success. The analysis found that at most installations, at least one full-time installation staff member is needed for Encroachment Partnering. However, a more detailed manpower study is needed to judge the exact mix of skills and manpower needed.

First, it is important throughout the Services to have senior management and headquarters support conservation buffering. Where headquarters management was not as supportive of the program, it was difficult to be as effective at the installation level. Army, Navy, and USMC installations all had strong support from headquarters management and staff. These Services even invest resources to help with conservation buffering, which help installations be more successful in their efforts. However, within the USAF, in the past, some senior managers at headquarters have not seen a need to participate in conservation buffering, which makes it difficult for installations to undertake conservation buffering activities. Without senior staff support, conservation buffering is not viewed as important and does not receive the needed resources.

Second, it is important to have the installation commander and senior management staff support and actively engage in conservation buffering. Installations with the commanders' support and understanding about the importance of the buffering program can be more effective, because it helps provide staff support, helps motivate the staff, and helps with community outreach. MCAS Beaufort is a good example; because the CP&LO reports directly to the commander, installation staff members understand the program's importance and the commander knows it well. The commander discusses the program with the local governments and community, explaining it clearly and demonstrating its importance to the installation. Even though Eglin AFB has commander support for conservation buffering, senior staff do not conduct as much outreach as at other installations, such as MCAS Beaufort. It is much more difficult for Eglin AFB to show the importance of conservation buffering when a junior officer, rather than a senior installation staff member, attends local government planning meetings.

There also is not enough experienced staff support for buffering. At many installations, especially in the Army and USAF, conservation buffering is another duty assigned because the installation commander feels that it is important, but the installation does not have the resources or staffing billet to dedicate a full-time person. Many of these installations, such as

Fort Stewart and Eglin AFB, are creative in finding ways to get staff help; however, they could be even more effective with more official dedicated staff support.

In addition, conservation buffering is a new collaborative approach that cuts across different functional and discipline areas, so involvement of staff with diverse expertise is needed, including environmental, real estate, legal, and training staff. A multidisciplinary approach, involving staff with expertise and skills in all these areas, is needed. In some cases, buffering is handled mostly by one discipline and not enough expertise from other disciplines is brought into the program.

Most installations need at least one full-time civilian installation staff member for Encroachment Partnering. The Navy and USMC both have a good model for doing this at many of their installations, such as at MCAS Beaufort and NAS Whiting Field. Explaining the program to the community, developing priorities and projects, managing projects, and working with partners all take time. A full-time installation buffering person is needed who is well known and trusted in the community to conduct community outreach and communications, to develop trust with landowners and other community members, to assess priorities and manage the program, and to work with the partners. Because it has a full-time dedicated well-trusted EAP staff member, NAS Whiting Field has significant interaction with, support from, and a strong working relationship with the local government. Eglin AFB has a dedicated Mission Enhancement Office that works with local communities to minimize encroachment by focusing on compatible growth planning. However, since Eglin AFB does not have dedicated buffering staff, it does not have as strong a relationship with the local governments on buffering as NAS Whiting Field. In fact, Eglin AFB relies on NAS Whiting Field staff to help with local government buffering outreach to Santa Rosa County. It is also easier for NAS Whiting Field to engage in outreach to local governments, since it is a smaller base and is in only one county whereas Eglin is in three counties and needs to interact with 13 municipalities. However, this is all the more reason why Eglin needs at least one full-time conservation buffering staff member to help with conservation buffering issues and local government outreach.

More Information Sharing and Technical Support Are Needed

Information sharing and technical support about how to implement the program are needed at the installation level, since many installations have only limited staff support and experience with buffering. Since it is a new program that cuts across traditional disciplines, it is difficult for one person to have all the necessary knowledge. Many installation buffering staff need information about what works and does not work and how to implement the buffering program.

In the interviews, the RAND team found that many staff members feel that they lack experience and skills and need more technical support and training to implement the buffering program. They felt that they could benefit by learning from successful, more experienced installations about what works and what does not in conservation buffering. For example, installations that are just starting buffering programs could learn from installations that have had several years of experience in successfully developing a buffering program, such as Fort Bragg, Fort Carson, and NAS Whiting Field. Staff members need to learn from other installations so that they do not reinvent the wheel or repeat mistakes because of lack of knowledge. Having staff learn from others' experiences will save installations time and money.

Similarly, the RAND team found that installation staff did not know what other installations were doing and thought that it would be useful to share information and experiences on areas of mutual interest. For example, MCAS Beaufort local government partners were very interested in developing a TDR program that would benefit the community and the installation. Neither the MCAS Beaufort staff nor their partners knew that NAS Fallon's buffering program was based on a TDR program with Churchill County, and they became very interested in talking with experienced staff and partners at NAS Fallon to learn from their experience.

There is some informal information sharing across some installations, but more formal information sharing would be useful. For example, Camp Blanding and Camp Ripley have shared information as their buffering programs have evolved. Service and installation participation at an LTA annual conference found that it was a beneficial learning experience.

Summary

In sum, the RAND team analysis shows that the conservation buffering projects thus far have had some effect at addressing encroachment and accomplishing the primary goals of the program, promoting military readiness and limiting incompatible land use. The projects have also preserved habitat, delivered other environmental benefits, and had other community benefits. However, the REPI program could be even more effective. One key issue is the level of funding; another is the implementation process, which needs to be more agile so that installations can compete in a fast-moving real estate market. In addition, the program needs to focus more strategically on addressing biodiversity loss and T&ES in buffering activities, such as by participating in regional efforts to preserve ecosystems, as well as addressing other environmental problems.

There is a critical importance of acting fast. Land is a finite commodity, and economic and demographic pressures are likely to increase the demand for it. Even bases sited in still-remote areas need to develop buffering plans and take action now, because even if they are not feeling encroachment pressure now, they likely will in the not-too-distant future. It is much easier and cheaper to deal with the problem now.

Recommendations to Improve Military Conservation Buffering

This assessment found that the REPI program and installation conservation buffering projects, so far, appear to be effective at helping prevent some encroachment problems, but more can be done. In addition, it is too soon to predict the long-term success at solving most encroachment problems. At some installations, such as Fort Carson, there is the strong potential to prevent most of the installations' encroachment problems. However, a number of program improvements are needed to help reach this goal and improve program effectiveness, as discussed in Chapter Six. In this chapter, recommendations are made as to how to meet these needs with more program help from OSD, the Services, and even Congress.

These recommendations come from three sources: first, from the interviews where people raised issues about effectiveness and efficiency needs. Installation staff, partners, and other relevant experts were all asked about what they thought was needed to improve the program. Second, the recommendations are based on the criteria that were applied to and analysis of the case studies, where common threads were found that were broadly applicable to the program. Third, they came from analyzing program, installation, and other relevant documents.

DoD Should Strategically Address Both Fundamental Causes of Encroachment

OSD and the Services need to ensure that installations are addressing sprawl and biodiversity loss in strategic ways in their conservation buffering activities.

To address sprawl, OSD and the Services need to ensure that installations are looking strategically and regionally at development issues. Installations need to work more with local and regional governments on growth management. OSD and the Services should fund studies to help assess regional growth issues; fund more efforts to partner with local and regional governments, NGOs, and other organizations on regional planning and growth management; and provide staff to conduct outreach more with local and regional governments in such efforts. More REPI, SRI, and other OSD funds should be used for such activities. In addition, OSD and the Services should develop outreach materials to explain to local governments the costs of sprawl to the community and installations. Installations and their partners need to help educate communities on these topics; outreach materials would help do this.

To address biodiversity loss, OSD and the Services need to make sure that buffering activities focus on biodiversity loss by concentrating more on habitat and broader ecosystem protection and management. More needs to be done to partner and work with other federal agencies, state and local governments, NGOs, universities, and the private sector to protect

and manage ecosystems to prevent the loss of biodiversity and T&ES problems. More REPI, SRI, and other OSD and Service funds should be used for installations to participate in collaborative regional ecosystem management and assessment activities. In addition, REPI and the Services should make sure that installation commanders and senior Service and OSD staff understand the strategic importance of addressing biodiversity loss and regional ecosystem concerns in helping address encroachment problems. REPI with the help of the Services, conservation NGOs, such as TNC, and strategic installation environmental staff, such as at Eglin AFB and Fort Carson, should develop written materials that explain the importance of managing and having healthy ecosystems and protecting biodiversity for addressing encroachment problems. Such materials should also provide examples of regional ecosystem collaboration efforts that military installations are participating in. These materials should then be used to help educate OSD, Service, and installation and partner staff. OSD, the Services, and installations also need to help educate other key stakeholders, such as other federal, state, and local governments, on such topics and the same materials can be used to do this as well.

In addition, OSD and the Services need to ensure that critical testing and training ranges that are still in remote areas and do not appear to have such encroachment problems today are also part of the buffering program. The military needs to strategically buffer these installations before encroachment problems make it more difficult to do so.

Urgency for Action: OSD and Services Should Invest More Resources

Because installations share a common need to act swiftly or lose opportunities to buffer, as surrounding lands are subdivided and become too expensive and owned by too many different entities, OSD and the Services should invest more resources in buffering now. Such resources include financial, manpower, policy guidance, and technical support. Although recommendations for how to increase such resources appear throughout this chapter, this section discusses the fundamental need for more funding by Congress and OSD for this program.

Given high land costs, the need to act fast or lose opportunities, the estimated costs to complete buffering programs at major installations, and the fact that REPI had over \$150 million in installations' requests for buffering projects for FY 2007 funds, REPI's budget could easily use \$150 million in FY 2008 and probably more after that to sufficiently fund and address encroachment.¹ However, more analysis is needed to determine the right amount. In fact, OSD should commission a study to determine the level of investment needed over the next five to 10 years to buffer most of the main testing and training installations against the majority of their encroachment problems. A budget of \$150 million or even more would be needed to complete the major buffering needed over the next five to 10 years. The right investment needs should be assessed now. Then, a reassessment should be made in two to three years to see if the funding is sufficient and that enough encroachment is being prevented. After these higher investments for five to 10 years, the program should be able to be significantly reduced in size and be in a maintenance mode. Namely, with more investment now at the main testing

¹ This rough estimate was also based on the following facts: Completing buffering programs at individual installations is estimated to cost as much as \$60 million, individual projects can cost \$10 million to \$15 million, land prices are high and increasing, and funds are needed for analysis and other functions, not just land purchases. Most important, the estimate also takes into consideration what could be executed in FY 2008.

and training installations, the majority of encroachment problems that can be addressed by buffering activities will be mostly solved and then funding would be needed mainly for maintenance activities, such as monitoring and managing the buffering projects and, where necessary, participating in regional ecosystem management activities.

Since it will be difficult to acquire enough additional funds, OSD should consider a different prioritization scheme for allocating funds to installation projects. OSD should adopt a three-phased approach to allocating funds. First, it should allocate most of its funds the way it has across many different installations, since this helps facilitate buffering at different locations that might not buffer without some OSD seed money. Second, REPI should dedicate some of the program funds (ideally, additional funds that are allocated to the program) to a few installations that have already made significant progress in addressing encroachment or have high probability of doing so, such as Fort Carson. Such installations would receive funding each year until they have dealt with as much of the encroachment threat as possible through this program. Third, REPI should dedicate some funds to a few installations that seem to be of highest priority to the military from the standpoint of joint testing and training and seem to have a likely probability of success, such as Eglin AFB and NAS Whiting Field. Again, such installations would receive funding each year until they had dealt with as much of the main encroachment threat as possible. An important part of this third phase is identifying the strategic joint use and training areas with the highest training value and highest potential for success with conservation buffering. OSD should conduct an assessment to identify these places.

However, it is important to note that in any prioritization scheme, OSD and the Services must have some flexibility to move funding from installation to installation as circumstances and opportunities change.

DoD Should Not Assume That Zoning Will Solve Encroachment Problems

Some within Congress and the military have assumed that working with local governments on zoning and other land use controls near installations will solve many of the installation encroachment problems. The RAND research team found that such zoning can be useful, but it cannot be relied on over the long term. DoD should take advantage of zoning and other local government support, such as clustering development away from the installation, while DoD has it. However, no one should assume that zoning will solve encroachment problems. In the long run, zoning will likely be changed or exceptions will be made as local development pressures increase and politics change. In addition, DoD should be acquiring more conservation easements and performing other long-term strategic buffering activities to ensure that areas near the installations are permanent buffers against encroachment instead of relying on zoning or other nonpermanent land use control policies.

Improving Program Policy Guidance and Focus

For the conservation buffering program, REPI should build on “The Department of Defense Conservation Partnering Program Guide” to develop more overarching program implementation guidance. This policy guidance should include a consistent approach across the Services for how the program should be implemented. Because of the benefits from collaboration and

outsourcing key functions, such as the appraisal process, the Army's cooperative agreement approach with partners seems the best model, rather than Navy's real estate approach. The RAND team recognizes that a cooperative agreement approach may not always be feasible or most effective given local conditions. However, all installations should be allowed to pursue such a model if it seems most appropriate for their needs.

This guidance should focus on leveraging funds from diverse partners when it makes strategic sense and is reasonable to do so. It should also require that REPI-funded projects focus on conservation as much as possible where appropriate, such as implementing a conservation easement if a property has potential conservation value and where feasible.²

Guidance should emphasize assessing, developing, and participating in broader strategic and regional issues that cut across installations and Services. It needs to include examining regional collaboration possibilities for joint training and cross-Service buffering synergies and benefits. It should also include a focus on collaborative regional planning, ecosystem, watershed, ecoregional, and other environmental and sustainability approaches with local governments, NGOs, other federal agencies, and other relevant stakeholders. Regional growth management is another key focus area. This involves participating in existing regional collaborations and helping to start new ones, as Fort Carson helped to do with the CSP partnership. As discussed above, such regional approaches and collaboration are needed to address sprawl and environmental encroachment issues.

Similarly, OSD guidance should also make clear that the installation's program needs to assess and address the fundamental issues of sprawl and biodiversity loss, both locally and regionally and in collaboration with local community and other key stakeholders. Collaborating and coordinating with local and regional planning agencies, conservation groups, and communities to work toward mutual goals is an important part of this process.

OSD implementation guidance is guidance regarding core program elements and should not be so strict as to limit flexibility and innovation by the Services and individual installations, which should be able to adapt to unique circumstances and local needs. For example, outsourcing the appraisal process to a partner may not be the most efficient or even a feasible option at some installations, so the military may need to perform this function.

OSD should provide a guiding handbook about how to implement the program. This handbook should address issues where there has been confusion and inconsistencies across Services. It should also address the fair market value issue as discussed above. Namely, it should allow exceptions to the appraised fair market value requirement and permit higher offers, if there is another verifiable offer to purchase the land, and it should permit land donations.

OSD needs to ensure that the Services are coordinating installation buffering plans with long-term plans to acquire land for strategic training. This should be part of the implementation guidance as well.

OSD should also develop umbrella MOUs and cooperative agreements with different key strategic partners that are currently or could become involved in buffering at more than one installation, such as TPL, TNC, and state agencies. It should also develop and make available some standard agreements as templates for different types of organizations to use, such as with local governments and local land trusts.

² If a property does not have any current, potential, or future conservation value, a restrictive easement may be sufficient. In addition, some landowners may not want a conservation easement, so this might not be a feasible option.

OSD needs to assess the effect of other federal agency policies and actions on conservation buffering to identify potential synergies and conflict. This includes looking at congressional bills regarding other federal agency land use and policies. For example, the “roadless rule”³ to protect almost 60 million acres of roadless areas in national forests from road construction and most logging could help benefit conservation buffering if it protects key habitats that are important to conservation buffering, such as LLP ecosystems. OSD should also meet with Congress and other federal agencies to explain the potential benefits or problems with the proposed policies and actions related to the conservation buffering program and should work with other federal agencies to make sure that proposed policies are enacted that help the buffering program. For example, OSD should work with DOI and USDA to set aside and protect more wilderness and wilderness study areas and perform more ecosystem restoration and management activities on BLM and FS properties in ecosystems and ecoregions that would benefit military conservation buffering by protecting more habitat and T&ES on these other federal lands.⁴ Similarly, OSD should work more with USDA to have its agricultural land and conservation programs give more priority to protecting agricultural lands that benefit installation conservation buffering. As discussed above, staff members who work on SRI and REPI activities have already made some progress in this area, but more could be done. For example, it is important that the 2007 Farm Bill’s program support conservation buffering. In addition, where synergies are found, OSD should make sure it provides guidance to the Services and installations about how to take advantage of such activities.

Similarly, OSD should assess the relationships with and work for more synergies with other OSD programs. SERDP and the OSD Legacy Resource Management Program are two that can be exploited more to support conservation buffering. OSD should make sure that its guidance provides information about how such programs could be used to this end.

Addressing Financial Issues

As discussed above, Congress, OSD, and the Services need to invest significantly more money to support this program. However, a number of other financial changes need to be implemented to improve the program.

First, OSD needs to ensure that multiyear funds are available to all Services and installations. As discussed above, some installations can carry funds over to the next year but others cannot. OSD and Congress should set up the funding mechanisms so that all REPI projects’ funding carries over for at least two years.

Second, OSD, the Services, and Congress should work with state and local governments to support the funding of land conservation for installation buffering benefit. Successful state and local government programs, such as Florida Forever and Beaufort County’s Rural and Critical Land Preservation Program, can be used as models. TDR programs, such as the one in Churchill County near NAS Fallon, that help local governments generate the funds, are another important model. OSD should make sure that these successful state and local government

³ For more on the “roadless act,” see “Roadless Conservation Act Introduced in Congress” (2003).

⁴ Similarly, DoD could work with other federal agencies, such as the Department of Energy (DOE). BLM and FS were emphasized here because these agencies, like DoD, manage the main locations on federal lands containing biodiversity and where the biodiversity is most at risk. See Appendix A for this evidence.

funding programs and their benefits for installation buffering are documented and explained to other state and local governments to encourage them to develop similar programs.

Third, REPI should assess opportunities for and help support leveraging of other military and federal agency funding, especially for land and ecosystem analysis and preservation, such as USDA funds. Some installations, Fort Sill and NAS Whiting Field for example, are taking advantage of USDA conservation and farm program funding for military conservation buffering. Similarly, REPI has helped to get USDA NRCS to support buffering and leverage other OSD program funding. However, more could be done to leverage other military and federal agency funding to help support buffering activities. Local installation staff members lack the time and expertise to do this assessment, and it also is inefficient for each installation to do such analyses. REPI should provide information to the Services and installations about such opportunities. To do this, REPI should review and assess which other military and federal programs can help support REPI and how best to organize and provide this information to installations. For example, REPI could assess how the various USDA farm programs, such as the Farm and Ranch Lands Protection Program, could be used to help conservation buffering. Then it should distribute the information learned to the Services and installations. REPI should also be strategically assessing how best to leverage its limited funding with the help of these other federal and nonfederal sources (as well as their activities).

Fourth, given the potential to lose buffering deals and hurt partnership relations, OSD, the Navy, and the USMC need to make it clear that the program does not require that partners match or even closely match military funds.

Fifth, Congress and DoD need some flexibility in implementing the appraised fair market value requirement in acquiring land interests for buffering. Installations and their partners need to know that they can and need to be able to acquire property at less than fair market value if landowners agree and know that it is below the fair market value and the military has disclosed the appraised value. In some cases, landowners will want the tax advantages that come from donating conservation easements. Similarly, in cases where a verifiable offer is made for the property that is higher than the buffering program appraised fair market value, the program should be allowed to match that offer if the property is important for addressing encroachment problems. Besides, technically, fair market value is what the land will bring in the market, not what an appraiser values it at.

Sixth, OSD needs to speed up the funding process for approving and providing funds to buffering projects. An important part of doing this is to create an emergency funding reserve. Part of REPI project funds would be held in reserve for unique buffering opportunities that come up after the REPI proposal and approval process. For example, if a landowner suddenly decides to sell property that was not in a proposal but is important to help buffer an installation, then the installation should be able to take advantage of this opportunity.

Seventh, OSD and the Services should help fund more than just the land acquisition process. Funding for regional growth and ecosystem assessments, collaboration, and management is also needed to help improve the program, especially for addressing strategic issues such as preventing biodiversity loss.

Improving the Buffering Implementation Process

A number of issues in implementing the conservation buffering program should be addressed to improve the program's efficiency and effectiveness.

First, the process needs to be faster in developing, assessing, funding, approving, and closing deals with landowners. The development of clear and consistent policy guidance, mentioned above, should help with some of the timeline problems. In addition, to help make individual project deal development and approval processes faster, the Navy and USMC project appraisal, deal review, and final approval process should be streamlined by outsourcing the appraisal process to partners or speeding up the Service appraisal process and by reducing regional and headquarters review requirements for each project. Similarly, the other Services should also try to streamline these activities where they can.

Such measures still will not be sufficient to make the military process fast enough to compete in a competitive real estate market. Therefore, in areas where competition for land is strong, once an installation conservation buffering program is established, OSD and the Services should consider designing a system where they can delegate some deal-making authority and some funds to the local level as another option for completing buffering projects. This process ideally would include establishing a fixed rate for a conservation buffer or land price so that the lengthy appraisal process could be avoided. In easement cases, a standard conservation easement document could be developed, which would not require a lengthy rewrite and review. Namely, the installation and its partners would have some funds and purchasing authority readily at hand to respond quickly to an unexpected opportunity. Such a proposal may not be feasible given the current laws and requirements, but these could be changed for this purpose. In addition, there is a federal model for doing this, which can be seen in how the FWS acquires water rights for Stillwater National Wildlife Refuge (SNWR). The FWS has placed people and resources on-site and, through planning efforts, has created a program template for real estate transactions involving the purchase of property and water rights in Churchill County. FWS offers a fixed rate per acre purchase price based on the cost of land with water rights. With this process, the local FWS real estate agent can purchase land as fast as any private entity. With the FWS system, purchase contracts still need to go to the regional FWS office for acceptance. However, if they have been solicited according to the program guidelines, the approval is routine and quick. A similar process could be established for some of the conservation buffering projects in the high-priority buffering areas, especially ones that involve a lot of landowners or competitive markets, such as near MCAS Beaufort or Fort Stewart. Besides making the deals faster, such a process would also reduce transactional costs. It would also allow landowners to choose between taking a quick deal with a fixed rate or undertaking a more lengthy process with a formal appraisal process and a customized easement document.

As discussed above, another process that could be implemented to help projects acquire funding faster is for OSD to keep money in reserve during the year to provide funding on short notice for new opportunities that arise.

Second, OSD and the Services need to ensure that there is sufficient monitoring and enforcement of the easements in place and that the language of the easements and partnerships sufficiently addresses these issues. Sample language should be included in OSD guidance. OSD needs to ensure that there is appropriate long-term monitoring and enforcement of easements by the appropriate partners and military staff. In most cases, such functions should be performed by an external qualified third party, such as a land trust, rather than by installation

staff. However, OSD and the Services should ensure that the agreement language allows the military to take over monitoring and enforcement functions if the partner cannot or is not performing them sufficiently. Installation staff members usually do not have the time or expertise to perform the monitoring and enforcement tasks. In addition, if military staff members have to perform monitoring and enforcement, it could hurt community relations if there is a violation. Past history has shown that the military has not always enforced its easements well, such as at NAS Oceana, where restrictive easements were not enforced. When the military performs such functions, OSD and the Services should ensure that enough staff members are assigned and enough attention paid to such issues.

Third, where beneficial, OSD and the Services should encourage buffering projects to focus on land that is not directly adjacent to installations. In the past, the Services and OSD have given some priority to projects that are near installations. This should not be a requirement when there are clear benefits to acquiring property elsewhere, such as protecting key habitat or a low-level flight training pathway.

Fourth, implementation should focus more on environmental concerns, such as broader ecosystem health and species protection to help address biodiversity loss and T&ES issues. OSD and the Services should emphasize such issues more in program implementation with installation buffering staff. OSD and the Services should help fund and participate in local and regional environmental collaborations, such as ecosystem management, watershed planning, and community and regional sustainability. Using OSD Legacy and SERDP grants can help fund such activities, especially research and analysis of some of the ecosystem issues. Such funds could be used to help assess other ecoregion and ecosystem preservation needs, as the CSP ecoregional assessment did. REPI staff should do more to work with these other OSD programs' staff to ensure that these activities support conservation buffering. OSD and the Services should encourage and explain to installations the need to focus more on such environmental issues, how such program funds can help them, and how to apply for them. In addition, in implementation, installations should use conservation rather than restrictive easements as much as possible.

Developing Partnerships and Working with Partners

OSD, the Services, and installations can do several things to help to improve their partnerships in buffering.

First, they should encourage installations to leverage funds from as many partners as possible for different buffering needs. Part of OSD's role here, as discussed in other parts of this chapter, is providing information about other partnership and funding opportunities, such as with USDA and FWS.

However, having diverse partners should be a criterion for evaluating only the overall installation program, not individual projects. In reviewing buffering project proposals, REPI and some of the Services have weighted individual projects more heavily if they have more partners involved. Having many partners involved in one buffering project deal is not necessarily beneficial, because it complicates and usually slows down the process. Partners, especially if they are contributing funds, will need to review the documents and will want to make sure that their interests are represented, which can take time and impose extra requirements, such as in the final conservation easement language.

Second, where possible and reasonable, all Services should allow installations to use cooperative agreements with partners and rely on them for key functions in the process, such as having experienced NGOs handle most of the appraisal and negotiation process. As discussed above, such outsourcing and delegation of responsibilities to partners saves some money and time, and partners can do things the military cannot.

Last, OSD and the Services need to give more credit and acknowledgment to partners' diverse contributions to conservation buffering, such as donating overhead costs, natural resource and GIS support, negotiation and conservation easement expertise, and counties clustering development away from the installation. Such credit needs to be included in any assessment of how the program leverages resources with partners, rather than just focusing on the dollar amounts, and in any reports to Congress about the program. Acknowledging how much organizations such as Santa Rosa County have supported installation buffering activities would help with partnership relations.

Improving Community Relations and Outreach

OSD, the Services, and installations need to support more community outreach as part of the buffering program. Expanded outreach is most needed with local governments, especially in cases where an installation has many different local governments near the installation. OSD and the Services should require that installation staff members participate in community planning as part of their conservation buffering activities. Local governments' planning processes and views can have a large effect on installations' efforts to buffer and address sprawl problems. Much time and effort are needed to work with all the different local governments, but it is worth the investment to help an installation's buffering program, as discussed above.

Both OSD and the Services should help fund planning collaboration with local and state governments. More planning analysis is needed to help assess potential growth management options that would also help address encroachment problems.

As part of the buffering program, installations should be required to develop an installation encroachment "road show" and present it to many diverse public audiences. Such a presentation could explain the importance of base training and testing and how and why it can affect neighbors, such as being noisy, and how the community and landowners benefit from conservation buffering. Installations such as Fort Carson and MCAS Beaufort found such a presentation useful in getting the word out about the buffering program.

OSD and the Services should help installations educate their own installation management and staff about the importance of addressing encroachment and having a strong, well funded buffering program. They also need to make sure that headquarters staff members support the program.

Addressing Staffing and Management Issues

As was discussed earlier, to be fully successful, installations need support from senior staff at headquarters and from installation commanders and sufficient implementation staff for buffering activities.

First, Congress and OSD need to work to ensure that all Service headquarters and other senior Service management understand the need for and support conservation buffering. It is important that the Services invest resources, including manpower, to support the program. More Service headquarters support is needed, especially in the USAF.

Second, OSD and Service headquarters need to work more to educate installation commanders about encroachment problems and the benefits of an active conservation buffering program. Both can put together briefings for commanders, showing examples from other installations about encroachment problems and how to address them. Fort Stewart started conservation buffering because the commander had seen a presentation about encroachment problems and buffering activities at Fort Bragg, which made him realize the need to buffer at Fort Stewart. Commanders need to understand the importance of acting early and quickly, even if encroachment does not seem an immediate threat. At every installation studied in depth, at least one staff member stated that the installation should have started buffering earlier before development and encroachment seemed a serious threat.

Third, where possible, full-time staff members should be assigned to work on Encroachment Partnering at any installation that is doing conservation buffering. The Services need to help fund and find a billet for a full-time installation buffering person who is well connected and respected in the community, has been at the installation a long time, and understands local planning process laws. The Navy and USMC have both funded and continue to fund such staff at many of their installations. The USAF and Army should also invest in more conservation buffering staff. In addition, OSD or the Services should consider conducting a more detailed manpower study to determine the exact mix of skills and manpower needed for installation buffering programs.

It may be difficult to find one person at every installation who meets such criteria. The person assigned to the buffering program will need information and additional technical training, which the Services and OSD should provide. This issue is discussed more below, in the section on technical support and information sharing.

Last, the Services should ensure that all appropriate military staff members are involved in the buffering process, such as having more input from environmental and training staff.

Improving Information Sharing and Technical Assistance

OSD and the Services can do a number of things to help address information sharing and technical assistance needs.

First, OSD with the help of the Services should help document lessons learned and provide this information to installation and partner staff. OSD should take the lead in creating such documentation because there are benefits in sharing across different Service activities and the information should be in a consistent format.

Documenting lessons learned so far should include, for example, providing detailed case studies of successful installations activities, sample conservation easements from completed projects, and a brochure on the benefits to the installation and the community. Such a brochure explaining the benefits of the program could be used for public outreach.

OSD should provide a basic web site and email listserv to help disseminate this information and facilitate information sharing. OSD need not invest a great deal of resources in such a site. It should be useful as a library where people can look up information. For example, it

could hold sample conservation easement documents from different projects. RAND researchers found that the specific language in the easements differed greatly depending on the partners involved, landowners' interests, and local conditions. Looking at different samples can help people see what is possible and can provide a starting template for a new conservation easement deal.

Second, OSD should host a yearly DoD conference on conservation buffering that includes all levels of military staff and diverse partners. Installations and their partners, such as local governments, should provide presentations about lessons learned, tips for success, things to avoid, and the benefits of buffering. Since installation staff members said that it was difficult to acquire travel funds for such conferences, OSD should help fund attendance at such conferences. Some Services are already hosting such conferences; for example, USMC headquarters hosted a two-day EP workshop in April 2007. More installations would benefit if a DoD-wide conference was also held.

In addition, OSD should support installation staff by providing travel funds to attend and learn from relevant activities, such as land trust conferences and regional ecosystem collaborations. In 2006, OSD provided funds for some installation staff to attend an LTA conference, which was a useful investment of funds. Funding staff participation in the CSP and SERPPAS collaborations are other possible examples. Another way to help educate staff members from an installation is to fund them to visit another installation to learn about its buffering activities.

The Importance of Biodiversity

One of the most significant environmental drivers currently and over the next few decades is biodiversity and the high rate at which it is being lost. Biodiversity loss is a key driver with respect to federally and state protected species and pressure on military lands to protect such species and their habitat. Scientific evidence shows the importance of biodiversity trends to future environmental health and to the military. This evidence is summarized here. First, to set the context, a brief discussion is presented that defines biodiversity, why it is important, why it is a worldwide concern, and why it is likely to be of increasing significance in the future. Next, there is a discussion of the main threats to biodiversity, which come from nonmilitary activities. Finally, this appendix discusses the key locations where much of the remaining biodiversity at risk is found on federal lands, those owned by BLM, FS, and DoD, making them the most important spots to protect. Thus, OSD and the Services should act strategically to ensure that other federal agencies are protecting biodiversity to reduce environmental pressures on military installations.

Definition of Biodiversity

In its simplest form, biodiversity can be defined as biological variety. It refers to the number and diversity of species, the genetic material of those species, and the natural communities, ecosystems, and landscapes in which those species live. In evaluating and conserving biodiversity, four main levels or types of diversity are considered: genetic, species, ecological, and landscape. The variety of these types and variability within and among them are important concepts of biodiversity.¹ Understanding the dynamics of these complex elements over time for the earth's diverse ecosystems and habitats is not easy and is a field of much scientific research. Despite the complexity of biodiversity concepts and dynamics, at the most basic level as species are lost, so is biodiversity.

Importance of Biodiversity

Biodiversity is important to maintain healthy and diverse natural resources and systems that humans depend on. Arguments for preserving biodiversity include economic, environmental, genetic, aesthetic, and moral ones. The main economic and environmental benefits of

¹ Stein, Kutner, and Adams (2000, pp. 7–8).

biodiversity include contributions to organic waste disposal, soil formation, biological nitrogen fixation, bioremediation of chemical pollution, crop and livestock genetics, biological pest control, biotechnology, plant pollination, ecotourism, and the harvesting of food, animals, and pharmaceuticals from the wild.² For example, economic benefits can arise from genetic resources, which play an important role in increasing crop and livestock yields. An example of an environmental benefit is the role of biodiversity in treating toxic chemical sites. Biological treatments, which use microbes and plants to degrade chemical materials, can decontaminate polluted sites (bioremediation) and purify hazardous wastes in water (biotreatment). A conservative estimate of the annual economic and environmental benefits of biodiversity in the United States is \$319 billion; worldwide, it is \$2,928 billion.³ Other estimates of the worldwide economic benefits of biodiversity range as high as \$33,000 billion per year.⁴

Biodiversity has been recognized as extremely important by the environmental and scientific communities because of its numerous benefits and the rapid rate at which it is being lost. Increased human activities and rapidly growing global population threaten the earth's biodiversity. Worldwide, tens of thousands of species are becoming extinct every year,⁵ and current extinction rates are estimated to be 1,000 to 10,000 times higher than natural extinction rates.⁶ As a result of these extinctions, natural systems that humans depend on are degraded or lost and the effect could be significant. Given current scientific knowledge, it is unclear at what point current biodiversity loss rates will lead to the breakdown of natural systems and cause significant problems. However, some evidence of problems already exists. For example, in California, significant habitat alterations and pesticide use have degraded natural ecosystems so much that few wild bees are left. Farmers who relied on wild bees for pollination must now rent bees commercially to pollinate key agricultural crops.⁷

Given such alarming trends, there also is increasing emphasis on biodiversity in the policy, management, and public arenas. In fact, maintaining and preserving biodiversity are considered among the most important environmental challenges of this century. Evidence for the global importance of biodiversity can be found with the signing of the Convention of Biodiversity by over 150 nations at the 1992 United Nations Earth Summit and the attention given to biodiversity conservation at the summer 2002 World Summit on Sustainable Development in Johannesburg, South Africa. We are also learning the importance of being strategic in preserving existing biodiversity. Scientists and natural resource managers know that "recovering species that have declined to low numbers or ecosystems that have been heavily degraded is far more expensive and problematic than maintaining our extant biodiversity."⁸

² Pimentel et al. (1997).

³ These estimates are from Pimentel et al. (1997), which provides a quantitative assessment of biodiversity benefits.

⁴ Costanza et al. (1997). For other approaches to quantifying the importance and benefits of biodiversity, see Daily et al. (1997); Stein, Kutner, and Adams (2000); and Smith and Smith (2001, p. VII A-D).

⁵ Smith and Smith (2001, p. VII-A).

⁶ Kellert and Wilson (1993).

⁷ Pimentel et al. (1997).

⁸ Marshall et al. (2000).

Threats to Biodiversity

Biodiversity is being lost mainly because of increased human activities, such as sprawl, which result in habitat destruction, fragmentation, and degradation. Pollution and invasive species are also significant contributors to biodiversity losses. In the United States, the main threats to species come from habitat degradation and loss, alien species, pollution, overexploitation, and disease, with habitat degradation and loss being the largest problem, threatening an estimated 85 percent of species at risk. The spread of alien species is the second greatest threat at 49 percent; pollution is third at 24 percent; overexploitation is fourth at 17 percent; and disease is last at 3 percent.⁹

The most widespread activities that cause habitat alteration are also the leading threats to endangered and threatened species as measured by the number of species they affect.¹⁰ In the United States, the top three activities that threaten species and their habitats are agriculture (38 percent), land conversion for commercial development (35 percent), and water development (30 percent).¹¹ The next four are outdoor recreation, including offroad vehicles (27 percent), livestock grazing (22 percent), pollutants (20 percent), and infrastructure development, mostly roads (17 percent).¹² Disruption of fire ecology, logging, and mining, oil, and gas geothermal activities were the next three most threatening activities. Military activities, such as training maneuvers and bombing practice, rank 11th, affecting about 4 percent of endangered and threatened species.¹³

Locations of Biodiversity at Risk

Next, it is useful to understand who owns the land where most of the endangered, threatened, and imperiled species and key habitats are at risk. In the United States, federally and privately owned lands harbor the greatest number of species and habitats that are at risk, although state lands contain significant amounts also.

The U.S. federal government owns about 400 million acres (not counting federal land in Alaska). These federal lands support at least one example of 59 percent of federally listed species¹⁴ and a similar percentage of imperiled species,¹⁵ whereas private lands support at least one population of more than half of all imperiled species and two-thirds of federally listed species.¹⁶ State lands outside Alaska include 90 million acres and harbor at least one example of 43

⁹ Stein, Kutner, and Adams (2000, p. 242).

¹⁰ Stein, Kutner, and Adams (2000, p. 245).

¹¹ Examples of water development activities are the building and maintenance of dams, levees, and irrigation systems.

¹² Stein, Kutner, and Adams (2000, pp. 245–247).

¹³ Stein, Kutner, and Adams (2000, p. 247).

¹⁴ Federally listed species refers to the plant and animal species that are listed as endangered and threatened under the Federal Endangered Species Act.

¹⁵ Stein, Kutner, and Adams (2000, pp. 278–279). Federally listed endangered and threatened species represent a relatively small portion of U.S. species considered at risk by scientists. Imperiled species refers to a fuller array of nearly 2,800 species identified by the Natural Heritage Network as being imperiled or vulnerable (Stein, Kutner, and Adams, 2000, p. 165).

¹⁶ Stein, Kutner, and Adams (2000, p. 283).

percent of imperiled species and 58 percent of federally listed species.¹⁷ However, “federal and private lands remain the two most important ownership types for listed species.”¹⁸

Within the category of federal lands, it is important to understand which federal agencies own the land where most species are at risk. FS, DoD, and BLM are the federal landowners with most federally listed and imperiled species and populations.

In fact, looking at the distribution of species and populations on federal lands,

we find that Department of Defense lands contain the most federally listed species of any agency, with at least one example of about one-fifth (21%) of all federally listed species. This finding is particularly striking, given that these lands represent just 3% of the federal estate. Many military bases turn out to be strategically placed, not just from a military standpoint but also from a biological perspective. Often found in coastal areas with fast-growing human populations, many of the Department of Defense land holdings, such as southern California’s Camp Pendleton Marine Base, are becoming islands of natural habitat in rapidly urbanizing regions.¹⁹

Forest Service lands contain the greatest number of imperiled species at risk (26 percent) and the greatest number of imperiled and endangered populations. Given the amount of federal land that they own, both DoD and the Forest Service manage disproportionate numbers of imperiled and endangered species populations.²⁰ The significance of DoD lands for maintaining biodiversity is even larger given the designated uses and current management practices of FS and BLM lands. These federal lands are managed for mixed uses including logging, grazing, mining, outdoor recreation, and oil and natural gas extraction. These activities are among the leading causes of habitat alteration and loss of species. If such activities on these lands increase, biodiversity losses are likely to increase, making military lands even more important for conserving biodiversity and serving as the remaining habitat for key endangered and threatened species populations. To avoid such a future, OSD and the Services should work strategically with DOI and USDA to protect biodiversity on BLM and FS lands.

¹⁷ Stein, Kutner, and Adams (2000, p. 279).

¹⁸ Stein, Kutner, and Adams (2000, p. 282).

¹⁹ Stein, Kutner, and Adams (2000, pp. 279–280).

²⁰ Stein, Kutner, and Adams (2000, p. 282).

An Assessment of Eglin AFB's Buffering Activities

Eglin Air Force Base covers 464,000 acres in the Florida Panhandle. With 724 square miles of land area and airspace overlying 130,000 square miles of land and water ranges, it is the largest Air Force base in the free world.¹ Eglin also has 750 acres on Cape San Blas, a geographically separate area in Gulf County, Florida.

Eglin AFB is home to a wide variety of U.S. Air Force units and host to Army, Navy, and USMC operations. The base has more than 50 test areas and sites embedded in a single contiguous land area adjacent to the Gulf of Mexico. This unique setting and overwater airspace combine to provide a sea-to-land transition area—an important resource for modern weapons system research, development, testing, and evaluation. These test areas are located beneath special use airspace that permits relatively unconstrained operations and makes Eglin AFB an ideal setting in which to operate.

Installation Training and Other Activities

Eglin is the headquarters of the Air Armament Center and is responsible for development, acquisition, testing, deployment, and sustainment of all air-delivered weapons. Eglin AFB occupies much of three counties in the northwest Florida Panhandle east of Pensacola. It is the only “overland supersonic range” east of the Mississippi.

Eglin AFB is unique because of the depth and breadth of testing and training that occurs there—all phases of munitions life cycle support, from research through sustainment testing. Additionally, various operational units train at Eglin.

Mission activities at Eglin AFB fall into four broad categories: weapon system research, development, test, and evaluation; training; space operations; and installation support. Among USAF bases, only the Eglin Reservation offers terrain features such as shoreline, rolling hills, dense forest, cleared flat expanses, and water all in one location to support a variety of mission requirements.²

Eglin's property at Cape San Blas provides Radar Tracking Network, instrumentation support, Electronic Combat and Systems support, surface-to-air missile tracking within the Eglin Gulf Test and Training Range, and ground training for Army Rangers and Special Operations Forces.

¹ Eglin Air Force Base (2002, p. 6).

² Eglin Air Force Base (2002, p. 6).

Eglin AFB had two significant gains from BRAC 2005. First, it was designated as an Initial Joint Training Site that teaches entry-level aviators and maintenance technicians how to operate and maintain the new Joint Strike Fighter (F-35) aircraft. The base will be the regional training center for the JSF and it will double the base sortie rates and quadruple flying hours. JSF will fly 80 percent of its time off the Gulf Coast. Second, the Army's 7th Special Forces (SF) group from Fort Bragg is being relocated to Eglin to jointly train with USAF Special Operation Forces, which are already located at Hurlburt Field. The Army Special Forces group will need over a dozen new ranges at Eglin AFB to accommodate a wide variety of weapons training.

Local and Regional Encroachment Concerns

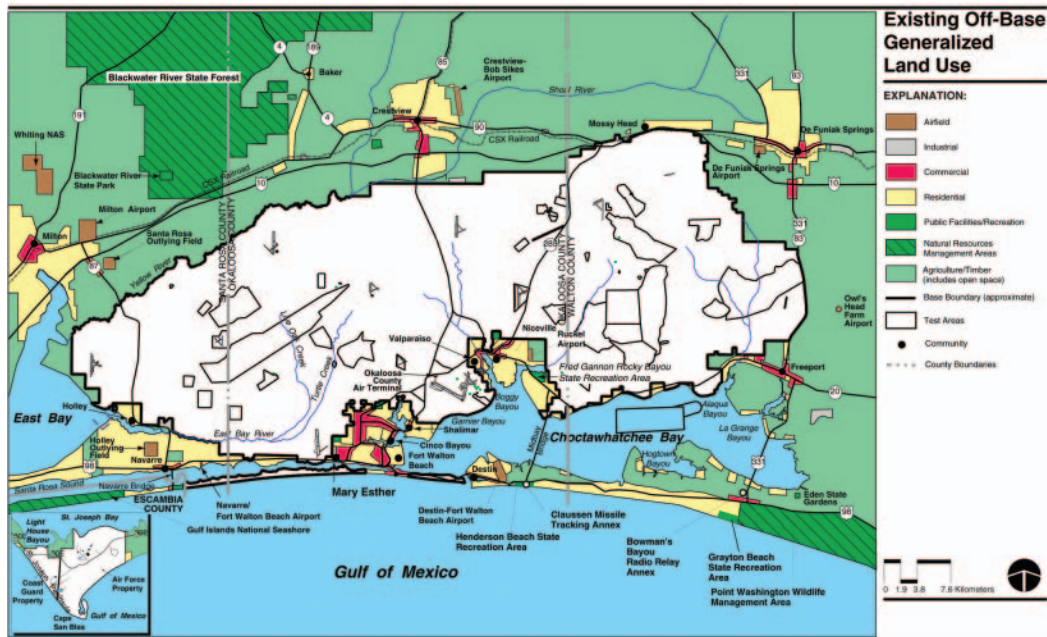
Eglin AFB faces significant development pressures, as well as environmental concerns. Encroachment pressures come from suburban, retirement, and resort sprawl; road expansion; and biodiversity loss. This section explains these land development pressures and how state and local governments help support Eglin's efforts to address such issues. Then, this section summarizes Eglin AFB's T&ES and other environmental pressures, explains how the base is addressing them with ecosystem management and regional collaboration, and describes state efforts to help conserve habitat, open space, and agricultural lands.

Pressures from Suburban, Retirement Community, and Resort Sprawl

The base extends throughout three counties: Walton, Okaloosa, and Santa Rosa. Thirteen incorporated cities exist within Eglin's region of influence, including Fort Walton Beach, Mary Esther, Crestview, Niceville, Valparaiso, Freeport, Destin, DeFuniak Springs, Milton, Cinco Bayou, and Shalimar. (See Figure B.1 for a map showing land use surrounding the base.) The installation used to be surrounded by pine plantations with limited development. The entire nature of this part of Florida has started changing over the last 10 years or so. Because of the beautiful "sugar white" sand beaches and warm weather, the region is facing development pressures both along the coast and further inland. Coastal communities, such as Fort Walton Beach, Destin, and the beaches of south Walton County, have been growing and expanding with retirement and resort developments. Similarly, inland areas face the pressures of new retirement and resort communities and commuter sprawl. All this development causes potential safety concerns and noise complaints from takeoff, landings, and low-level flying.

Crestview in Okaloosa County north of the base, which has much more affordable housing than Fort Walton Beach and other coastal areas, illustrates the nature of the encroachment problem. For \$300,000, one can purchase a half-acre lot with a nice house. A new development in Crestview with about 1,000 homes is located just off the end of Eglin's Duke Field runway. It is predicted that Crestview will soon be larger than Fort Walton Beach. Crestview is home to many people who are moving slightly inland because of hurricane risks and cheaper homes, and to retirees from northern climates. Those who live directly north of Eglin's Duke Field will experience the takeoff and landing noises. Reserve units use Duke Field at night; however,

Figure B.1
Land Use Surrounding Eglin AFB



SOURCE: Eglin Air Force Base (2002, p. 31).

RAND MG612-B.1

even though it is not used much right now, in the future, with the JSF, this runway will be used significantly more. The result is likely to be more noise complaints in the future.

Developers buy thousands of acres of pine plantation and put in entirely new communities, often for retirees, changing rural communities in a few years. Freeport, a town east of the base in rural Walton County, illustrates this pattern. The area has large tracts of 40,000 to 50,000 acres of timberland that are being subdivided and developed. About 49,000 housing units are in various stages of approval around Freeport. The area south toward the beach has already experienced a lot of development. A new highway is being built near Freeport. The town is being transformed into a new city. In a few years, the place will be entirely changed.

New or expanded roads can be another significant encroachment concern for military bases. Florida is experiencing many such changes because of the pressures of development and state and local efforts to increase hurricane evacuation routes by expanding highways.

Counties surrounding Eglin AFB have seen significant increases in property values. According to Florida Department of Revenue data, the nearby counties of Okaloosa and Walton have experienced compound annual growth rates between 2002 and 2005 of 17.5 percent and 34.1 percent, respectively. Santa Rosa real property values have seen a compound annual growth rate between 2002 and 2005 of 15.4 percent, whereas statewide growth was 16.8 percent.³ Given the Santa Rosa growth rate, waiting four years (2002 to 2006) to purchase a conservation easement could add over 75 percent more to the cost in real terms, and

³ Florida Department of Revenue (2006).

at the Walton County rate, the cost of waiting rises to 225 percent.⁴ The real estate market has softened since mid-2006, and waterfront properties are not selling as fast because of the 2005 hurricanes. However, property prices and the rate of development are still predicted to increase, although at a slower rate than in 2005. More development is occurring inland away from the coast, which causes development pressures north, east, and west of the base.

State and Local Government Support of the Military

State and local governments in Florida are supportive of the military, and they have done a number of things to help address encroachment concerns around installations.

Florida recognizes the contribution of military bases to its state and economy and has been very supportive of U.S. military bases in the state. In 2004, the state passed legislation, Senate Bill 1604, requiring that local communities work with the military bases because of BRAC concerns. The act amends sections of the Growth Management Act and

requires each county in which a military base is located and each affected municipality to send to the commanding officer of the military installation information regarding proposed changes to the comprehensive plan and land development regulations that would affect the intensity, density or use of land adjacent to the military base. The law requires affected local governments to amend their comprehensive plans by June 30, 2006, to include criteria to be used to achieve the compatibility of adjacent or closely proximate lands with military installations.⁵

This legislation also required that each military base have a nonvoting member on all local government planning boards so that they could remain aware of the potential effect of plans on the bases.

In 1998, Florida also created the Florida Defense Alliance (FDA) as a nonprofit partnership between the governor, state officials, Florida's Federal Delegation, Florida's state legislators, base commanders, community leaders, and business executives to increase military value, reduce base inefficiencies, and promote multi-Service synergies for Florida's military bases. FDA helps provide funds and other support for conservation buffering.

Local government support varies from county to county and municipality to municipality. Both Okaloosa and Santa Rosa Counties are very supportive of Eglin AFB, since they see its economic value to the community. Santa Rosa County also is home to NAS Whiting Field, and it has done a lot to help this installation, as discussed in Appendix G. Walton County, a traditional rural county where the military has less economic effect, is to the east of the base. It does not have many military families living within the county nor does it benefit much from military jobs, so county organizations are not as supportive of the base. In fact, a few years ago the town of Freeport built a new high-density residential community near Eglin AFB by annexing a large surrounding agricultural area into the town and rezoning it as residential development without the base knowing about it.

⁴ These values would be slightly less when corrected for inflation. These numbers are not shown, because the RAND team did not wish to imply a level of precision given the approximate nature of the entire calculation.

⁵ Florida Department of Community Affairs (n.d.b).

Environmental Issues and Activities to Address Them

To better understand Eglin's conservation buffering, it helps to understand the environmental conditions, encroachment, and management history at Eglin AFB. Here, there is a discussion of encroachment at Eglin from federally and state protected species and how installation staff realized that collaborative ecosystem management was needed to address such issues and how they commenced efforts to do this. This section also explains some state efforts to help conserve habitat and other lands.

T&ES and Ecosystem Management at Eglin AFB. This part of Florida—Eglin and the surrounding East Gulf Coastal Plain Ecoregion—is characterized by rich biodiversity. It also is considered a biodiversity hot spot, i.e., a location with much biodiversity and where most is at risk. Eglin's high level of biodiversity is primarily due to its diverse community types, ranging from barrier islands to old growth longleaf pine (LLP) forests. In fact, over 70 percent of the remaining old growth longleaf pine forests on which the red-cockaded woodpecker depends are at Eglin. Eglin is home to 11 federally listed threatened or endangered species. The federally listed species include, among others, the red-cockaded woodpecker (RCW), the Okaloosa darter fish, the Flatwoods salamander, and the leatherback sea turtle. There are 64 state-listed threatened and endangered species found on Eglin, with the large majority (51) of those being plant species. Of the 13 state-listed threatened and endangered animal species, only four (the snowy plover, least tern, Southeastern American kestrel, and black bear) are not also federally listed as a T&ES.⁶

In 1987, Eglin AFB was scheduled to conduct a major \$5 million test related to the Star Wars defense system, as well as build a new tank training range for the Alabama Army National Guard. Base personnel conducted environmental assessments for each project as required by the National Environmental Policy Act. In addition Section 7 consultations were conducted pursuant to the Endangered Species Act. In both consultations, the U.S. Fish and Wildlife Service concluded that the projects, if implemented as proposed, were likely to jeopardize the continued existence of the red-cockaded woodpecker, a federally listed endangered species. Its decision was based on Eglin's lack of a comprehensive survey of its RCW population. As a consequence, the USAF moved the test to another base and tabled construction of the new tank training range. Since Eglin lost both missions, its leaders decided to address the species problem through better ecosystem management. Eglin AFB staff engaged university scientists and TNC to help conduct multiyear monitoring and scientific research to understand how to more effectively manage the base's unique ecosystems to avoid such problems in the future. Eglin AFB invested significantly in natural resources programs to ensure the continued access to land and airspace required to accomplish the Air Force mission by maintaining these resources in a healthy condition.

The research showed that to sustain the ecosystems, and key T&ES, such as the RCW and black bear, the base needed to consider lands outside the base. Even though Eglin AFB was large, to recover and ensure long-term healthy populations of endangered species, more area was needed so that these species would not constrain any base operations. Those at the base recognized that the nearby Blackwater River State Forest (189,594 acres slightly north of Eglin) and Conecuh National Forest (CNF) (83,790 acres north of the state forest in Alabama) were key strategic partners in helping to manage LLP ecosystem for these species recovery. A

⁶ Eglin Air Force Base (2002, p. 57).

forest ranger at CNF also was concerned about managing RCW habitat and met with Eglin staff about their mutual interests. Soon, they were in discussions with the state of Florida and other large landowners in the region, including private forest owners.

Gulf Coastal Plain Ecosystem Partnership (GCPEP). In 1996, GCPEP was formed when landowners united to conserve and restore the dwindling longleaf pine ecosystem and the unique aquatic resources of northwest Florida and south Alabama. Eglin AFB, various Florida agencies, TNC, FS, and private landowners are all part of this partnership. By 2005, together, the 10 public and private partners that constitute GCPEP own and manage more than 1.05 million acres containing the majority of the world's remaining old-growth longleaf pine trees, some of which are 500 years old. By reconnecting the longleaf pine ecosystem, GCPEP lands provide crucial contiguous forest to aid the recovery of many species, including the RCW. GCPEP is also working to protect other rare species, such as the Okaloosa darter fish and Florida bog frogs, which are found nowhere else in the world.⁷

While pursuing their individual missions, the partners are working to accomplish the partnership goal of collectively protecting and managing the exceptional biodiversity of the GCPEP landscape.

Florida Forever. Besides supporting the military, the state of Florida is aggressively trying to preserve its natural environment. Because of development pressures and environmental problems from so much urban and suburban growth in southern and coastal areas, Florida is working hard to protect natural areas and rural communities throughout the state.

Across the state, Florida is acquiring land through Florida Forever, a 10-year, \$3 billion, land conservation program established by the governor and the Florida legislature. The state is fortunate to have such an aggressive and proactive program to conserve natural areas. However, given development pressures, increasing property values, and the multitude of natural areas worth preserving, this funding is not sufficient to meet demand, and the state prioritizes projects to determine which to fund first. The military has also been fortunate that the state has been so supportive of U.S. bases, often giving priority to some base buffer projects with these funds. In fact, "the state has invested \$719 million to acquire nearly one-half million acres of land buffering military installations across Florida, protecting natural resources and benefiting military operations. A total of \$1.5 million has been contributed by the DoD to military base buffering projects."⁸

Florida Forever focuses on land with conservation value. Florida Forever was amended so that it now includes criteria for military base buffering along with determining conservation value. However, Florida Forever funds are less likely to be used to purchase lands to buffer bases if they are degraded habitat. In addition, the state has more projects it wants to fund than funding to fund them, so this funding shortage means that funds are not always readily available for installation buffering.

Florida's Rural Lands Stewardship Program. The 2001 Florida legislature established the Rural Land Stewardship Program (RLSP), "which provides that counties designate all or portions of lands classified in the future land use element as predominantly agricultural, rural, open, open-rural, or a substantively equivalent land use, as a rural land stewardship area. Within these areas, planning and economic incentives are applied to encourage the implemen-

⁷ Gulf Coastal Plain Ecosystem Partnership (2005).

⁸ The Nature Conservancy (n.d.).

tation of innovative and flexible planning and development strategies and creative land use planning techniques.”⁹

It is like a TDR program but is specifically designed to preserve rural areas while allowing development. The program works by designating the location of the stewardship areas. Then it assigns “transferable rural land use credits” to the stewardship areas, divides the stewardship areas into credit “sending” and credit “receiving” areas, and transfers credits from sending to receiving areas. Within receiving areas, credits are used to construct the desired development, and within sending areas, credits are transferred to protect the rural economic base and environmental resources. Stewardship areas are supposed to be larger than 10,000 acres and may be multicounty. A unique aspect of this program assigns more value to property with T&ES on it. Having T&ES on the land, such as RCWs, increases the value of the land with respect to the rural stewardship credits.

This program is designed to direct development to suitable locations within rural areas, maintain the economic value of rural areas (agriculture, silviculture, mining, hunting/fishing, outdoor recreation, and tourism), and protect valuable ecosystems and habitat areas. It is a county land use planning program, a rural areas development program, and a rural areas protection program.

Installation Encroachment Program

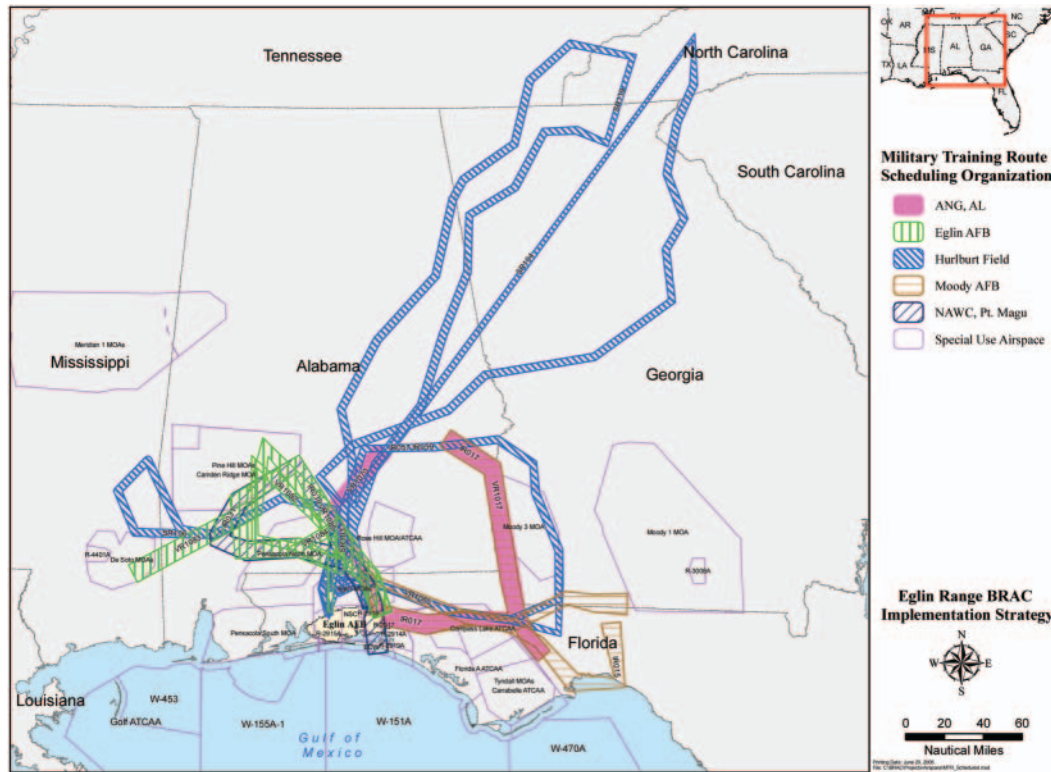
At and around Eglin AFB is one of the most strategic buffering and encroachment management activities in the country, in terms of vision, acreage, and ways to address sprawl, environmental encroachment, and conservation concerns. The buffering is strategic in its military airspace buffering and multi-Service considerations and collaborations. For example, Eglin AFB and NAS Whiting Field have collaborated on some projects submitted to REPI for funding that benefits both installations. One main objective of Eglin’s buffering is to sustain critical airspace through land use planning and buffering acquisition. Figure B.2 shows some of the key military training routes that the base considers in its buffering planning.

Many projects have been completed or have been proposed to help buffer Eglin AFB. Many of them have been done without any funds from the USAF or OSD, with the state of Florida and TNC being key strategic partners who have taken the lead on buffering projects because of the conservation value of the land. However, even when no REPI funds were used, just having an official OSD buffering program helped with visibility, partner support, and momentum for Eglin AFB’s buffering activities.

Unlike some other Service military installations, Eglin AFB does not have a formal conservation buffering program or full-time staff for buffering. It does have a dedicated Mission Enhancement Office (MEO) that works with local communities to minimize encroachment by focusing on compatible growth planning. At the installation level, there has been support for buffering by command, range, MEO, and environmental staff. However, since the USAF has not had an official conservation buffering program, Eglin AFB has not had as much regional, Major Command, or headquarters support as Army, Navy, and USMC installations receive. Eglin AFB also does not have staff dedicated to

⁹ Florida Department of Community Affairs (n.d.b).

Figure B.2
Military Training Routes Near Eglin AFB



SOURCE: Map courtesy of Eglin Air Force Base, 46th Test Wing Plans Office, March 2007.

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conservation buffering. However, despite this lack of staff and headquarters and regional support, the installation has done quite a lot. With more USAF support, it could do even more.

Before discussing specific buffering projects, it is important to understand a broader strategic collaboration to protect a 100-mile low-level flight corridor for Eglin AFB and other installations—the Northwest Florida Greenway.

Northwest Florida Greenway

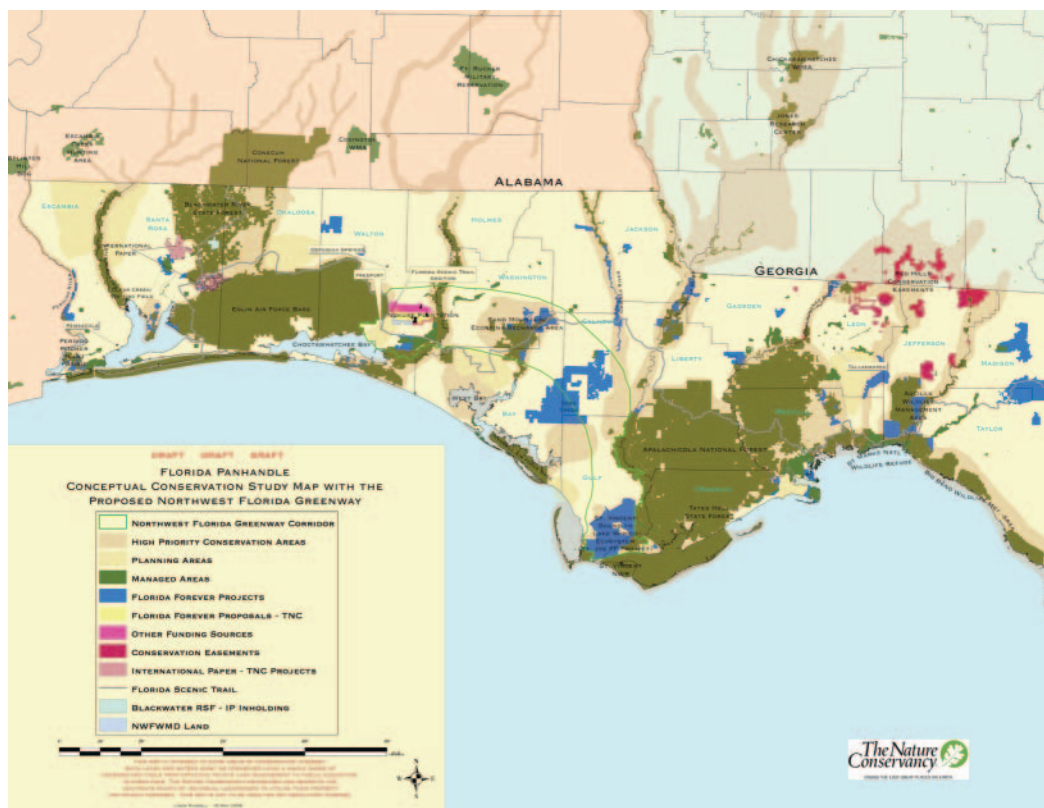
In summer 2003, staff from Eglin AFB, The Nature Conservancy, and the Florida Department of Environmental Protection discussed expanding the concept of the GCPEP to include building a greenway to protect key low-level military airspace and a biological connection between Eglin AFB and the Apalachicola National Forest. The corridor study area was 100 miles long and 10 miles wide. In November 2003, Governor Jeb Bush and his cabinet entered into a Memorandum of Partnership with the Deputy Under Secretary of Defense for Installations and Environment and the Florida Chapter of The Nature Conservancy to make the Northwest Florida Greenway a reality. The Northwest Florida Greenway is designed to create a conservation corridor spanning six counties and following the flight path of military aircraft on training and testing exercises from the Apalachicola National Forest and the Gulf Coast to Eglin AFB. Home to five U.S. Air Force and Navy installations, the region is also a known

biological hot spot for wildlife and native flora supporting a diversity of ecologically sensitive natural communities, such as black bear habitat, estuarine tidal marshes, and floodplain swamps.¹⁰

TNC did a conservation assessment of the area to help develop the corridor priorities. Because of the desire for connectivity, the corridor includes some areas that are not the highest-priority conservation lands in the corridor. Figure B.3 shows the Northwest Florida Greenway corridor in relationship to federal, state, and local managed lands and high-priority conservation areas.

DoD, Eglin Air Armament Center, U.S. Forest Service, U.S. Fish and Wildlife Service, Florida Department of Environmental Protection, Florida Department of Community Affairs, Florida Department of Agriculture and Consumer Services, Florida Fish and Wildlife Conservation Commission, Northwest Florida Water Management District, The Nature Conservancy, and the Okaloosa Board of County Commissioners have all signed a Memorandum of Agreement to support the Northwest Florida Greenway.

Figure B.3
Northwest Florida Greenway Corridor



SOURCE: Map courtesy of The Nature Conservancy, Fall 2006.

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¹⁰ Florida Department of Environmental Protection (2005a).

This corridor is a strategic effort to conserve key training space and habitat. Since much of the land consists of undeveloped large tracts of forest industry lands, such a large-scale plan is feasible. However, because of development pressures in Florida and declines in the logging industry, some of the timber companies have started to sell off some of this land for development. There is currently an opportunity to acquire or place conservation easements on much of this land, but the opportunity will likely fade over time, so the partners need to act fast. A major constraint will be having sufficient funds to acquire so much land that has already increased significantly in value. A few major projects have been completed in the corridor already, as will be discussed below.

Sample Buffering Projects

Four sample buffering projects around Eglin AFB are discussed here. Two are in the Northwest Florida Greenway east of the base, another is north of the base, and the other is west of the base.

1. Nokuse Plantation Conservation Easement on 18,500 Acres in 2005. This Eglin AFB buffering project leveraged funds from the Florida Forever land acquisition program. In February 2005, Florida approved purchase of a 18,500-acre conservation easement on Nokuse Plantation located east of Eglin Air Force Base, spending \$17.25 million state dollars to DoD's \$1 million.

Nokuse Plantation is owned by M. C. Davis, a unique landowner who wants to restore the LLP and other ecosystems on this former pine plantation to help preserve biodiversity. Nokuse Plantation

is a 53,000 acre private conservation initiative in the Florida Panhandle conceptualized and funded by M. C. Davis and Sam Shine. It is designed to be both a model and a catalyst for future landscape level conservation projects, which is the only way to preserve nature's intrinsic biodiversity.¹¹

Mr. Davis also supports the military and fully embraces the Northwest Florida Greenway, of which his property is part.

In this conservation easement deal, the \$1 million DoD funds from REPI were used to purchase an easement on 250 acres (\$4,000 per acre) at current market value, and the State of Florida negotiated the rest of the 18,000-acre purchase at roughly 25 percent of current appraised value with the balance being considered a "gift to the state" (roughly \$1,000 per acre). Because the federal acquisition had to be fair market value, OSD funding was used on only part of the property. The state could accept the discounted conservation easement, but DoD could not.

This is the only project to use OSD funds so far. If Mr. Davis had not purchased this property for conservation purposes, it would likely have been developed, as was the area in nearby Freeport. It is a key strategic buffer area that lies directly east of the Eglin Range beneath a low-level route used for pilot training and Navy cruise missile tests. The property is considered to be the western anchor for the Northwest Florida Greenway.

In FY 2007, Eglin AFB proposes to partner with TNC and the state of Florida to purchase a conservation easement on an additional 11,961 acres of the north part of the Nokuse Plantation. This property is on the "A list" for acquisition through the Florida Forever pro-

¹¹ "Nokuse Plantation" (n.d.).

gram. However, there is not enough funding for all A-listed projects. A major factor in moving an acquisition to completion is the willingness of partners to provide matching funds. Since 80 percent of the land is currently considered to be of low conservation value to the state because it had been clear-cut, matching funds are even more important. Mr. Davis, the current landowner, is actively engaged in an aggressive ecosystem restoration effort. Because of this effort combined with the military's interest in this project, the Florida Forever program placed the property on the high-priority list. However, without a "substantial funding match," it is doubtful that this project will compete well for the limited funding available given the stiff competition throughout the state of Florida for conservation projects and the significant rise in real property values over the last five years.¹²

2. Yellow River Ravines Florida Forever Project Purchase of 11,528 Acres in 2006. Since a strip of land, called the Yellow River Ravines, located between Blackwater River State Forest and Eglin AFB, provided connectivity between these two key large tracts of publicly managed forested areas, a key forest land acquisition project was pursued. This buffer project deal was brokered and completed by TNC for the state as part of Florida Forever. In summer 2006, TNC acquired 11,528 acres in the Yellow River Ravines. See Figure B.4 for a December 2005 Florida Forever map of this property north of Eglin AFB.

The land will be managed by the Florida Division of Forestry as an addition to Blackwater River State Forest and will provide an opportunity for long-term restoration of the original longleaf pine community, of which only 2 percent remains in the world. This land provides a key conservation corridor between the state forest and Eglin AFB and protects one of three strategically important low-level flight training routes entering the Eglin Range. Besides buffering Eglin AFB, this land also helps to buffer Navy Outlying Landing Field (NOLF) Harold from encroachment.¹³ This acquisition helped prevent the type of incompatible residential development that is occurring in nearby Crestview.

3. Escribano Point/NOLF Choctaw Purchase of 1,166 Acres in 2003. On the very western end of Eglin AFB is a runway known as Field 10 and NOLF Choctaw. NOLF Choctaw supports the mission of Naval aviation by providing touch-and-go and primary flight training to Navy, Marine Corps, Coast Guard, Air Force, and other fixed-wing flight students. Located in Santa Rosa County in an area called Escribano Point, it is one of the few mostly undeveloped waterfront tracts left in the county.

In 2003, the state of Florida acquired 1,166 acres in this area through the Florida Forever program. The purchase preserves wetlands, woodlands, and shoreline along East Bay, which is a critical component of the environment and economy of the Panhandle. Rare and threatened plant species, such as the white-top pitcher plant and sweet pitcher plant, found nowhere else in the world, grow among the diverse marshes, oak hammock, scrubby pine flatwoods, and wet prairie habitat. The Atlantic sturgeon and West Indian manatee are among the endangered animal species that frequent area waters.¹⁴ This project helped prevent likely incompatible development, since it is prime development property with nice views of the bay.

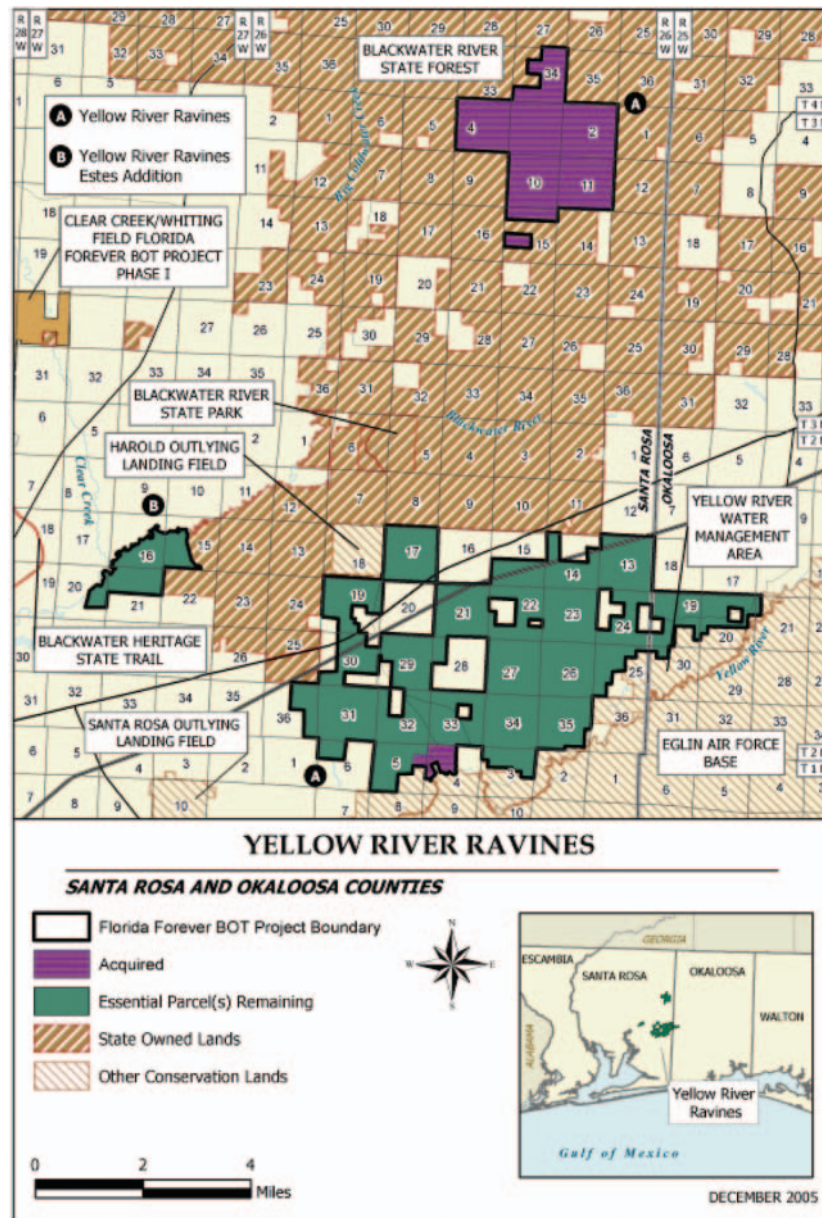
There is also a 2007 REPI proposal for this Escribano Point area. The state of Florida would like to acquire all 2,914 acres of this area because of its conservation value and cultural

¹² Eglin Air Force Base (2007).

¹³ For more information, see The Nature Conservancy (2006d).

¹⁴ Florida Department of Environmental Protection (2003a).

Figure B.4
Yellow River Ravines Area North of Eglin AFB



SOURCE: Florida DEP (2005b).

NOTE: This map shows the majority of the Yellow River Ravines property before the 2006 acquisition, so this area is shown as "Essential Parcel(s) Remaining."

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resources. The area is very rich in archaeological and historical resources, containing nine recorded archaeological sites and two historic structures.¹⁵ Since Escrimano Point is surrounded by Eglin Air Force Base to the east and waterways to the west, and is so close to Choctaw runway, it would be ideal to use this entire area as a buffer. Unfortunately, the owners of this

¹⁵ Florida Department of Environmental Protection (2006b, p. 141).

prime waterfront land propose to develop the property into a residential area, which would be incompatible with current and future operations of this critical Outlying Landing Field. The window of opportunity to protect this area is quickly disappearing.

4. Box R Ranch Property Purchase of 7,597 Acres in 2003. In 2003, Florida purchased the Box R Ranch in the southernmost area of the Florida Greenway. This acquisition preserves one of the last remaining undeveloped, natural coastal areas in Florida, and protects low-level military flight corridors and Operating Areas near the Gulf of Mexico used by Tyndall AFB. In partnership with The Nature Conservancy, Florida DEP acquired the 7,597-acre Box R Ranch located at the southernmost tip of the Greenway, two miles west of Apalachicola.

Located in Franklin County, the area supports a variety of ecologically sensitive natural communities, including estuarine tidal marshes and floodplain swamps, and protects the quality of water critical to oyster harvesting, a major source of income and revenue for the local economy. The Florida Fish and Wildlife Conservation Commission will manage the property as part of its Wildlife Management Area system. Containing nearly 6,000 feet of frontage along the Intracoastal Waterway and the Apalachicola River, this land is biologically diverse, providing habitat for many threatened and endangered plant and animal species, including the Florida black bear and bald eagle.¹⁶

This area is near a developed area whose residents have complained to the military about noise from the low-level flights.

Assessing Eglin AFB's Accomplishments in Addressing Encroachment

Eglin AFB's buffering activities have helped promote military readiness and are preserving habitat as well as providing other benefits. Based on the RAND assessment, Table B.1 presents the summary of the range of benefits that are starting to accrue. The extent of these benefits is discussed below along with the assessment of the buffering projects' accomplishments.

Buffering activities have been enhancing and preserving the military mission by helping to prevent an erosion of the natural buffer that Eglin AFB is used to having. They are helping to preserve the low-level flight mission by helping to protect low-level flight corridors. As an Eglin AFB range staff member stated, this buffering "helps air maneuvers by providing long contiguous pathways which enhance the mission."

The buffering activities provide more flexibility for operations. Buffering enhances the maneuver capability of air and ground forces. Eglin can use areas on the base for more intense missions because the buffering activities help to protect T&ES elsewhere. The activities help air maneuvers by providing long contiguous pathways that enhance the mission. And buffering supports analysis of APZ and safety zones as well as range sustainment planning.

The buffering activities also have tremendous potential to protect the long-term strategic military missions in the region (i.e., F-15 pilot training at Tyndall AFB, and future F-35 pilot training at the new Joint Integrated Training Center to be established at Eglin AFB as a result of the 2005 BRAC actions). Future aircraft and weapon systems that will be tested and used in training at Eglin AFB will require more space and will make more noise. For example, the JSF will require more space for training, including the low-level flight corridors. Thus, protecting

¹⁶ Florida Department of Environmental Protection (2003b).

Table B.1
Actual and Anticipated Benefits from Eglin AFB's Buffering Activities

Benefit Categories	Sample Benefits
Promoting military readiness and other mission benefits	Sustains compatible use and access for the mission Enhances maneuver capability of air and ground forces Helps protect low-level flight corridors Helps protect night training Enables more training space Increases operational flexibility Helps facilitate joint use and training Has increased regulatory flexibility
Addressing sprawl and limiting other incompatible land use	Prevented incompatible development, especially home and resort development Stopped subdivision and development of Yellow River Ravines' 11,313 acres, as happened at Crestview Helped prevent housing and resort development on 1,166 acres of Escribano Point near Choctaw runway
Preserving habitat and other environmental benefits	Helps protect habitat, biodiversity, and ecosystems Protects key conservation corridors Helps protect and sustain T&ES off base Helps keep the black bear off the federal T&ES list Helps protect watersheds and water quality Helps protect broader ecosystem through the Gulf Coastal Plain Ecosystem Partnership Helps the installation share environmental management skills and resources with private landowners
Community relations and partnership benefits	Improved relations with the environmental community and regulators Helped improve relations with state and local governments Military is viewed as a partner in conservation
Additional community benefits	Helps keep the installation as an economic force in the region Helps provide additional state forest, parkland, and outdoor recreation areas

such areas now will help the installation in the future as mission testing and training air and space requirements evolve.

Eglin's conservation buffering helps the joint mission, since other Services use Eglin AFB for testing and training, such as the Navy using Choctaw Field. In addition, strategically looking to buffer airspaces throughout the Florida Panhandle benefits both the Air Force and Navy. For example, the Northwest Florida Greenway project benefits Air Force and Navy flight operations at multiple installations in the region. In addition, the buffering coordination and collaboration between Eglin AFB and NAS Whiting Field is a good example of joint strategic planning for the future. However, more could be done for joint strategic planning in the region. Some other installations, such as Tyndall AFB, should be more involved in the buffering collaboration, especially given that the Northwest Florida Greenway underlies much of Tyndall's military operating area (MOA) airspace.

The buffering activities and Eglin's strategic ecosystem management activities mean, as one natural resource staff member stated, "We are not encroached upon by the regulatory agency as much." The activities have increased regulatory flexibility. The buffering projects also help reduce the amount of time the base staff must spend consulting with FWS and the National Marine Fisheries Service regarding tests and risks to federally protected species. Because of federally protected species concerns, Eglin often has to consult with such regulatory agencies before conducting tests.

Eglin's buffering activities have also helped prevent incompatible land use near the base, especially resort, retirement, and commuter sprawl developments. The buffering project of 11,313 acres in the Yellow River Ravines project likely stopped this area from being subdivided into a residential development, as happened at nearby Crestview. Given the high development potential of the waterfront tracts in the Escribano Point area, the purchase of 1,166 acres there, near Choctaw runway, likely prevented high-end residential or resort development. Similarly, the Box R Ranch purchase and other projects have likely prevented housing, retirement community, and resort development that is occurring all over this part of Florida.

Eglin AFB buffering activities have not helped to facilitate any local or regional growth management or planning. There is some partner NGO and state interest in doing assessments of such issues, such as examining the effects of road expansions on sprawl and installations. However, currently there is no funding for such analyses. In addition, the installation does not have enough staff to undertake outreach and to partner with local governments on planning and growth management issues. More benefits could accrue in this area with such assessments and with more outreach and collaboration with local governments on planning and growth management.

Eglin AFB buffering activities have substantially benefited the environment by preserving habitat and biodiversity. They have helped protect diverse ecosystems and T&ES and other species of concern. For example, they have helped preserve wetlands, marshes, shorelines, and woodlands, including an old-growth LLP ecosystem. Habitat for rare and threatened plant species, such as the white-top pitcher plant and sweet pitcher plant, and aquatic species, such as the Atlantic sturgeon and West Indian manatee, have been protected. The protected large-scale landscapes also provide critical stopover sites for migratory birds and protect numerous other rare plants and animals, such as red-cockaded woodpeckers, tiger salamanders, eastern indigo snakes, Panhandle lilies, yellow fringeless orchids, and Florida pine snakes.

The buffering is helping to protect key conservation corridors that connect important habitat for such wide-ranging species as the Florida black bear. In fact, according to a Florida conservation NGO representative, the buffering helps keep the Florida black bear off the federal T&ES list. The federal government was considering adding it to the list as a T&ES but it put off the listing because of the GCPEP collaborative management and the buffering efforts to protect corridors between the large tracts of land. This is an example of how strategic buffering to protect wildlife corridors helped prevent another T&ES concern for the base.

Eglin AFB is part of a couple of larger landscape and ecosystem regional planning efforts, including the GCPEP and the Northwest Florida Greenway. These efforts are important strategic activities to protect ecosystems and biodiversity and ultimately prevent T&ES encroachment.

Eglin's buffering activities have also helped with community relations and partnerships, especially with the regulators and the environmental community. Eglin's efforts have demon-

strated that Eglin and OSD are environmental partners. OSD's contributions of money for buffering projects in Florida show that DoD is a serious conservation partner, which helps Florida to continue to give funds and priority to military buffering projects. Also, Eglin's buffering activities help the military's image with respect to environmental issues.

The buffering activities have also helped improve relations with state and local governments, especially state agencies. However, since Eglin AFB does not have staff dedicated to buffering and Encroachment Partnering, such benefits are not as significant with local governments. Eglin AFB does not have enough staff to attend all the various local government planning meetings. The installation does not spend a large amount of time explaining the importance of addressing base encroachment concerns. It needs to conduct more outreach to local governments on buffering issues to reap more benefits in community relations and with local planners.

Eglin's buffering activities also provide additional community benefit. They help preserve the base as a key economic source in the region. The base and contractor support provide high-paying, stable jobs in the area. In fact, the U.S. military in Florida is one of the top three economic drivers in the state. Since some of the buffered lands become state lands, this helps provide the state with parkland and outdoor recreation areas, such as hiking trails. In fact, the current plan is to have the Florida National Scenic Trail go through the Nokuse Plantation conservation easement area. A portion of the trail is already established on Eglin AFB along its northern boundary and will tie into the section now planned to cross the Nokuse Plantation.

Conclusions About Eglin AFB

Eglin AFB's buffering activities have had some clear accomplishments in helping to promote military readiness, limiting incompatible land use, preserving habitat and biodiversity, and providing community benefits, such as more parklands. These buffering activities present a rare and strategic opportunity to buffer a low-level flight route over large areas and protect significant parts of the disappearing ecosystems and unique biodiversity. There is an opportunity to keep Eglin and other Florida bases from becoming islands for protecting biodiversity.

Eglin's buffering program is also strategic because it addresses joint testing and training mission considerations across different installations in the region, including NAS Whiting Field and Tyndall AFB. It is a regional, strategic, multi-Service and multibase partnering effort. However, some bases should be more involved in the process. For example, Tyndall AFB is not as actively engaged in buffering as it could be.

Eglin AFB has been proactive, but it has not had enough USAF staff support, time, or skills for buffering, at both headquarters and the local level. More staff members are needed to help assess financial and legal issues related to buffering, as well as to process projects. This weakness has made it more difficult for the installation to complete some buffering projects or spend sufficient time conducting outreach to local governments about buffering and the importance of addressing incompatible land use.

Eglin AFB, TNC, and other partners need to act fast or they will lose the opportunity to complete the Northwest Florida Greenway and other buffering projects because of subdivisions, development, and rising land values. The hurricane evacuation road building projects also will affect the ability to buffer. Having large tracts of undeveloped land—over 10,000 acres—for buffering, such as with the Nokuse Plantation, is a unique opportunity that the

military should take advantage of while it still can. Given the size, scope, and cost of the Northwest Florida Greenway initiative, more money and support are needed now or this effort may not be able to protect this flight corridor from encroachments.

Eglin has a strong chance of preventing significant amounts of encroachment threat through buffering activities. However, given the development pressures and increasing land costs, the Florida Forever prioritization scheme and funding constraints, which limit what the state can contribute, and the fact that about a dozen local governments need to be contacted and collaborated with on local planning, the military needs to contribute more buffering funds and support to make this happen. Such support includes growth analysis to help assess future problem areas and staff support to work with local governments on growth management.

An Assessment of Fort Carson's Buffering Activities

Fort Carson is a 138,303-acre major Army training site located directly south of Colorado Springs in El Paso County, Colorado, and stretches south along I-25 into Pueblo and Fremont Counties. The installation measures about 2 to 15 miles wide (east to west) and 24 miles long (north to south). The cantonment area of Fort Carson is in the northern part of the installation with most of the major training areas to the south and east on the post, such as three major gunnery ranges located near the southern end.

Installation Training and Other Activities

Fort Carson is the home of the 4th Infantry Division; 2nd Brigade Combat Team; 2nd Infantry Division; 2nd Brigade, 91st Support Brigade; 4th Engineer Battalion; Headquarters West, First U.S. Army; the 43rd Area Support Group; and 10th Special Forces Group (Airborne). Training at the installation includes tanks and other tracked and wheeled vehicles, and rotary-wing aircraft. Some joint use and training with other Services, such as the U.S. Air Force, U.S. Marine Corps, and other agencies, are also conducted at Fort Carson.

Fort Carson is also responsible for managing the 235,368-acre Pinon Canyon Maneuver Site (PCMS) in southeast Colorado. The current buffering program is not addressing the PCMS because of limited resources and the immediate buffering need near Fort Carson given development pressures.

Local and Regional Encroachment Concerns

The area around Fort Carson is experiencing significant development pressures as the entire Colorado Front Range is becoming more developed. Suburban and rural sprawl keeps expanding out from the cities even into the prairie areas to the east as more people have moved to Colorado and ranching has become less economical compared to potential development investments. Near Fort Carson, Colorado Springs sprawl is moving down from the north, and from the Pueblo area sprawl is moving up from the south. The area faces residential commuting suburban and rural sprawl, resort development, and retirement community growth pressures. For example, Pueblo West has growing retirement and commuter communities. Because of these development pressures, land prices have been rising significantly and ranch land and other large tracts of land and open space are being lost.

Development pressures in the area are expected to continue—both El Paso and Pueblo Counties are projected to lose significant acreage to development over the next couple of decades.¹ A detailed analysis of land sales data in Colorado indicated that Pueblo County saw a compound annual growth rate of 16 percent from 2000 to 2005 for parcels over 35 acres; and El Paso County had a compound annual growth rate of 24 percent over the same timeframe. Statewide averages were 17 percent.² Additional evidence is provided by two appraisals prepared for The Nature Conservancy on the Walker Ranch, which is adjacent to the south and southeast sides of Fort Carson. Supporting data for the appraisals indicated that ranch land in the area of Fort Carson has been appreciating at a rate of 12 percent per year, with some parcels appreciating over 20 percent per year between 2000 and 2005.³

The nearby cities of Colorado Springs, Fountain, and Pueblo are all very pro-development and pro-growth. Similarly, El Paso and Pueblo Counties are also promoting development. There is no regional planning or growth management to help stop the sprawl.

T&ES and the Central Shortgrass Prairie Ecoregion

Fort Carson also faces T&ES and other species of concern issues, which are a potential encroachment problem. Many of these species are part of the Central Shortgrass Prairie ecoregion. In fact, Fort Carson includes prime habitat for the CSP ecoregion, which encompasses approximately 56 million acres and includes parts of Colorado, Kansas, Nebraska, New Mexico, Oklahoma, Texas, and Wyoming. The majority of the ecoregion is privately owned (92 percent); 5 percent is state-owned, and 3 percent is in federal ownership.⁴ Less than 50 percent of Colorado's original short-grass prairie remains today, and much of it is threatened by suburban and rural sprawl.

The CSP contains 146 animal and plant species that are state and/or federally listed and are considered imperiled, endemic, or declining. A key specie community that serves as an indicator of functioning prairie ecosystems of this ecoregion is the black-tailed prairie dog animal community. The prairie dog animal community is defined as any active black-tailed prairie dog colony or complex that supports one or more associated species. Associated species include the burrowing owl, mountain plover, ferruginous hawk, and swift fox. These species do not depend entirely on black-tailed prairie dogs, but they do tend to be associated with prairie dog colonies to varying degrees in the CSP ecoregion. Many other species are also associated with prairie dog colonies and would benefit from prairie dog conservation.⁵ Fort Carson contains prime habitat and colonies of black-tailed prairie dog animal community and associated species.

The prairie dog, mountain plover, burrowing owl, and many of the other associated species have declined significantly over the past couple of decades. The prairie dog and mountain

¹ Colorado Conservation Trust (2005).

² Colorado Conservation Trust (2005). The compound annual growth rate is a calculated value that shows the smoothed annual growth rate for the period the investment was held. It is calculated using the value of the initial investment, the ending value, and the number of years the investment was held. In reality, the value of investments fluctuates and does not necessarily grow monotonically any given year; therefore, this term is best used to compare investments over the same or similar timeframes.

³ See Appendix I for more details on these calculations.

⁴ Neely et al. (2006, p. iv).

⁵ Grunau et al. (2006, p. X-1).

plover were both proposed for federal listing a few years ago but were not listed at that time. If the declines continue, they may be listed, especially because in many areas of the West, prairie dogs are still being shot and poisoned by government agencies and local landowners. If either of these species were listed, it would likely have significant training effects at Fort Carson, so the installation has a long-term strategic interest in helping to preserve a healthy population of such species by helping to preserve the CSP ecoregion.

Other federally listed or previously listed species found on Fort Carson include the Mexican spotted owl, peregrine falcons, and bald eagles. Fort Carson also provides habitat for other declining species, such as rare plants, the Arkansas darter, and the southern red-bellied dace. Four very rare plants are known to occupy portions of Fort Carson: Pueblo goldenweed, roundleaf four-o'clock, golden blazing star, and Arkansas River feverfew. With the exception of Pueblo goldenweed, the plants are largely restricted to isolated geologic outcrops known as shale barrens and occur on the southern end of Fort Carson and on ranch land south of the post. In fact, the properties to the south of Fort Carson contain a significant percentage of the known occurrences of these plants, and they are usually in the best condition and in the most intact native landscape. Protection of these populations is considered essential to the preservation of these species.

Installation Encroachment Program

Fort Carson started a strategic program in 2002 to address any installation encroachment problems that might affect it. Installation buffering staff members have examined an average 1.5- to 2.0-mile buffer area around the base perimeter to identify all existing land uses and those that are compatible with the military mission, potential changes to those uses, and places where buffering projects are needed. The initial focus is on an average 1.5- to 2.0-mile depth because of Army training doctrine and how Fort Carson uses the installation. The purpose of the initial focus is to stop immediate encroachment.

Fort Carson management and staff are also looking at a regional level, because some encroachment concerns, such as T&ES, need to be addressed on a regional scale. They realize that activities far away from the installation can cause potential encroachment. Over time, there are always ongoing changes in targets, noise, safety zones, dust, and ecosystem mitigation concerns, which is why installation staff members take a broader regional and long-term strategic perspective on buffering.

As with other Army installations, Fort Carson's program is part of the Army Compatible Use Buffer program. The ACUB program at Fort Carson was previously assigned as another duty to two individuals within the Directorate of Environmental Compliance and Management (DECAM). One of those individuals accepted another assignment in January 2007. As of spring 2007, the DECAM still did not have a single full-time dedicated person for buffering.

The Fort Carson ACUB objective is "to reduce encroachment and protect training land through the creation of land buffers to accommodate current and future missions and conservation of sensitive natural resources."⁶ Given the main training area and development pressure locations, the installation's buffering program is focusing on limiting development on 60,000 to 82,000 acres in the region, with an immediate focus on an average 1.5- to 2.0-mile strip around the eastern, southern, and southeastern installation boundaries. Fort Carson staff

⁶ *Proposal: Army Compatible Use Buffer for "Sustaining Colorado's Great Outdoors"* (2003).

members are concerned about residential development that causes complaints and safety issues related to training involving explosives, noise, or dust. They also are greatly concerned about potential light pollution for night training and about protecting habitat and species with conservation buffering, so that training is not affected by T&ES restrictions.

Fort Carson is leveraging a number of different partner efforts in its buffering activities for different reasons, including leveraging funding, negotiations, implementation of MOAs, third-party acquisitions, and strategic analysis support. These partners include El Paso County, Pueblo County, Colorado Open Lands, Colorado Department of Transportation, Colorado Springs Economic Development Corporation (CSEDC), FWS, Great Outdoors Colorado, The Nature Conservancy, and private landowners.

Fort Carson is phasing in its buffer projects over time, because it does not have immediate funding to complete all the projects currently planned. The installation has executed multiyear conservation leases of property, which is like a placeholder for a conservation easement until funds are available to purchase a permanent easement outright. With these leases, grazing rights are acquired, the property is not allowed to be developed, and the installation has first right of purchase when the lease expires.

Fort Carson has been developing local buffering projects around the installation but, because of regional concerns, it is also participating in two more strategic regional activities to preserve and conserve land and the environment: the Peak to Prairie Project and the CSP partnership.

Peak to Prairie Project

Begun in 2004, the Peak to Prairie Project is a large-scale conservation initiative in El Paso and Pueblo Counties designed to protect such valuable resources as working agricultural operations, scenic vistas, threatened wildlife habitat, military assets, and open space. The goal of the project is to preserve and protect these resources by protecting public and private lands. The three main natural resource priorities are protecting the I-25 corridor's agricultural, scenic, and riparian areas near Fountain Creek; helping to establish a buffer to the east of Fort Carson; and protecting Central Shortgrass Prairie land. The result will be a relatively intact landscape in one of the last remaining stretches of unfragmented land along Colorado's Front Range.

The project involves many partners and stretches from Cheyenne Mountain in the west to the El Paso County line in the east, from the city of Colorado Springs in the north to the city of Pueblo and the Arkansas River in the south. Partners include, among others, Colorado Open Lands, The Nature Conservancy, Colorado State Parks, El Paso and Pueblo Counties, Colorado Springs Utilities, USDA's Natural Resource Conservation Service, Fort Carson, DoD, and several private landowners. The project covers over 900 square miles of prairie, creek, mountains, and plains.⁷ For a map of the area, see Figure C.1.

Originally, a state land trust, Colorado Open Lands, was examining ways to protect areas along Fountain Creek (east of I-25 east of Fort Carson; see Figure C.1). Staff members expanded the project focus once they heard about the Fort Carson buffering project and TNC's suggestion about the need for a broader landscape focus in the region.

This is an ambitious effort. However, it is unclear whether it can reach all its objectives given development pressures. For example, a large ranch, covering over 20,000 acres east of

⁷ More information is available on the Peak to Prairie Project. As of April 11, 2007, <http://www.coloradoopenlands.org/site/ourWork/landProtection/peakToPrairie/index.php>, Colorado Open Lands, and The Nature Conservancy (2006).

Figure C.1
Map of Peak to Prairie Area



SOURCE: Colorado Open Lands and The Nature Conservancy (2006, p. 4).

NOTE: For more information about the Peak to Prairie Project see:

<http://www.coloradoopenlands.org/site/ourWork/landProtection/peakToPrairie/index.php>.

RAND MG612-C.1

I-25 and toward Pueblo, was just sold for development. Part of this area is in the Peak to Prairie corridor. The developer wants the property to be annexed into the city of Pueblo so that he can develop at a higher density. The city is likely to annex it. Colorado Open Lands is working to have part of it left as open space to maintain as much of the conservation corridor as possible.

Central Shortgrass Prairie Ecoregion Partnership

Fort Carson is also participating in the Central Shortgrass Prairie ecoregion partnership. The CSP partnership is a collaboration of federal, state, NGO, and private landowners to study, manage, and preserve the CSP ecoregion. Begun in 2004 with the start of a Central Shortgrass Prairie Ecoregional Assessment, this partnership's ultimate goal is "to promote the long-term sustainability of all native species, plant communities, and ecosystems within the ecoregion through the collaborative design and conservation of a network of areas and implementation of species conservation guidelines."⁸ The CSP focuses on identifying and protecting key ecological patches and conservation corridors so that managers can try to maintain a healthy, viable

⁸ Neely et al. (2006, p. v).

ecosystem. This approach does not try to save everything; rather, it focuses on saving and managing key pieces of land to keep the system resilient, healthy, and functioning. By better conserving and managing key pieces of the CSP ecoregion as a healthy viable ecosystem, this partnership, if successful, would recover CSP T&ES and prevent any other species from being placed on the T&ES list.

Partners include The Nature Conservancy, the Colorado Association of Conservation Districts, the Colorado Natural Heritage Program and other state natural heritage programs, the Directorate of Environmental Compliance and Management, Fort Carson, DoD, the Colorado Division of Wildlife, the Colorado State Land Board, the Natural Resources Conservation Service, the U.S. EPA, NatureServe, Playa Lakes Joint Venture, the Rocky Mountain Bird Observatory, FWS, FS, and other federal, state, and nongovernmental agencies and organizations.

The CSP partnership started with a science-based ecoregional assessment to identify which pieces of property needed protection. This CSP ecoregion assessment was funded by the Department of Defense Legacy Resource Management Program, Fort Carson (DECAM), and the Colorado Division of Wildlife. In-kind services were provided by the U.S. Fish and Wildlife Service, state natural heritage programs, and numerous other experts.⁹

This is an even more ambitious effort than the Peak to Prairie Project. To succeed, it will need to engage other federal and state agencies more as it continues its process of trying to protect and sustain the CSP ecoregion. More analysis and implementation support for collaborative management will be needed as well.

Sample Buffering Projects

Fort Carson has several large-scale buffering projects completed and in process. The installation is fortunate to have a few large private landowners immediately adjacent. Directly south of the installation, Gary Walker owns about 38,000 acres of ranch land and two of Fort Carson's initial buffering projects were on this property. In July 2005, 4,960 acres of Walker Ranch directly south of the Army's Fort Carson were conserved through the purchase of a permanent conservation easement on the property for \$4.92 million (see Figure C.2 for the location of this easement property). Partners who helped fund and negotiate this deal were DoD, Fort Carson, and The Nature Conservancy. TNC was Fort Carson's main partner for this transaction and took the lead on negotiations and development of the final deal. The easement prohibits development of the land and allows only ranching and conservation practices in the future. It also protects the four rare plant species that occur on the southern end of the installation.

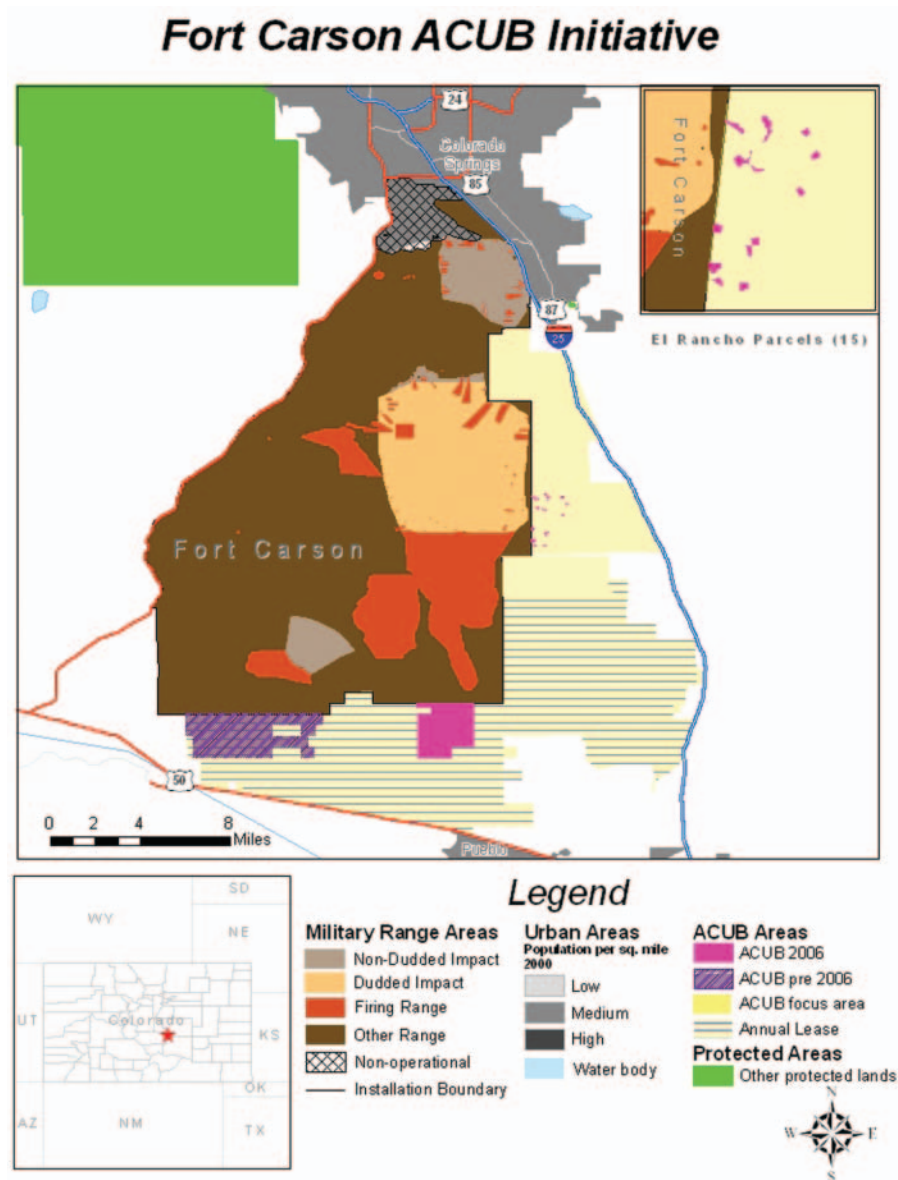
Similarly, in 2006, another 2,880 acres of Walker Ranch were protected with a perpetual conservation easement at a cost of \$3.12 million.

Comparing conservation easement appraisals for this property shows how significant the increase in land values has been. A parcel of Walker Ranch was appraised in 2002 at an easement cost of \$360 per acre. Not quite four years later, another parcel, albeit much smaller, was appraised at nearly \$1,085 per acre, a CAGR of 37 percent, which means that in 2006, Fort Carson would have to pay 316 percent more than in 2002 for a conservation easement on Walker Ranch.¹⁰

⁹ For more information on this assessment process, see Neely et al. (2006).

¹⁰ For more details on these calculations, see Appendix I.

Figure C.2
Map of Fort Carson Buffering Areas



SOURCE: Map courtesy of Headquarters, ACUB staff, March 2007.

RAND MG612-C.2

Since 2002, TNC for Fort Carson has had an annual conservation lease on the rest of Gary Walker's property to ensure that it is not developed until funds can be acquired to place permanent conservation easements on it. This lease has ranged from \$115,000 to \$150,000 per year (price has increased over time) for 30,000 acres and is paid for by the Department of the Army. In 2006, after the second conservation easement deal, a long-term conservation lease with a first option to buy on Gary Walker's remaining 20,383 acres was acquired. Similarly, TNC (for Fort Carson) has a conservation lease and is working on conservation easements on

Bob Walker's 16,000-acre ranch to the southeast of Fort Carson. The first phase objective is to protect 12,200 acres that are in the average 1.5- to 2.0-mile buffer area.

Another major focus for Fort Carson has been directly east of the installation where a real estate developer had invested in land and had begun building what was intended as a 250-home subdivision immediately east of the fence line. In late 2005, a unique deal was worked out with the developer to stop further residential development along the northern sector, which would have been at the eastern border of an artillery range and in the 115 decibel noise zone of this training range. CSEDC in partnership with El Paso County and Fort Carson negotiated this deal with Casa Builders of Colorado Springs.

In this deal, Casa Builders agreed to sell El Paso County parcels in the land strip along the west end of the Rancho Colorado development that are in the buffer area of the installation (just east of the installation's duded impact area and a major firing range; see Figure C.2). The land was purchased with DoD funds. As of late spring 2007, El Paso County had acquired 57 lots (517 acres) along the west end of the Rancho Colorado development. Part of this deal also involved DoD purchasing and preventing the potential expansion of the water delivery system. REPI funds of \$2.8 million were used for this land and water deal. Because of the relationship between the county and Casa Builder, this developer is able to develop its 250 homes at a higher density on 1,000 acres more than a mile and a half from the artillery range in the Midway Ranch area next to I-25. El Paso County granted a zoning change to allow Carpenter to do this.¹¹

El Paso County will retain ownership of the land and has a contract to not allow any incompatible uses on it. Other parts of Rancho are still in private hands; however, these properties now have limited potential for development given the lack of available water. Fort Carson and El Paso County are continuing negotiations with other private landowners to acquire some of these properties within an average 1.5- to 2.0-mile buffer area; such acquisition will depend on available funds.

To summarize the costs to the military, land acquisition costs for the buffering deals through spring 2007 have been \$9.84 million. The two Bob Walker conservation easements on 7,840 acres cost \$7.02 million and the Rancho deal is costing \$2.8 million. Most of this was paid for by the REPI program: \$4 million in FY 2005 and over \$5 million in FY 2006. The first Walker easement in FY 2005 on 4,160 acres cost \$4.92 million. This is a significant investment by the military. However, given the rising land prices and the number of acres buffered and all the benefits from this buffering to Fort Carson, not to mention the community, these have certainly been worthwhile investments.

Given limited staffing support for ACUB, Fort Carson has relied significantly on its partners to help with conservation buffering outreach, negotiations, analysis, contract development, and closing the deals. CSEDC and TNC have both contributed significant manpower, analysis skills, and negotiations and outreach efforts. Other partners have helped as well. Consider the buffering deal to stop the Rancho development of 250 homes next to the eastern fence line. In this deal, CSEDC provided transaction costs, such as the initial property appraisal and environmental assessment, and significant staff time to explore, analyze, and conduct outreach about potential options of who would purchase and own the land and then to negotiate with the developer and meet with county staff. El Paso County paid the legal costs to put together

¹¹ For more information about this deal, see McKeown (2005); Roper (2006).

the contract. Even the developer paid for some transaction costs: He paid rezoning costs, such as legal and planning fees, to develop elsewhere.

Assessing Fort Carson's Accomplishments in Addressing Encroachment

Since Fort Carson's program to address encroachment was started around 2002, it has already shown some progress. Table C.1 summarizes the range of benefits that are accruing from Fort Carson's conservation buffering activities, as determined by the RAND assessment. The extent of these benefits is discussed below as the assessment of the buffering projects' accomplishments is presented.

Fort Carson has already helped protect the training mission. In September 2006, the garrison commander stated, "[The buffering] allows me to train all times of day and night." Other installations have had training curtailed because of encroachment, but Fort Carson does not have this problem because of its buffering activities. The buffering projects are helping to protect the perimeter of the base from ambient light, which helps with night training, including ground, tank, and aerial training. The buffering activities also minimize the effect of the training on surrounding communities and thereby reduces neighbors' complaints about noise, smoke, fires, and other potential damage claims from training.

The Army, USAF, and Colorado Air National Guard use the gunnery range at the southernmost end of the installation for low-level flight training. This training could not be conducted if Walker Ranch were to be developed as Pueblo West was.

The installation has also had operational benefits from protecting wildlife with the Walker Ranch conservation easements. Specifically, staff members do not have to restrict training to protect four unique plant species on the southern end of the installation, since they are protected by the conservation easement on the Walker Ranch just south of the installation.¹²

In addition, the military mission and the community are safer, since fewer people reside near gunnery and other training ranges, i.e., there is no development in safety zones.

There have been joint training and multiple Service benefits, such as helping to protect low-level flight training for the Colorado Air National Guard. There are also some cross-Service benefits with USAF installations in Colorado, which are more interested and motivated to do conservation buffering at their bases because of Fort Carson's ACUB efforts.

Fort Carson can continue to deal with a limited number of landowners as neighbors, instead of having to deal with many, which makes it easier for installation management. Because of good relations with the people who own property near the gunnery ranges, they have fewer complaints and having fewer people nearby makes it easier to maintain such relationships.

Fort Carson buffering activities have been successful at stopping some incompatible land use next to key training areas, such as preventing the construction of an additional 250 homes near the eastern fence line and stopping Pueblo West from sprawling to its southern borders. Given the strong development pressures in the region, the activities have not affected local

¹² Since so many troops and equipment were deployed in the Global War on Terrorism during September 2006, there was not as much training at this range. When the installation commences mechanized infantry training again, the benefit will be even greater because the installation will not have to restrict this training because of the plant species.

Table C.1
Actual and Anticipated Benefits from Fort Carson's Conservation Buffering Activities

Benefit Categories	Sample Benefits
Promoting military readiness and other mission benefits	Protects the perimeter of the installation from ambient light, which helps with night training
	Enables low-level flight training over the southern part of the installation
	Minimizes the effects on surrounding communities and thereby minimizes complaints about noise, smoke, etc.
	Helps protect joint use and training
	The military mission is safer with less development near safety zones
	Minimizes the risk of wildfires from installation training spreading to and affecting nearby homes
	Installation management deals with only a few landowners as neighbors
	Providing operational flexibility from protecting wildlife in conservation easements
Addressing sprawl and limiting other incompatible land use	Prevented high-density development in five-mile strip for 1.5 miles east of the installation
	Prevented an additional 250 new houses from being built near the eastern fence line
	Helping to protect open space east and south of Fort Carson
	Helping to prevent Pueblo West suburban sprawl from spreading to the southern part of the post
	Helps provide a buffer between Colorado Springs and Pueblo so that they do not combine to become one large suburban area
	Has helped local governments become more interested in protecting open space and managing growth
Preserving habitat and other environmental benefits	Helping to preserve plant species of concern and making a case for not listing them as T&ES
	Helps protect and preserve habitat and T&ES
	Helps protect ecological systems, such as the CSP ecoregion, in eastern Colorado
	Helping to preserve large pieces of property with conservation value
	Conserving wildlife travel corridors
	Helps with water quality and quantity concerns
	Helps educate local governments about the need for ecosystem protection and management
Community relations and partnership benefits	Helps improve community relations
	Helped improve community visibility and collaboration within the Peak to Prairie Project
	Helped launch the CSP partnership
	Offers the potential to leverage military funds with state funds for acquiring conservation easements
	Helps foster more collaborative approaches to conservation in the region

Table C.1—continued

Benefit Categories	Sample Benefits
Additional community benefits	Provides scenic open space
	Helps maintain regional quality of life and community sense of place
	Helped the Peak to Prairie region do long-range and more strategic planning
	Helps protect ranch land
	Helps increase local land values
	Landowner can keep land and get economic benefit from it beyond ranching

zoning activities in any significant way and have had minimal influence on any local population growth and development pressures. However, Fort Carson's buffering activities, according to a community land trust staff member, have helped local governments become more interested in protecting open space and managing growth. They have also helped local governments consider installation needs in their local land use planning.

With its conservation buffering, Fort Carson is helping to preserve habitat that is home to species of concern and is also strategically trying to preserve habitat to prevent other species from being added to the T&ES list. The installation is also helping to preserve travel corridors for wildlife and unique ecological areas, such as the shale barrens with the rare plants. Fort Carson is strategically addressing current and potential future habitat and species encroachment and helping to preserve ecological systems and biodiversity by participating in broader landscape and ecoregional collaborations, such as the Peak to Prairie and CSP ecoregion collaborations. These strategic collaborations, if successful, will help preserve the CSP ecological systems and prevent CSP species from being added to the T&ES list and encroaching on training at the installation. These buffer activities strategically align with Fort Carson's INRMP and the installation sustainability planning.

The buffering activities also are helping to support regional issues related to water quality and quantity concerns. Water rights, such as at Fallon, Nevada, are also a significant issue in Colorado. Fort Carson buffering helps conserve water by preventing some development and also helps protect Fountain Creek watershed water quality, by helping to prevent storm water runoff and pollution problems from more development.

Another benefit of the buffering and Fort Carson's participation in the CSP is helping to educate some local governments about the need for ecosystem protection and management and how it benefits the installation. This benefit is minor so far—much more needs to be done—but at least it has started. For example, because of the buffering program, a city of Pueblo planner recently learned about Fort Carson's participation in the CSP and that this is important to the installation.

Fort Carson buffering activities have helped improve community relations. For example, a local government representative commented on the Rancho deal that it was preventing “tension and stress” that would have occurred if homes were next to the fence line.

Fort Carson buffering activities have also helped improve conservation partnering and collaboration within the region. They have helped garner state and local governments and community support for the Peak to Prairie and CSP collaborations. As one conservation land trust representative put it: “The Army and U.S. military getting behind the long term vision of protecting these natural resources [such as the CSP ecoregion] help get community and non-

partisan political support to protect them. The US military helps to reach non-conservation audiences, such as state and local organizations within Colorado.”

Fort Carson buffering has also had other benefits for the community and region. It has helped preserve scenic open space and ranching and has helped to increase local property values. It has even helped with quality of life and preserving community character. Residents of Colorado greatly value their open space, and Colorado Springs has a unique history and sense of community, part of which is at risk of being lost by so much development along the I-25 corridor. The Fort Carson buffering is helping to prevent Pueblo from sprawling into Colorado Springs, which helps the two remain distinct communities. These quality of life benefits also positively affect installation soldiers, other personnel, and their families who also reside in the community.

Conclusions About Fort Carson

Fort Carson’s buffering is helping to promote military readiness by preventing incompatible land use and preserving habitat for species of concern. Fort Carson’s ACUB offers a unique strategic opportunity to buffer large tracts of land around the installation. This buffering activity, as former Garrison Commander Mike Kazmierski has stated, has the potential to prevent 90 percent of the residential sprawl encroachment problems. “It’s not a perfect solution, but if we can get a mile and a half where there’s no heavy development, we think that’s a 90 percent solution.”¹³ The RAND analysis of Fort Carson’s effort supports this estimate with respect to rural and suburban sprawl problems near the fence line. In addition, installation management will continue to deal with only a limited number of landowners as direct neighbors, which is a management advantage that few installations still have. However, the buffering program will require significant financial investment with about \$10 million already invested by January 2007 and significantly more than that needed to complete the planned buffering. This upfront investment is worthwhile if it results in an installation that has prevented most of their sprawl encroachment problems.

Fort Carson is also being strategic in addressing the loss of biodiversity and T&ES issues with the Peak to Prairie and CSP activities. However, full collaboration of CSP partners and stakeholders is important to CSP management and sustainability. In addition, it is unclear if the Peak to Prairie Project can succeed given the strong development stances of the cities of Pueblo, Fountain, and Colorado Springs. If these efforts fail to preserve the CSP ecosystem, T&ES concerns, such as those involving the black-tailed prairie dog and mountain plover, could cause encroachment problems for Fort Carson. It is important that other military installations and organizations in the CSP region also participate and invest more in the CSP ecoregional collaboration to help it succeed and provide environmental encroachment relief for all military installations in the CSP. In addition, other federal, state, and local government agencies need to provide more support to the CSP and the Peak to Prairies activities to help them save species and prevent T&ES encroachment. Fort Carson can help take the lead by conducting more outreach and working more with other government agencies, such as the cities of Pueblo, Fountain, and Colorado Springs, to ensure that they understand the importance of and support the Peak to Prairie Project and the CSP partnership. One way to help do this is

¹³ McKeown (2005).

to work with all the different government entities in the Pikes Peak region on regional growth management.

The Fort Carson buffering activities also show the need for more investment in analysis, conservation easements, and collaborative management over larger areas because of habitat and watershed concerns; and because of the CSP, Peak to Prairie, and Fort Carson sustainability plan opportunities. An important part of such activities will be leveraging diverse partners, such as Colorado Open Lands.

An Assessment of Fort Stewart's Buffering Activities

Fort Stewart and Hunter Army Airfield (HAAF) are home to the 3rd Infantry Division and combine to be the Army's Power Projection Platform on the Atlantic Coast. It is the largest Army installation east of the Mississippi, covering 279,270 acres in southeast Georgia. Fort Stewart is about 40 miles southwest of Savannah, Georgia. Most of Fort Stewart's land was obtained in the 1940s from many individual owners.

HAAF is a 5,370-acre installation on the southwestern edge of Savannah, Georgia. It has the Army's longest runway on the East Coast (11,375 feet), and the Truscott Air Deployment Terminal. Together, these assets can deploy such units as the heavy, armored forces of the 3rd Infantry Division or soldiers of the 1st Battalion, 75th Ranger Regiment. Fort Stewart's proximity to the port of Savannah and Hunter Army Airfield facilitates its deployment mission.

Installation Training and Other Activities

HAAF supports Fort Stewart's deployment mission and is home to the 224th Military Intelligence (MI) Battalion, Marine Corps Reserves, and 1/75th Ranger Regiment. It also houses aviation units from XVIII Airborne Corps, Special Operations, Coast Guard, National Guard, and the 3rd Infantry Division. Fort Stewart/HAAF represent a single installation with a unified command structure.

Fort Stewart is responsible for the combat training of the equivalent of about two heavy divisions of U.S. Army soldiers stationed at Fort Stewart, across Georgia, and in other locations of the southeastern United States. The primary mission of this installation is to support and assist in training the 3rd Infantry Division (Mechanized). It also supports nondivisional units training for their respective roles in combat. In addition, Fort Stewart has an area mission to provide support and services to other agencies, reserve forces, and installations within its prescribed area of responsibility.

Fort Stewart divides its land into 120 maneuver training areas. The Army conducts live-fire training exercises involving mortars, artillery, and tanks at Fort Stewart 24 hours a day throughout the year. Tanks, field artillery, helicopter gunnery, and small-arms ranges operate simultaneously. The ranges provide training and qualification firing for individual and crew-served weapon systems, antitank weapons, demolitions, helicopter gunnery, 25-mm gun, and 120-mm tank gun firing.¹

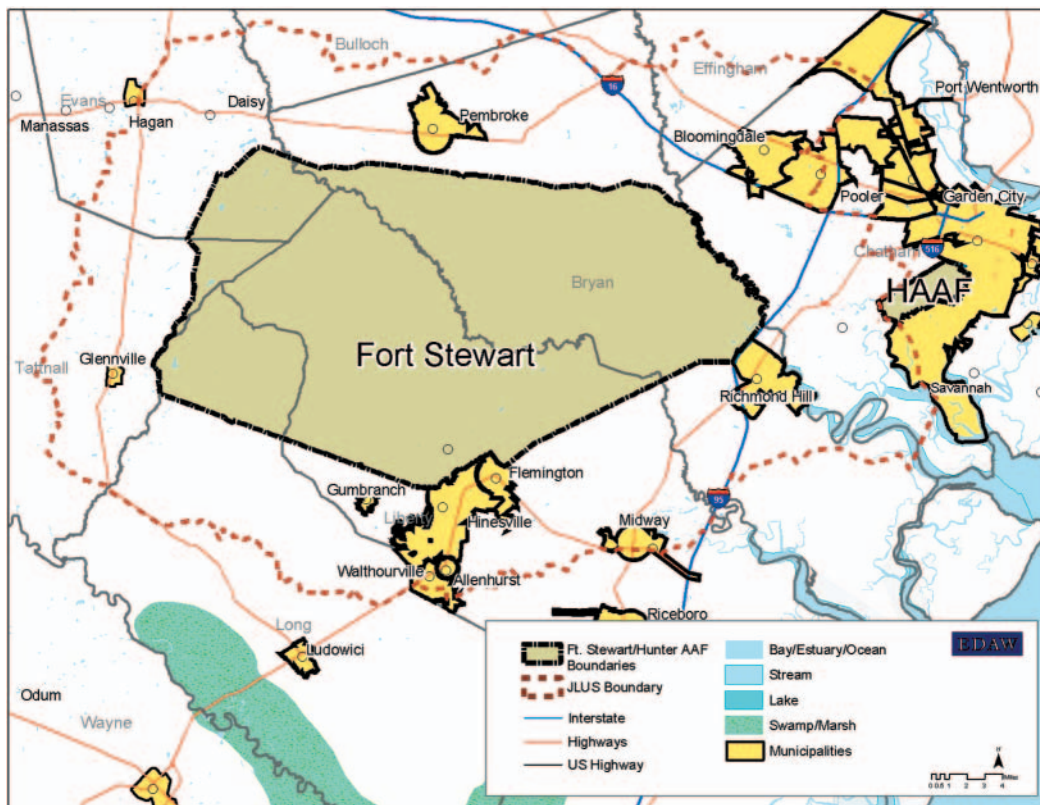
¹ For more information on such training operations at Fort Stewart, see EDAW, Inc. (2005, pp. 10–14).

Local and Regional Encroachment Concerns

Fort Stewart is a relatively flat, coastal landscape of sandy soils, riparian areas, and marshland that falls in portions of six counties—Bryan, Chatham, Evans, Liberty, Long, and Tattnall. Most of these are primarily rural, poor counties with some small cities. The city of Hinesville and Liberty County are adjacent to the cantonment area along the southern boundary of the installation. The city of Pembroke and Bryan County surround Fort Stewart to the north. The cities of Glennville and Richmond Hill lie to the west and east of installation boundaries, respectively. Figure D.1 shows the relationship between Fort Stewart and the surrounding communities. HAAF is approximately 40 miles east of Hinesville in the city of Savannah and Chatham County, Georgia.

The coastal Georgia region has experienced the state's second-fastest rate of growth in percentage terms. Virtually all of the counties near Fort Stewart will continue to grow over the next decade. Development pressures are beginning along the northeastern side of the installation, which is closest to Savannah. A large amount of development is also taking place in the Hinesville and Richmond Hill areas and land prices are rising. These trends could raise compatibility issues with Fort Stewart/HAAF operations in the foreseeable future, particularly as

Figure D.1
Fort Stewart's Location in Relation to Local Jurisdictions



SOURCE: EDAW, Inc. (2005, Figure 1).

RAND MG612-D.1

north Bryan County's population spreads south and unincorporated West Chatham and south Bryan County, including the city of Richmond Hill, extend west.

Encroachment effects from sprawl on the current mission are relatively minor because of Fort Stewart's large size and mostly rural surroundings. The potential for future encroachment, however, is significant as incompatible development moves closer to the installation and as Fort Stewart seeks to develop and site new activities and facilities that will likely be required to support future missions. Currently, fee simple title or conservation easements on many land holdings around the installation may be available at a reasonable price, but acquisition opportunities are likely to diminish or be much more costly in the future.

Local Government Support

The Fort Stewart/HAAF military complex is a major economic force in southeast Georgia. The military and civilian payroll, coupled with spending in goods and services, infuse the regional economy with almost \$2 billion each year, and every dollar spent by the military creates an additional \$1.10 in economic activity (i.e., the estimated expenditures multiplier is 2.1).² Given the installation's economic influence, most of the counties and communities are genuinely supportive of Fort Stewart. However, relations with the different counties are sometimes mixed when it comes to zoning and buffering support because the counties want development. Also, the economic benefits from the installation tend to be near Hinesville and to the south of the installation, so counties in these areas tend to support the installation more than others. However, since they are also rural and fairly poor counties, they also want more development and do not always see the need for buffering. Noise zones from tank training extend into Bryan County (north of the installation) but the installation has little economic effect on this county, so it has less incentive to support buffering.

During 2004–2005, a JLUS was conducted for Fort Stewart with the surrounding cities and counties. This process identified a series of tools that the Army and the local governments could choose to adopt during the implementation phase of the JLUS process. The tools were designed as options to promote collaborative regional decisionmaking and to balance community and military interests. For local governments, these options included land use and growth policy options, such as zoning, clustering of development, and TDRs.³ However, none of the local governments committed to implementing any of these options. In fact, within one adjacent county, a developer requested a zoning change near the installation, from agriculture to residential zoning for a planned housing development; this went against the JLUS principles. Fort Stewart asked the county not to change the zoning but the county did. However, the developer went bankrupt, so the houses were not built.

Environmental Issues

The Fort Stewart/HAAF complex lies within the Georgia Coastal Plain, which includes a number of saltwater marshes and wetlands. This unique coastal environment is one of the most ecologically rich and diverse places in the world.

As with other installations in the southeast, the longleaf pine ecosystem is of primary concern, as expressed in Fort Stewart's original ACUB proposal:

² These statistics are from a 2002 study by the Bureau of Business Research & Economic Development at Georgia Southern University (EDAW, Inc., 2005, p. 8).

³ For more details on the options, see EDAW, Inc. (2005).

Fort Stewart is located in the lower coastal plain physiographic province, in the heart of the once vast longleaf pine ecosystem. Prior to settlement by European colonists in the 17th and 18th centuries, longleaf forests dominated an estimated 60–92 million acres in the Atlantic and Gulf coastal regions. Rivaling Latin American rain forests in species diversity, longleaf pine ecosystems can contain over 40 plant species per square meter—among the highest values reported at this scale in the world—and support an estimated 300 globally imperiled species. Today, less than 3 million acres of longleaf forest remain, and less than 3% of this acreage is considered to be in relatively natural condition. The rest has been converted to agricultural use, developed, converted to short rotation slash and loblolly pine plantations, or degraded by interruption of the natural fire regime that sustains this ecosystem. Longleaf pine forests are dependent on periodic fires (estimated return interval of 1–5 years) to set back succession and maintain the open forest condition and herbaceous ground cover that characterize this ecosystem. For thousands of years, forest fires occurred naturally in the spring and summer as a result of lightning strikes during frequent thunderstorms, but most of the longleaf landscape today burns much less often due to modern fire suppression technology and fragmentation of the landscape. On Fort Stewart, however, live fire training frequently starts forest fires, and military land managers have continued to use prescribed fire to reduce wildfire risks, so the installation supports some of the best remaining examples of longleaf forest.⁴

Other areas of particular conservation value include the Ogeechee River area east of the installation and silviculture land to the north. Another important natural area is along the Canoochee River, which flows diagonally through Fort Stewart. The health of these watersheds is a key local concern.

Fort Stewart provides core habitat for many species of plants and animals. Fort Stewart/HAAF currently contains six species that are listed as threatened or endangered. These animals include the American bald eagle (threatened), red-cockaded woodpecker (endangered), eastern indigo snake (threatened), wood stork (endangered), flatwoods salamander (threatened), and shortnose sturgeon (endangered). In addition, Fort Stewart is home to 20 state listed or federal species of concern.

Increasing development on surrounding civilian lands further fragments and reduces valuable wildlife habitat, which in turn isolates military lands as the remaining intact natural areas. Species drawn to Fort Stewart lands could trigger federal protections that restrict the use of installation lands for training purposes.

Since the LLP ecosystem and the RCW are major concerns, Fort Stewart staff members are working to restore LLP habitat. They do controlled burns for restoring wire grass and LLP ecosystems as well as for training needs. They also harvest timber. They thin the loblolly pine to get rid of it and replant with LLP. Buffering of LLP ecosystems and other sensitive habitats is a priority of the buffering program.

Concern about water issues is also increasing in the region. Local governments are passing laws to put meters on agricultural wells. Water will be a major issue in the future. Water issues are becoming more prominent because aquifers are projected to be drying up.

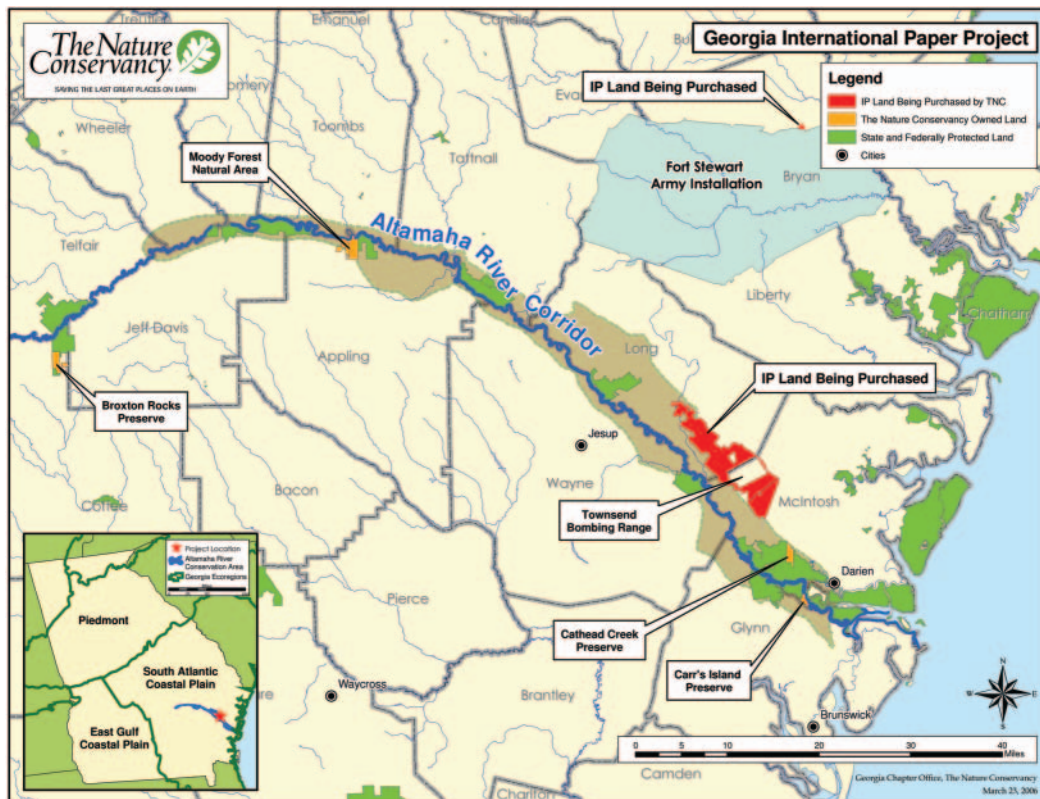
Fort Stewart is also near the Altamaha River corridor. Winding 137 miles throughout southeast Georgia to the Atlantic Ocean, the Altamaha River is formed by the confluence of the Ocmulgee and Oconee Rivers just east of Lumber City. Encompassing 1.2 million acres

⁴ Fort Stewart (2003, p. 1).

and spanning 10 rural south Georgia counties, the Altamaha River watershed is one of the three largest river basins on the Atlantic Seaboard, draining approximately one-quarter the state of Georgia.

The Altamaha River watershed ranks among the most biologically rich river systems along the Atlantic Seaboard. The watershed sustains globally rare natural communities, including the only known example of old-growth longleaf pine-black oak forest in the county. The river supports 11 imperiled pearly mussel species, seven of which are found nowhere else in the world. At least 120 species of rare or endangered plants and animals are found in the Altamaha River watershed, including bald eagles, swallow-tailed kites, and red-cockaded woodpeckers.⁵ TNC is actively trying to protect this corridor and protect a wildlife corridor from this area to Fort Stewart, which will be discussed more below. Figure D.2, which shows TNC's Plan to Protect Altamaha River corridor, shows how close it is to Fort Stewart.

Figure D.2
TNC's Plan to Protect the Altamaha River Corridor



SOURCE: Map courtesy of The Nature Conservancy, March 2006.

RAND MG612-D.2

⁵ For more information, see The Nature Conservancy (2006a).

Installation Encroachment Program

Fort Stewart staff members are looking comprehensively at a two- to four-mile area around the entire installation for possible buffering opportunities. The Fort Stewart ACUB program focuses mainly on surrounding rural lands, which will help support the training mission of the installation. The program is strategic, looking decades out, considering where development pressures will occur and changes in weapons and warfare (and, hence, in training requirements and effects). The long-term plan is to protect 120,000 acres at an estimated cost of \$60 million.

Fort Stewart's conservation buffering priorities are driven by

1. The training mission: What pieces of the boundary are most critical for them to protect, both now and in the future, for example, if tank ranges need to increase in size?
2. What is the acquisition opportunity? Will the property soon be sold and subdivided for development?
3. What is the development pressure in the area?

For its ACUB program, Fort Stewart uses a cooperative agreement approach through research and development (R&D) parts of the Army, which enables the funds to be carried across fiscal years. Research Development and Engineering Command (RDECOM) provides the contracting vehicle for Fort Stewart to route its REPI funds. "Grants" or task orders are used to purchase conservation easements. This arrangement allows Fort Stewart to have greater flexibility in using the money and not risk losing funds at year's end. The grant agreement enables funds to carry over across fiscal years for up to five years. It can take a long time to close a deal, so it is important to have this flexibility with funding.

In 2001, the Commander Officer of Fort Stewart took a serious interest in addressing encroachment and raised awareness among his staff about this issue following a meeting exposing him to the encroachment threat. This meeting included a presentation about the encroachment threat and buffering activities at Fort Bragg.

Originally, Fort Stewart staff members were talking with TNC staff about helping with the buffering process. However, most of the land around the installation is not the last of the best natural lands, so it did not fall within TNC's mission. However, some lands near Fort Stewart were of interest, so TNC wanted to be involved but did not seem to be the appropriate lead partner for the installation. In addition, the holdings of individual landowners around Fort Stewart range from less than an acre to several thousand acres, but most parcels are less than 100 acres. Establishment of a conservation buffer would therefore require working with a large number of landowners with diverse backgrounds and interests.

As a result, installation staff members started a dialogue with TPL about that organization taking a lead role in partnering on conservation buffering. TPL suggested that Fort Stewart conduct a conservation visioning and greenprinting process to work with the community in developing and implementing common conservation goals. In 2001, Fort Stewart signed a cooperative agreement with TPL for conducting this process.

Greenprinting: The Coastal Georgia Private Lands Initiative

A conservation visioning and greenprinting process is how TPL works with local communities and regions to help them develop and implement a conservation strategy, which includes

a vision, priorities, and a plan for protecting different natural areas in a community. This process consists of four main steps. The first step is conducting public outreach and constituency building with all relevant stakeholders for helping to develop and implement the conservation strategy. Second, a greenprinting analysis is performed to elicit priorities for protection. Greenprinting is TPL's application of GIS modeling that helps communities, nonprofits, and public entities make informed decisions about land conservation priorities. The greenprinting model provides a systematic approach for analyzing public access to current parks and open space. In addition, the model identifies currently unprotected areas that offer the highest conservation benefit based on locally identified criteria. The third step in the process is developing a practical portfolio of financial resources to implement the vision over time. The final stage is implementation by creating a simple, straightforward process that facilitates public participation and secures financial and human resources for implementing the conservation strategy.⁶

In 2002, the greenprinting process was officially established as the Coastal Georgia Private Lands Initiative (CGPLI). It was established by Fort Stewart, TPL, TNC, the Georgia Land Trust (GLT), and other partners to facilitate development and implementation of an effective conservation buffer for Fort Stewart.

The purpose of the CGPLI was to identify and promote the permanent protection of critical greenspace lands surrounding Fort Stewart/HAAF. The first stage of the process involved numerous public meetings with the community, conservation NGOs, Fort Stewart staff, and other stakeholders to start developing a common vision and identify conservation resources of concern. Then TPL conducted its greenprinting GIS analysis to identify priority areas and produce a series of maps showing different areas of desirable greenspace surrounding Fort Stewart/HAAF, including watersheds, stream buffering, connecting greenways, and viewshed corridors. A CGPLI priority acquisition map was produced as a compilation of these maps to depict the areas of greatest concern and most immediate threat of encroachment. This analysis process led to Fort Stewart/HAAF proposing to preserve open space in five distinct categories to include

- watersheds
- primary stream buffering and greenways
- open space/viewsheds
- agricultural lands, including forested areas, and
- comprehensive-plan-related protection.⁷

The first priorities were as follows:

- The eastern boundary of the Fort is the Ogeechee River. This area is under significant development pressure from the city of Savannah. Both Fort Stewart and TNC have identified this area as having potential for land conservation that would have a direct positive effect on water quality, wildlife habitat, and the creation of some additional public open space.

⁶ For more details on TPL's conservation visioning and greenprinting process, see The Trust for Public Land (2006a) and Tassel (2005).

⁷ The Trust for Public Land (2004, p. 25).

- On the northern boundary of the Fort, approximately 4,000 acres of land are currently in timber production and under threat of residential development. Several timber companies have expressed interest in opening discussions regarding a sustainable forestry program using conservation easements to protect the land and keep it in timber production.
- The western boundary of Fort Stewart is primarily an agriculture zone. Several landowners have expressed interest in discussing conservation easements as a way to enable their property to remain in an agricultural use.
- The southern boundary is in mixed use. The most significant area from a priority standpoint is that portion of the city of Hinesville that lies directly outside Fort Stewart. As mentioned above, TNC would like to establish a connection between Fort Stewart and the Altamaha River, which would provide watershed, conservation corridors, and wildlife protection (see Figure D.2 for a map of this area).⁸

As the CGPLI process was completing in 2003, Congress passed 10 USC §2684a, and the Army created the ACUB program. ACUB thus became the charter for Fort Stewart's conservation buffering. Fort Stewart staff members molded the CGPLI results to develop ACUB proposals and start implementing conservation buffering.

The Roles of Different Partners

On completion of the greenprinting process, Fort Stewart signed another cooperative agreement with TPL to implement ACUB in its priority areas. Fort Stewart has identified 120,000 acres in the target area but gave TPL a map of eight to 10 parcels that were the initial priority areas.

Fort Stewart's lead buffering partner has been TPL, but it leverages other partners as needed. Fort Stewart identifies the priorities and TPL does the work of identifying properties and contacting and negotiating with landowners. TPL is free to negotiate and close the transaction. TPL has great autonomy to operate outside authorized priority parcels and to look at and pursue opportunities that come up. TPL also manages the appraisal process for the deals, contracting to appraisers that use LTA standards.

TPL has subcontracted to GLT to help develop and manage the conservation easements. TPL is the official conservation easement purchaser that pays the seller, but then TPL transfers the easement to GLT with a one-time fee for monitoring and enforcing the conservation easement. This one-time fee is like buying title insurance for a fee simple purchase to ensure that property ownership will be defended against any future challenges. GLT has responsibility for the easement monitoring and enforcement. Inspections are done at least once a year, typically twice a year. If GLT were to default on enforcing the conservation easement, the Army would enforce it. By allowing GLT to hold the title, GLT can contact landowners to ensure that requirements under the conservation easements are maintained. GLT standards are consistent with those used by the Land Trust Alliance. TPL pays GLT for this service, and Fort Stewart/Army reimburses TPL.

TNC is also an important partner in Fort Stewart conservation buffering. TNC has helped identify ecological areas that need protection. This NGO has also helped negotiate and carry out some buffering deals where it had priority interests and landowner contacts.

⁸ The Trust for Public Land (2004, pp. 24–25). See this source for more details on the CGPLI.

Another more recent partner is Ducks Unlimited (DU), which signed an MOU with the Department of the Army about wetlands issues for ACUB lands across the country. DU will be working with Fort Stewart to identify wetlands protection and restoration projects. DU is identifying conservation easements near Fort Stewart that would help protect habitat for migratory waterfowl related to the "North American Waterfowl Plan," which calls for no net wetlands loss. DU is working on some buffering projects southeast of the post.

Recently, Fort Stewart has started pursuing new state, USDA, and local partners to help fund buffering activities. In 2006, Georgia established the Georgia Land Conservation Program to promote acquisition of land and/or easements on private land to promote conservation. The governor's proposed budget amendments for 2007 include continued funding for the program. Fort Stewart and its partners are actively pursuing funding through this new program, as well as from other private conservation sources and federal programs, such as the USDA Forest Legacy Program.⁹ Efforts are under way to partner with Chatham County to protect a corridor along the lower Ogeechee River using a combination of local, Georgia Land Conservation Program, and ACUB funds.

Sample Buffering Projects

Fort Stewart had completed two projects as of January 2007 and has several others in the works. Four sample projects are presented here to illustrate the types of projects. For all these projects but one, TPL was the main partner that negotiated and closed the deal with the landowner; the exception was for the Blue Sky Tract, which was a TNC deal.

1. Gill-Floyd tract, conservation easement on 107 acres in 2005. This was Fort Stewart's first conservation buffer deal. This land agreement closed using Army funds at a cost of \$86,250 in 2005. The landowner can have only one home on the property and will continue to manage it for timber.

2. Blue Sky tract, conservation easement on 184 acres in process. This conservation easement purchase is using an estimated \$185,000 of REPI funds. TNC bought the land in fall 2006 from International Paper (IP). This project was part of a larger TNC and IP deal in the region. The Army is buying the development rights through a conservation easement. TNC will sell the property with the conservation easement on it to a conservation land buyer, most likely a hunting club. This conservation easement deal was expected to close in spring 2007.

3. Morgan tract, conservation easement on 1,326 acres in process. This conservation easement was originally estimated to cost about \$2.5 million. However, the cost is expected to be higher because of recent nearby developments. Specifically, the appraisal is being reevaluated in light of the county's pending acquisition of a school site nearby and other large development proposals that are driving up prices. This deal was expected to close in spring 2007. The conservation easement costs more because this tract is close to developments along highway 17 and I-95.

4. Sands tract, conservation easement on 316 acres in 2006. This deal closed August 31, 2006, and cost \$505,000. The project is near the northeastern corner of the installation along the Canoochee River and is an important habitat for T&ES. For example, the land is home to the indigo snake. This conservation easement has special provisions to protect the area along

⁹ For more information, see U.S. Department of Agriculture Forest Service (n.d.).

the Canoochee River. For example, the easement states that “changing, disturbing, altering, or impairing the natural, scenic, and aesthetic features, particularly areas along the Canoochee River bottomlands” is “strictly prohibited.”¹⁰ It also requires that the landowner prepare a Timber Management Plan at least 30 days before harvesting timber and that this plan “must be approved by a Registered Forester” who must certify in writing that the plan complies with the easement.¹¹

Assessing Fort Stewart’s Accomplishments in Addressing Encroachment

Because Fort Stewart’s first few buffering deals have closed relatively recently, it is too early to assess some of its successes. Its first buffering project was completed in 2005 and one other at the end of summer 2006. Because the RAND visit and main interviews with Fort Stewart staff and partners were in early August 2006 after the completion of only one deal, interviewees mostly mentioned anticipated benefits, although some benefits were already accruing from the program. One deal was completed shortly after the RAND visit and it was also examined as part of this analysis. Table D.1 shows the range of benefits Fort Stewart is starting to accrue, as determined by the RAND assessment. Below is a discussion of the extent of these benefits and other accomplishments so far.

Fort Stewart’s buffering activities are seen as helping to support the installation’s current and future training and facilitate the joint mission. As a Fort Stewart training range manager stated, “Buffering ensures we can continue training 24/7.”

The joint mission is also helped, because other Services, such as Marines from MCAS Beaufort, use Fort Stewart for training. However, more joint use and training benefits could be garnered with more joint use and training buffer planning in the region, such as coordinated buffering of the flight corridors between Fort Stewart and MCAS Beaufort’s Townsend Bombing Range.

At Fort Stewart, Service members train up to the installation boundary. According to the base “Land Use Requirements Study” (LURS), Fort Stewart is 432,000 acres short of what is needed for training. Anything that enables it to use the land more for training is important. The ACUB program allows Fort Stewart to use its installation more intensively for training. When training demand increases and no new lands or resources are available for expansion, more intensive use of the installation results. Having conservation buffers allow Fort Stewart to use its lands more intensively with fewer concerns about noise, safety, and other effects from communities on the perimeters of the installation. Training right up to the installation boundary is possible, which would not be so if houses were next to the fence line.

There is also the potential at Fort Stewart to use buffering lands for low-impact training maneuvers. Nearby landowners may be interested in renting land to the installation for low-impact training maneuvers, so permission for this is written into some of the conservation easements. The right to allow such use is a right specifically retained by the landowner. Such conservation easements state that activities by large organized groups are allowed, including

¹⁰ The Trust for Public Land (2006b, pp. 3–4).

¹¹ The Trust for Public Land (2006b, p. 5).

Table D.1
Actual and Anticipated Benefits from Fort Stewart's Buffering Activities

Benefit Categories	Sample Benefits
Promoting military readiness and other mission benefits	Starting to help sustain the training mission Enables the installation to be used more intensively for training Promotes the ability to train without hindrance from community politics and noise complaints Enables the potential to use some buffering lands for low-impact training maneuvers because landowners want the option to rent the property for such a purpose
Addressing sprawl and limiting other incompatible land use	Minimizes the risk of incompatible land use that would hurt the mission Prevented some incompatible development Stopped potential future developments on 107 acres Transfers knowledge about sustainability and growth management to local governments
Preserving habitat and other environmental benefits	Helping to protect habitat, biodiversity, and ecosystems Improves installation environmental management Protects key conservation corridors Helps protect and sustain T&ES off base Helps preserve wetlands Helps with water quality
Community relations and partnership benefits	Improved relations with the environmental community, regulators, and state and local governments Improved installation public relations with surrounding communities, including landowners Improves reputation of the base and the military Improved relations between training and environmental staff Improves working relations with buffering partners Military is viewed as a partner in conservation
Additional community benefits	Helps keep the installation as an economic force in the region May provide recreational opportunities for hikers, hunters, and fishermen Provides economic benefits to landowners

“use by Fort Stewart for low impact training maneuvers” as long as they do not “significantly impair the Conservation Values of the Property.”¹²

The program has already likely prevented some long-term incompatible land use. The 107 acres of the Gill-Floyd tract might have eventually been developed if not for the ACUB conservation easement. Some of the other tracts might also have been sold for development if they had not become part of ACUB. The program is viewed as minimizing the risk of incompatible land use that would hurt the mission.

The ACUB program supports the JLUS process. However, given the surrounding counties' interest in development, most of the surrounding counties have not implemented many of the JLUS recommendations. There are exceptions. For example, after much review and

¹² The Trust for Public Land (2006b, p. 7).

considerable pressure from development interests, Chatham County decided not to change the proposed land use for a large parcel west of the HAAF runway from industrial to residential when it updated its comprehensive land use plan in 2006.

Fort Stewart's ACUB has not yet helped any of the counties focus on growth management. However, Fort Stewart staff members and their partners have started to educate some of the counties about the advantages of smart growth, but more outreach and education are needed.

The buffering program also has enabled the transfer of knowledge and ideas to the counties from conservation NGOs, for example, sharing information on smart growth and sustainability from Fort Stewart to the counties. Local governments often lack understanding about the effects of sprawl on the military and the NGO partners provided them with such information. However, more needs to be done to help educate local counties about the advantages of growth management and planning.

Fort Stewart ACUB is helping to preserve habitat and other natural resources. The buffering helps preserve ecosystems and biodiversity by protecting key habitats, including sensitive and T&ES, such as the flatwood salamander, the swallowtail kite, the indigo snake, and the RCW. These species are found in the conservation buffer areas. The buffering also extends the range for these species because the lands are contiguous with the base's property. For example, if 200 acres from a conservation easement is added to the base's 270,000 acres, a RCW recruitment cluster could be placed on these 200 acres. However, 200 acres by itself would not be large enough for a RCW recruitment cluster.

Environmental staff at Fort Stewart stated that the ACUB helps "sustain the conservation mission. If we don't have an external buffer, we would need an internal buffer." Some activities, such as controlled burns, cannot be done next to houses. Fort Stewart has more effective conservation and environmental management inside the installation boundary because of conservation buffers around it.

Other environmental benefits include protecting conservation corridors, helping water quality by protecting wetlands (which helps clean water), and helping to protect watersheds and large tracts of land. A staff member from a conservation NGO partner stated that Fort Stewart's ACUB allows preservation of large land masses with conservation value in coastal Georgia and river areas, which are experiencing explosive growth.

The buffering helps support the INRMP and other strategic environmental initiatives. Fort Stewart is developing an installation sustainability plan and buffering is also important to this strategic management and long-term planning process. As one installation sustainability staff member stated, ACUB is "critical to the sustainability of the installation."

In addition to the positive results shown to date, more could be done to help with regional and cross-Service conservation and ecosystem planning and management to further help strategically address T&ES and declining biodiversity pressures. For example, the installation buffering program could be assessing and considering synergies with SERPPAS. SERPPAS is a pilot effort to develop a working regional partnership between DoD, Florida, Georgia, Alabama, South Carolina, and North Carolina and other stakeholders. Their agreed upon mission is "To seize opportunities and solve problems in value-adding ways that provide mutual and multiple benefits to the partners, and sustain the mission and secure the future for all the

partners, the region, and the nation.”¹³ Conservation corridors throughout the southeast are a priority for SERPPAS. Since SERPPAS is a fairly recent OSD-led effort, installation buffering staff members were not that familiar with it. SERPPAS is starting an RCW team project that Fort Stewart will likely participate in.

Similarly, more could be done with MCAS Beaufort, TNC, and other relevant stakeholders to coordinate on watershed and ecosystem management and planning for the Altamaha River watershed. Fort Stewart has already started moving more in this direction. Fort Stewart is looking at protecting a habitat corridor with the Townsend Bombing Range for large mammals such as bears and maybe even panthers. The installation was home to a panther (not the endangered one) that had traveled up from northern Florida. It was staying on a Fort Stewart range feeding on deer and wild pigs. Florida Fish and Wildlife Conservation Commission captured it and took it back to Florida. Given Florida's conservation efforts, there is even the potential that Fort Stewart could be used to help recover the endangered Florida panther if enough open space and corridors are preserved.

ACUB does not require that landowners manage lands for conservation. However, it might be able to in the future, which would also increase environmental benefits. In addition, landowners might choose to improve management of their lands for conservation when they see how lands are managed inside the installation.

Fort Stewart's ACUB also helps with community relations and partnerships. The program helps to build and strengthen partnerships to promote conservation and limit encroachment. It has brought Fort Stewart closer to private landowners, FWS, natural resource management offices of the state, and local governments, community leaders, etc. For example, it has helped to improve ties between Fort Stewart/the Army and TNC and TPL. Their knowledge of the Army helps to make these partners more effective. There is a synergistic effect. They now understand the installation's mission. The program has made obvious individual interests, commonalities, and differences, which are important bases for cooperation.

The program has enabled Fort Stewart to know other entities and build constructive relationships with them, improving trust and expanding their understanding of the Army, what it does, and why it does it. The Fort Stewart buffering program has helped outsiders, such as local landowners and environmental and conservation NGOs, view the military in a more positive way. For the Army, it has also helped improve public relations with surrounding communities. All the counties now know about ACUB and Fort Stewart's encroachment needs and concerns.

ACUB has also improved collaboration internal to the installation, most notably between installation training range and environmental staff. It has also increased the interaction between the range manager and environmental and conservation groups, which has helped working relationships between environmental and conservation NGOs and training staff at the grass roots level.

Fort Stewart's ACUB also provides additional community benefits. Most important, it preserves the installation as an economic source for local communities. Nearby counties value the jobs and other financial benefits from the installation.

¹³ SERPPAS Meeting Summary January 11–12, 2006.

It also may provide recreational opportunities for hikers, hunters, and fishermen. Some landowners may allow some public access, others will not, but owners' families and friends may use the land or the owners may lease it to a hunting club.

Fort Stewart's ACUB also provides economic benefits for landowners. They can acquire funds and still keep their land for forestry or farming. Landowners also like the flexibility of the ACUB program. The agreements are customized for each landowner's needs. One landowner said about JLUS, "it tells me what I can and cannot do, this program is more flexible."

Conclusions About Fort Stewart

Fort Stewart has a strategic and comprehensive approach to buffering, involving two to three miles of land around the installation, which is considering the long-term training needs of future weapon systems and warfare operations, and habitat, T&ES, and other environmental concerns. The plan is to buffer on 120,000 acres, which involves numerous landowners at an estimated cost of \$60 million. Although still a fairly new program, Fort Stewart's buffering program has had some clear accomplishments. The program is helping to promote military readiness and preserve habitat. Benefits from the program so far include helping to protect training space, enabling more of the installation to be used for training, preventing incompatible development, protecting T&ES and wetlands off post, and helping improve water quality. The program has also improved installation relations with the environmental community and between installation training and environmental staff.

The need to deal with numerous landowners and seven different counties that mostly want development is a challenge for Fort Stewart. However, at least, unlike nearby MCAS Beaufort, the installation is surrounded mainly by rural areas without much development or as high land prices, so it has a good opportunity to buffer.

So far, all of Fort Stewart's buffering funds have come from the Army and OSD, i.e., REPI. It is difficult to find nonmilitary funding for buffering in light of local and regional conditions. Given that the surrounding counties are mostly poor and rural, they want development and lack funding to collaborate on buffering. Also, there are no significant state funding sources for conservation easements and land acquisitions. However, this situation is beginning to change a little with the new Georgia Land Conservation Program and Fort Stewart's efforts to pursue other funding sources. Regardless of this progress, in the near term, Fort Stewart will still depend heavily on DoD funding for buffering.

Fort Stewart's program relies strongly on NGO partners to meet and negotiate with landowners. Fort Stewart's cooperative agreement with TPL enables the installation to outsource many key functions, such as the appraisal process. However, the installation has had less direct contact with landowners and counties than other installations. There is an opportunity to engage more with these groups to help strengthen the program, and Fort Stewart is now pursuing more direct engagement with landowners, counties, and other local groups. However, it requires a significant investment in staff time given the numerous local governments and landowners in the region.

Fort Stewart staff members are strategically trying to protect habitat and biodiversity; this can be seen in how they develop, implement, and manage the buffering program, such as considering how buffering areas can help with RCW and LLP habitat recovery. However, Fort Stewart also has opportunities for even more strategic regional, environmental, and multi-

Service approaches, such as through SERPPAS and the installation sustainability plan. Fort Stewart buffering staff members are starting to coordinate with and examine the implications of such activities in relationship to buffering activities. Regional species and habitat recovery would benefit more from additional coordination and strategic planning and analysis with efforts such as SERPPAS. Similarly, more could be done with MCAS Beaufort at Townsend Bombing Range to jointly plan and buffer, such as buffering flight corridors between Fort Stewart and the Townsend Bombing Range.

An Assessment of MCAS Beaufort's Buffering Activities

Marine Corps Air Station Beaufort is home to Marine Aircraft Group 31, which includes approximately 4,200 Marines and sailors working there. It is in Beaufort County, South Carolina, approximately 50 miles south-southwest of Charleston, South Carolina, four miles from downtown Beaufort, South Carolina, and approximately 40 miles northeast of Savannah, Georgia. Both the city of Beaufort and MCAS Beaufort are on an island. The main air station and nearby Laurel Bay Housing Area cover 6,900 acres within Beaufort County. MCAS Beaufort controls an additional 5,200 acres at the Townsend Bombing Range in McIntosh County, Georgia, near the coast south of Savannah.¹ Figure E.1 shows the location of MCAS Beaufort's main station, Laurel Bay Housing Area, and Townsend Bombing Range.

Installation Training and Other Activities

The mission of Marine Corps Air Station Beaufort is to provide support as an operational base for the Marine Aircraft Group (MAG-31) and the support units. The mission of MAG-31 is to conduct antiair warfare and offensive air support operations in support of Fleet Marine Forces from advanced bases, expeditionary airfields, or aircraft carriers and to conduct such other air operations as may be directed. One U.S. Navy F/A-18 squadron is also assigned to the installation.

To support this mission, MCAS Beaufort uses simulated aircraft carrier decks for practice landings. The approach pattern is the same as that used at sea on a real carrier, a large figure eight. Since most of the approach is off station, it lies within the APZ and affects the community with noise. Noise complaints are the main encroachment concern. Too many complaints may force MCAS Beaufort to alter training methods, such as restricting late night flights. At the extreme, they might even cause MCAS Beaufort to be shut down.

Access to significant offshore airspace and advanced technology provides MCAS Beaufort with excellent ranges for air-to-air training. For its training mission, most MCAS Beaufort aircraft use offshore airspace and land training ranges along the East Coast. Beaufort aircraft primarily use Townsend Bombing Range along with the Dare County Range in North Carolina and other ranges along the East Coast.

The 5,182-acre Townsend Range is used routinely by all Services to fine-tune the bombing and air combat skills of fighter pilots. This range is managed by the Georgia Air National Guard and gives pilots the opportunity to train for air-ground combat. USMC aircraft fly low

¹ More information is available on MCAS Beaufort. As of April 11, 2007, <https://www.beaufort.usmc.mil/WELCOMEBOARD/Default.asp>.

Figure E.1
Map of MCAS Beaufort Vicinity



SOURCE: "Integrated Natural Resources Management Plan for the Marine Corps Air Station, Beaufort, South Carolina" (2006, p. 2-2).

RAND MG612-E.1

at Townsend Bombing Range and it will be used more heavily by other Services because of the 2005 BRAC changes.

Local and Regional Encroachment Concerns

Beaufort County, South Carolina, used to be a remote rural area with small family farms and a traditional southern coastal way of life. The region is known for its beautiful and peaceful coastal islands, beaches, wetlands, and marshes. During the past 10 to 20 years, though, the region, especially southern Beaufort County, has been experiencing an economic and development boom, thanks to retirees, tourists, the military, and even the movie industry. The four counties of South Carolina's Lowcountry—Beaufort, Colleton, Hampton, and Jasper—together have been one of the fastest-growing regions in the state during the past decade. During most of 1990–2003, Beaufort County was the fastest-growing county in the state; most of that growth has occurred in the southern sector in Bluffton and Hilton Head.²

Although community relations in this traditionally military support community are excellent, the demographics of the South Carolina coast are changing. As population density

² Lowcountry Council of Governments (2004, pp. 9–10).

increases, especially the number of retired residents, the installation is subject to increasing encroachment pressures. New residents moving to the region come to enjoy the peaceful natural beauty of the island, marshes, and coastal community.

When someone purchases property in MCAS Beaufort's APZ and noise zones, state and county laws require disclosure of the fact that the property is in these areas at time of sale, so new property owners should be aware of this before they buy near the installation. Unfortunately, this disclosure information is often only in the stack of papers that buyers sign at closing and buyers may not take the time to read it. Since they expected a quiet community, such property owners are often surprised by the noise from MCAS Beaufort aircraft and are more likely to complain about it.

Much of the southern part of the county is turning into a wealthy retirement and resort community because of Hilton Head's reputation and success. This trend is also beginning in the northern part of the county. This has caused significant development pressure and rising land values throughout the county, especially for waterfront property. Most people in Beaufort County can no longer afford to live on the waterfront, because the value of this land has increased so much. There is less turnover in agricultural lands near MCAS Beaufort, and the land has not appreciated in value as fast as in the southern part of the county. However, several large brokers in the area estimated that such land values have appreciated about 4 percent a year since 2002, although in the last half of 2006, the area experienced a flat market.³ Yet, as other parts of the county become more developed, development pressures and land prices are expected to increase closer to MCAS Beaufort.

Local Government Support and the JLUS

The community and local governments value having military installations in the region because of their economic contribution. Three military installations are in the county: MCAS Beaufort, Marine Corps Recruits Depot Parris Island, and Beaufort Naval Hospital. DoD is the second-largest employer in Beaufort County (second to the education system). The military provides the highest-paying jobs in the local economy. According to a Beaufort County official, the county has a "glorified service economy." The working per capita income for the county is below the state average while installation jobs are above this average. In fact, the average civilian employed at an installation in Beaufort County makes 40 percent more than his or her counterparts employed elsewhere and these jobs are recession-proof. MCAS Beaufort accounts for 64 percent of the military personnel and, overall, 60 percent of the military's total economic contribution to the area, according to an analysis completed for the Greater Beaufort Chamber of Commerce by Georgia Southern University. Specifically, in 2002, the combined payrolls, plus contracts and other budget expenditures of MCAS Beaufort, were estimated to contribute more than \$240 million annually to the region. Since there are commuters to MCAS Beaufort in all three counties, the base provides regional economic benefits not just to Beaufort County.⁴

In September 2004, a JLUS was completed for MCAS Beaufort. The Lowcountry JLUS was a partnership consisting of Beaufort County, the city of Beaufort, the town of Port Royal, Marine Corps Air Station Beaufort, and the Lowcountry Council of Governments (LCOG).

³ Personal communication with Jeanne Wood, Executive Director, Beaufort County Association of Realtors/Beaufort MLS, October 26, 2006.

⁴ For the source of these statistics and more information, see Lowcountry Council of Governments (2004, pp. 9–14).

The study focused on determining how best to cooperatively ensure the continued economic development of the area while maintaining the present and future integrity of operations and training at MCAS Beaufort. Initially, the 2005 BRAC process was a great motivator for the local governments in this JLUS process, but the process slowed down slightly after the BRAC announcements. Then in December 2006, recommendations of the JLUS were implemented by all three local governments, the town of Port Royal, the city of Beaufort, and Beaufort County, by the adoption of uniform zoning ordinances. The JLUS Implementation Committee also recommended a TDR program to supplement the zoning changes. In addition, in January 2007, the LCOG received a grant from OSD OEA to do a study on implementing a transfer development rights program to benefit MCAS Beaufort, local citizens, and the county.

It took some time to implement the JLUS recommendations because the local counties and cities in the region differed in their zoning views and policies. The different local jurisdictions' zoning policies had caused, as local government officials called it, "annexation wars." Municipalities tend to want to grow and annex property and have higher densities. For example, the city of Beaufort had less-strict zoning than the county. The city of Beaufort likes to annex property into the city for development, since it does not have to pay for much of the infrastructure and other services, and it accrues significant tax revenues. The county has to pay for the city's infrastructure, including fire protection, roads, and schools. Such "annexation wars" were causing encroachment problems for the installation, which is in the city of Beaufort with county lands next to it. Some developers with property in the AICUZ were trying to have it annexed into the city so they could have a higher-density development. The adoption of the new zoning ordinances now helps to prevent such a problem. However, exemptions to the new zoning ordinances could still potentially be sought and granted.

T&ES and Other Environmental Issues

There is a strong tradition of protecting wetlands and coastal ecosystems within Beaufort County. The local community and county greatly value their natural environment, such as marshlands, for aesthetic, cultural, economic, and recreation reasons. For example, public access for personal and family fishing and seafood harvesting is an important local tradition with significant community value. The natural environment is also important to the economy, particularly as it supports tourism.

MCAS Beaufort has some T&ES concerns. Past species surveys identified over 50 rare, threatened, and endangered species that live or may live on MCAS Beaufort although only five of these species have been confirmed. The American alligator is fairly common in the permanent and semipermanent freshwater wetlands on the installation. The bald eagle has been observed nesting on the installation and the wood stork has been seen flying over the installation. Also, a bat species, the southeastern myotis, has been captured at the Laurel Bay Housing area. Finally, one federally listed plant species, pondberry, has been located at three places, all in the northern portion of the station. The plants grow in colonies at the upper edge of frequently flooded areas of pine flatwoods. The three sites have five distinct colonies.⁵

The Townsend Bombing Range also has T&ES issues, such as the flatwoods salamander, which is listed as threatened under the Endangered Species Act. More than half of the known flatwoods salamander populations occur on federal lands, including the Apalachicola National

⁵ "Integrated Natural Resources Management Plan for the Marine Corps Air Station, Beaufort, South Carolina" (2006, pp. 3–18).

Forest, the Osceola National Forest, St. Marks National Wildlife Refuge, Eglin Air Force Base, Hurlburt Field, Naval Air Station Whiting Field's Holley Outlying Field in Florida, Fort Stewart, and the Townsend Bombing Range in Georgia.

There are two ecologically unique areas near MCAS Beaufort properties. First, MCAS Beaufort is just south of the Ashepoo, Combahee, and South Edisto (ACE) Basin, with part of MCAS Beaufort AICUZ study zones lying within this basin. The ACE Basin represents one of the largest undeveloped estuaries on the East Coast. It consists of approximately 350,000 acres of diverse habitats including pine and hardwood uplands; forested wetlands; fresh, brackish, and salt water tidal marshes; barrier islands; and beaches. The basin's unique estuarine system provides invaluable habitat for a rich diversity of finfish and shellfish. The basin contains a wealth of wildlife, including such endangered and threatened species as bald eagles, wood-storks, ospreys, loggerhead sea turtles, and the shortnose sturgeon.⁶

Second, the Townsend Bombing Range is within the Altamaha River watershed. As discussed in Appendix D, this river runs 137 miles throughout southeast Georgia and the Altamaha River watershed encompasses 1.2 million acres through 10 rural south Georgia counties. The Altamaha River watershed ranks among the most biologically rich river systems along the East Coast. At least 120 species of rare or endangered plants and animals are found in the Altamaha River watershed.⁷ As discussed above, TNC is working to protect this region; see Figure D.2.

Other environmental concerns in the region are bird species that depend on the marshes and stormwater runoff and management concerns.

Because Beaufort County values its natural resources and is concerned about the environmental effects of so much growth, it created the Beaufort County Rural and Critical Land Preservation (RCLP) program. Through this program, Beaufort County Council acquires property for conservation, parks, buffers, scenic vistas, and preservation of valuable economic and natural resources. Properties are purchased outright or landowners may sell or donate the development rights or a conservation easement and continue to live and farm the property. In 2000, voters approved \$40 million for this program, which has protected over 10,000 acres so far. In November 2006, the voters passed a bond to supply this program with another \$50 million.

Installation Encroachment Program

MCAS Beaufort started addressing encroachment issues in 2002. At that time, the installation appointed a full-time Community Planning and Liaison Officer (CP&LO) who reports directly to the commanding officer to focus on Encroachment Partnering. The CP&LO spends about one-third of his time each on encroachment outreach, project management of encroachment projects (such as reviewing language), and project development of encroachment projects. MCAS Beaufort also has a deputy CP&LO. MCAS Beaufort has developed an Encroachment Partnering Plan. The main focus of MCAS Beaufort's Encroachment Partnering Program is buffering areas in the AICUZ's accident potential zones and noise zones.

⁶ "The ACE Basin Project" (n.d.).

⁷ For more information, see The Nature Conservancy (2006a).

The AICUZ region was updated in 2003, and the noise and safety zones became larger because of the changes caused by adding the Navy F/A-18 squadron. MCAS Beaufort staff members recognize that the AICUZ noise and safety zones may increase again in the future with the advent of new aircraft, so even though the focus is on the current AICUZ area, other buffering opportunities are being considered as well.

MCAS Beaufort's Three-Phased Approach to Encroachment

MCAS Beaufort has been using a three-phased approach to try to address encroachment:

1. work with local governments on zoning
2. use the Encroachment Partnering Program (EPP).
3. use the Military Construction (MILCON) process to buy or condemn property or certain property rights.

This approach is briefly discussed.

1. Work with local governments on zoning. In 1990, MCAS Beaufort tried to work with Beaufort County to get zoning ordinances passed to restrict development in the APZ and noise zones. However, after 27 iterations of changes to make landowners happy, the ordinance had no teeth left to it. It contained just “recommendations.”

Even with the JLUS recommendations being implemented in December 2006, it is not ironclad. As a local government person stated, even with a zoning regulation, it “can change with the stroke of a pen.”

A couple of MCAS staff members and local government staffers who were interviewed stated that zoning cannot be relied on in the long run. It is useful to have favorable zoning; however, zoning can be changed. People with a lot of money can get variances to the zoning or change it.

The possible development of a TDR program will be another useful local government tool to help address encroachment.

2. Use the Encroachment Partnering Program. With an EPP, MCAS Beaufort partners work with local municipalities to purchase land outright or to purchase development rights. The partner buys the land in fee, a restrictive easement, or a conservation easement. Beaufort County is the purchasing partner. The USMC buys the development rights, through a restrictive easement, which is 50 percent of the restriction on the property.

Beaufort County has been very supportive of the EPP.

3. Use MILCON to buy or condemn property or certain property rights. This is the method of last resort. The installation uses MILCON funds to buy or condemn development rights and purchase avigation easements, which is buying the right to fly over the property and make noise.⁸ In 1990, MCAS Beaufort used MILCON funds to buy land in fee in the APZ.

When using MILCON funds, the USMC negotiates in earnest with the landowner and pursues condemnation procedures only when it cannot reach agreement with the owner on price and an impasse is reached. Exercising its power of eminent domain may create bad rela-

⁸ More specifically, an avigation easement is a property right acquired from a landowner that grants the right to fly over the property; the right to cause noise, dust, etc., related to aircraft flight; the right to restrict or prohibit certain lights, electromagnetic signals, and bird-attracting land uses; the right to unobstructed airspace over the property above a specified height; and the right of ingress/egress upland to exercise those rights.

tions between the Department of the Navy and local landowners and the community. Sometimes, a friendly condemnation is required because there is a cloud on the title or the owner wants to pursue this procedure to get tax benefits.

MILCON funds can be used anywhere an installation wants if it can justify the use and get approval. There is ready approval if the area is inside the AICUZ footprint, i.e., both the APZ and noise zones. However, since using MILCON can take five, 10, or even 12 years, and since it can harm relations with local landowners and the community, MILCON is used only if there are no willing sellers with the EPP approach.

Use of the Beaufort County RCLP Program

The county partnered with MCAS Beaufort on encroachment buffering because of the Beaufort County RCLP program. This program provided matching funds with military encroachment partnering dollars for properties of mutual benefit. The 2005 BRAC also helped motivate the local community to work with the base on buffering projects because they did not want the base to close.

TPL is the main implementing partner for the Beaufort County RCLP program so it is also a key partner for MCAS Beaufort. As with Fort Stewart, TPL helped the county and MCAS Beaufort create a conservation vision and institute a greenprint process to identify key areas for land protection.

TPL helps negotiate the agreements for MCAS Beaufort. However, unlike with Fort Stewart, the USMC and Navy handle the appraisal process. The USMC/Navy appraisal and easement development and review process also requires regional and headquarters review so, according to several people interviewed, it has been slow. The entire process from appraisal to final offer has taken as long as eight months. Such a long process frustrates landowners who may walk away. By comparison, Fort Stewart's process takes only a couple of months because most of the process is handled by TPL through Fort Stewart's cooperative agreement arrangement and the Army oversight process is faster. However, the Navy and USMC have been working to streamline the buffering project oversight and review process, which is helping to shorten this timeline.

Before September 2006, MCAS Beaufort's buffering funds had to be used before the end of the fiscal year or the funds would be lost. This had caused stress and difficulties at the end of the year; in one case, the military gave a landowner only five days to make up his mind about a final proposed offer. This short amount of time was because the money did not arrive until January, then there was a long appraisal, deal development, and final review process, and then the fiscal year was about to end. One buffering staff member stated how they were always "jumping through hoops to close the deals" before the end of the fiscal year. However, on September 28, 2006, a multiyear Memorandum of Agreement was signed with Beaufort County alleviating these difficulties in obligating funds before year end. This change shows how MCAS Beaufort and the USMC are learning from program challenges and changing their program to make it more effective and efficient.

Sample Buffering Projects

MCAS has over a dozen buffering projects that are in process or have been completed, with about half of them having been finalized. See Figure E.2, which shows the current AICUZ and most of the completed buffering projects.

Figure E.2
Map of Completed MCAS Beaufort Buffering Projects



SOURCE: Map courtesy of the Installation Geospatial Information and Services Manager, MCAS Beaufort, February 2007.

RAND MG612-E.2

In 2004 and 2005, five projects were completed as part of the program. All of them are in the footprints of the Air Installation Compatible Use Zone and Field Carrier Landing Practice operations and thus are subjected to relatively high noise.

1. The Winn property—69 acres acquired in 2004. This project was a joint acquisition by the county and Marine Corps of a restrictive easement on 69 acres at a total cost of \$311,250. The landowner retains fee title and continues to use the land for agricultural purposes; this land has been placed in the County Open Space Preserve system.

The property may have some rare plants on it. However, there were no direct provisions to protect them, since the easement is only a restrictive one.

2. Lucky parcel—71 acres. The county obtained fee title and USMC a restrictive easement. The county purchased this property and will probably put a hiking trail on it.

3. Battey-Wilson parcel—63.55 acres. The county owns fee title and USMC an easement. This parcel will be incorporated into the Beaufort County Open Space Preserve system. It contains a maritime forest, which is being protected.

4. Rathbun parcel—28 acres. The county and USMC both obtained an easement. The Rathbun Parcel will continue to be used for agricultural purposes by the owner.

5. Amgrey donation—24 acres. This land was donated to the county. The landowner agreed to an easement donation on it. It is within the AICUZ. The landowner probably donated the property because of the tax credit. This project is not considered a REPI project.

Another project was completed late in 2006. TNC worked with a timber company to negotiate a conservation purchase near the Townsend Bombing Range. TNC had acquired the option to buy over 24,000 acres from IP in the Altamaha River watershed. TNC wants to protect the Altamaha River in this area. TNC bought the property in cooperation with a timber investment management organization that will own and manage it. TNC placed a conservation easement on the property. USMC acquired a restrictive easement on 10,687 acres via a Memorandum of Agreement with TNC. State DNR owns an easement and allows hunting on another part. The Department of Transportation (DOT) bought a small piece of the property for a wetlands easement. See Figure E.3 for a map of these different project areas.

Another project is in the works by different NGOs and other organizations to help with ACE Basin protection near MCAS Beaufort.

Assessing MCAS Beaufort's Accomplishments in Addressing Encroachment

MCAS Beaufort has accrued some significant benefits through its Encroachment Partnering Program. Table E.1 summarizes the range of benefits that are beginning to accrue, as determined by the RAND assessment. The extent of these benefits is discussed below as the assessment of the buffering projects accomplishments is presented.

The buffering activities are helping to sustain the mission by preventing significant incompatible developments within the AICUZ noise and safety zones. The EPP is helping to preserve the training space by minimizing lawsuits and noise complaints about aircraft training flights. These two issues have been a problem for MCAS Beaufort because of resort and home growth in the region and could eventually close the installation if complaints increased. Buffering to prevent lawsuits is important to MCAS Beaufort because of problems with such lawsuits in the past, which used up valuable installation and USMC resources and time. For example, a wealthy landowner, who was also a lawyer, bought an island under the AICUZ study zones near the end of the runway. He claimed he could not sell lots for what they were worth because of the flight noise. He tried to sue MCAS Beaufort. The installation settled the case instead of going to court.

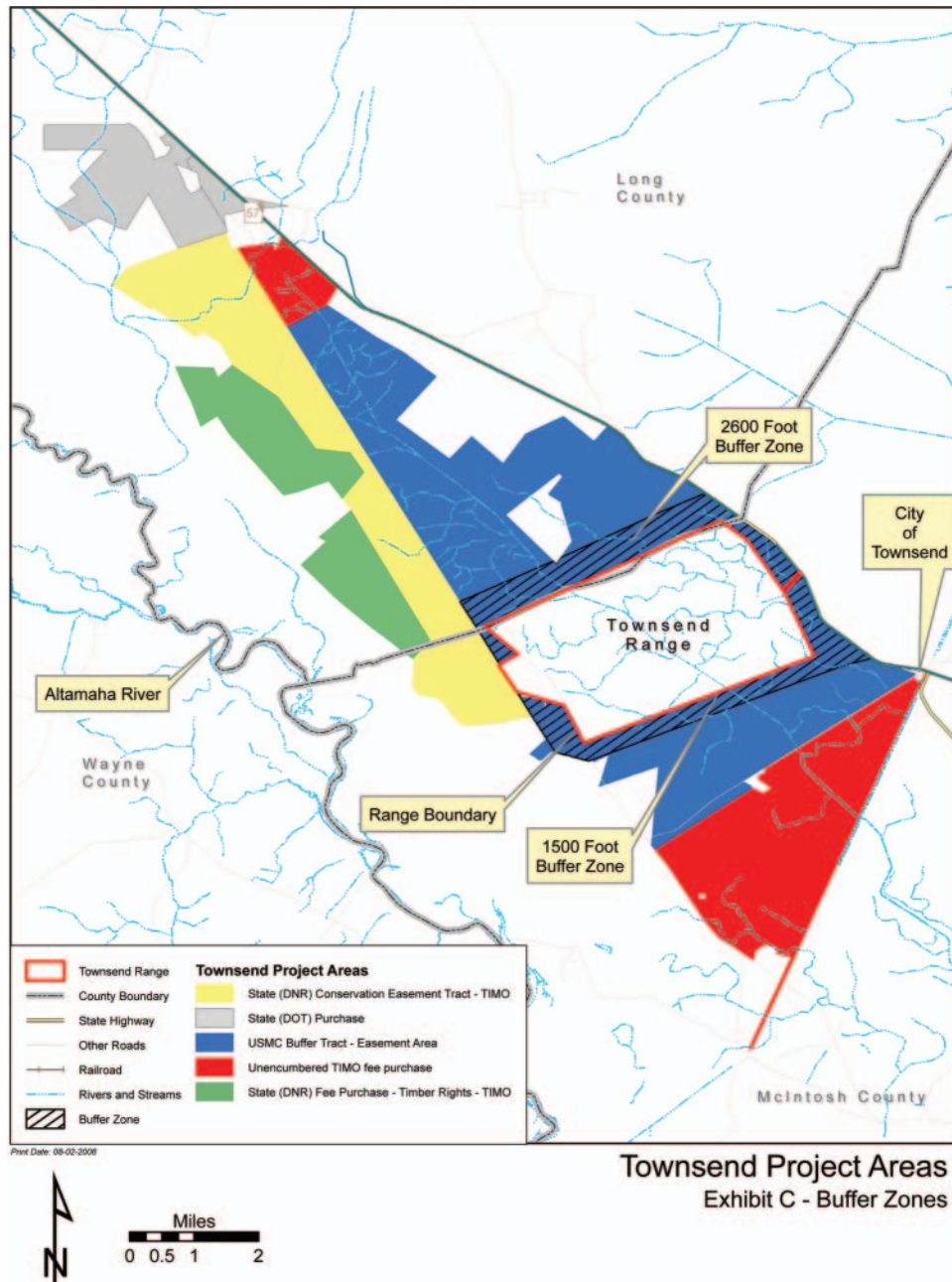
However, the EPP is helping to prevent such noise lawsuits and complaints. In fact, there has been a decline in noise complaints around the base since the EPP started. Part of this decline has come about because the EPP has been educating the public about the noise issues. For example, the public affairs office sends out an e-mail letting neighbors know when the practices are going to occur. People complain more when the noise comes as a surprise.⁹

Such buffering also increases the safety of flight operations by minimizing residential development in potential accident zones.

EPP activities help maintain the training capabilities and allow for expansion and changes in the future. The program makes future expansion possible for the JSF. The JSF will have a larger noise footprint than the F-18 it is replacing. The buffer program will enable JSF training at MCAS Beaufort.

⁹ It is difficult to separate out how much of the noise complaint reduction is because of public education and how much is because of EP buffering activities. However, since education and outreach are part of the overall EP process, credit can be given to the EP program.

Figure E.3
Conservation Projects Near Townsend Bombing Range



SOURCE: Map courtesy of MCAS Beaufort, March 2007.

RAND MG612-E.3

EPP activities are important for joint use and training space as well. Since other Services use MCAS Beaufort property, buffering benefits multiple Services. However, more could be done to take advantage of cross-Service training buffering opportunities, such as looking at regional training buffering needs with all the relevant installations and training areas, including Fort Stewart.

Table E.1
Actual and Anticipated Benefits from MCAS Beaufort's Buffering Activities

Benefit Categories	Sample Benefits
Promoting military readiness and other mission benefits	Helps sustain the mission
	Helps preserve training space
	Helps prevent lawsuits and noise complaints
	Enables future expansion for the joint strike fighter
	May help reduce bird air strike hazard
	Helps facilitate joint use and training
Addressing sprawl and limiting other incompatible land use	Preventing incompatible development, especially residential development, in AICUZ noise and safety zones
	Prevented 140 acres near the runway from being developed
	Most likely prevented residential development on 63.55 acres
	Prevented high-rise bridge from being built in the APZ
	Helps control sprawl, prevents unwanted growth in the county
Preserving habitat and other environmental benefits	Provides space and travel corridors for wildlife
	Helps protect wetlands and marshes
	Helps protect habitat and T&ES, such as an endangered plant specie
	Helps improve water quality and protect aquifer
Community relations and partnership benefits	Improves relations with the community, environmental groups, landowners, and realtors association
	Helped overall MCAS public relations
	Helps reinforce the county's cooperation with and commitment to MCAS Beaufort
	MCAS now seen as helping to protect the environment
	Improved installation management attitudes about collaboration
Additional community benefits	Helps keep the installation as an economic force in the region
	Has helped the county leverage conservation funds
	Contributes to local quality of life
	Helps preserve "rural character of the county"
	Helps preserve agricultural lands and family farms
	Helps provide parkland and recreational access and facilities, such as for fishing and hiking
	Landowner can keep land and get economic benefit from it beyond farming
	Helps maintain property values
	Helps prevent traffic congestion and helps with emergency evacuation

To summarize the training benefits, as an MCAS commanding officer stated, so far they have been “successful at preserving training space,” and have laid the groundwork for continued success. But, the toughest fights are ahead because, despite the aggressive EP efforts, condos and homes are still being developed and sold in the AICUZ. Given such development pressures, it is unclear if MCAS Beaufort can be successful over the long term. There is a need to act fast to protect as much buffer space as possible while it is still possible, given these development pressures.

According to the former MCAS Beaufort environmental director, the buffering may also help the bird air strike hazard (BASH) program by reducing the bird aircraft strikes, since the birds can go to other open marshes that are protected by the buffers.

The EPP is also helping to address sprawl problems in the region and helping limit incompatible land use in the AICUZ areas and other areas near the installation. The 140 acres of the Lucky and Winn properties near the runway would have become residential development if not protected through the buffering program. The Battey-Wilson property of 63.55 acres would likely to have been developed also if not for the EPP.

The program has also helped prevent the incompatible development of a high-rise bridge in the APZ. Because there are only two ways to get on and off the island, the local government is supporting a new beltway highway in the region to provide a better evacuation route. USMC EP staff were invited to the meeting where state and local transportation planners were discussing where this new highway would go. The initial plan included a high-rise bridge in the approach to the main runway within the MCAS Beaufort APZ, which was incompatible land use. USMC staff proposed a different route, without such a high-rise bridge in the APZ. They would allow the highway without any exit areas under the APZ. The transportation planners accepted it. Because of the EPP outreach and communications process this proposed incompatible bridge was prevented early in the process.

The EPP has helped the county manage growth by helping to control sprawl and prevent some unwanted growth and development. MCAS Beaufort EPP staff members have articulated what is acceptable and unacceptable development near the base and conveyed that to the local community. They have explained what endangers air station operations and how development can occur but needs to be controlled. This has helped the communities control development in ways that meet installation needs.

The program helps where zoning is not as effective. In the past, different local governments’ zoning policies made it difficult to affect growth with zoning in the region. The program supports and reinforces the JLUS, but as an MCAS commanding officer stated, the buffering program is a “cleaner, simpler way to do business than JLUS.”

MCAS Beaufort’s buffering activities have helped to preserve habitat and provided other environmental benefits as well. The program has helped preserve habitat and conservation corridors. For example, it helps protect wetlands and tidal marshes and helps preserve wildlife corridors from uplands to marsh for animals such as otters and minks.

The program benefits local water quality and the local aquifer, which is a drinking water source, because development is prevented.

The program helps protect T&ES and key ecosystems, such as habitat in the ACE Basin. For example, the program may help protect an endangered plant species that grows on a property protected by a restrictive easement. However, since this easement is a restrictive one, not a conservation easement, no provisions are made to protect the plant species. The conservation interest would be better served with the stronger protection of a conser-

vation easement, including language such as Fort Stewart has used in its conservation easements to protect special natural areas. In addition, as land trust partners stated, the restrictive easements legally go away if the installation closes, so there is no permanent conservation protection. For example, if the property were transferred to another federal agency, or even to another military Service, the restrictive easement could be challenged and perhaps overturned.¹⁰

In general, MCAS Beaufort's policy to pursue restrictive easements is a less-sure protection of habitat and conservation benefits than if the installation pursued more conservation easements.

MCAS Beaufort's EPP helps support the INRMP. However, there is no real strategic effort to look broadly at regional ecosystem concerns or to participate in any regional ecosystem collaborations. The TPL greenprinting process for MCAS helped identify some critical areas for protection in the region. However, MCAS Beaufort is not focused on looking at long-term collaboration to manage regional ecosystems, as Eglin is with the GCPEP in Florida. MCAS Beaufort has an opportunity to do so with the ACE Basin collaboration and with SERPPAS. MCAS Beaufort staff members know of SERPPAS but have not been looking at its relationship with the buffering program. Similarly, there is no strategic regional buffering or ecosystem collaboration with Fort Stewart at the Townsend Bombing Range. However, given the new projects by NGOs and other organizations to help with ACE Basin protection and by TNC to protect the Altamaha River corridor near the Townsend Bombing Range, MCAS Beaufort may move more in this direction given these opportunities.

MCAS EPP has improved community relations and has had other partnership benefits. The EP program has helped with installation outreach and public exposure to the community. Installation staff members, especially the CP&LO, have participated in many public meetings about the program, which has helped overall installation public relations. It has also helped with collaboration. As a base commanding officer stated, the installation has "more of a common understanding now with organizations outside the base." The program has helped the base work more with local community and other organizations and to understand each other's mission and needs better.

It has helped improve community relations with specific groups, such as local governments, environmental groups, landowners, and the regional realtors association. Local government organizations include Beaufort County staff, County Councilman, and the Chamber of Commerce. As a Beaufort County councilman stated, it is a "wonderful program of joint effort" between the county and MCAS Beaufort to preserve and protect properties of mutual interest and benefit.

It has helped improve relations with conservation organizations, such as conservation NGOs and ACE Basin groups. Because of the EPP, MCAS Beaufort is now seen as helping to protect the environment.

Because of past MCAS land condemnations, some landowners dislike and are distrustful of the installation. The easement program helps improve MCAS Beaufort's image with landowners and gives another economic option to landowners.

¹⁰ This interpretation is based on explanations by several land trusts and one DoD lawyer about the problems with restrictive easements. Different legal experts have different opinions on this subject. However, several land trusts said that the language of a Navy/USMC restrictive easement is not as strong or permanent as the language in a conservation easement.

MCAS Beaufort's EPP has improved relations with the realtors association. Realtors even pass out a brochure from the installation that shows the APZ and noise footprint overlaid on a Beaufort County map.

The program has also helped improve installation management attitudes about collaboration with nonmilitary organizations in installation management. The installation management is much more open to collaborating with local governments and NGOs in areas where there are mutual interests.

The various Beaufort County and other regional and local government officials who were interviewed mentioned a range of community benefits from MCAS Beaufort's buffering program. A Lowcountry Council of Governments staff member mentioned that the "ultimate benefit" of the buffering program is protecting the mission of the air station, since it helps the "local economy." Since the military provides the highest-paying jobs to the local economy, local governments and the community mentioned this economic benefit as critical to their community. MCAS Beaufort also helps to stabilize the real estate economy, since there is a lot of speculative property buying in southern Beaufort County, but not in northern Beaufort County.

Another county and community benefit is leveraging resources by stretching the land preservation dollars of the county. As one local government official stated, it is a "win-win" situation because with joint projects, the local government doubles its money and so does the military.

Another important benefit is helping to maintain the regional quality of life and to preserve the "rural character of the county." By protecting open space, scenic views, and agricultural lands around MCAS Beaufort, the program helps preserve the rural character and local quality of life. It also helps preserve agricultural lands and family farms.

The program has helped landowners economically so that they are not forced to sell family farms. One landowner who was about to sell the family farm to a developer stated that his mother used to say that they were "land rich money poor." This program is "like a dream come true. I got to get money out of my farm and did not have to sell it." He did not want to develop the family farm. He wanted to keep it as an operational farm. He also maintains privileges, can pass the farm on to his children, and can sell if he wants. "We are both winners in what we got."

The EPP has helped provide community parklands and recreational benefits, such as recreational fishing. In cases where the county purchased and now owns the property, the property can become recreational facilities and parklands. For example, in one case there is the public use potential for placing a ball field, another for parks and trails.

The buffering also helps maintain the property values of the region by helping to preserve open space, wetlands, tidal marshes, etc., since this is what people value in the region.

The buffering program, especially as it closes more of its deals, helps keep traffic off the road. If it can help prevent some of the large residential developments, this could be a significant result. The county traffic engineers are trying to better manage development issues related to traffic increases, since they are on an island that has limited main roads and bridges. In addition, the Beaufort County Director of Emergency Management stated that the MCAS Beaufort buffering program even helps with emergency evacuation. This is an important issue because of the many islands in the county that have only a few main access roads, bridges, and hurricane emergency routes. It is also important to the community, as well as to MCAS Beaufort, since MCAS personnel also need to evacuate during hurricanes and other emergencies.

Conclusions About MCAS Beaufort

MCAS Beaufort's conservation buffering activities have helped the mission by preventing incompatible land use in the AICUZ. They have also helped preserve habitat and have provided other environmental and community benefits and improved installation community relations. The local community values the economic, quality of life, environmental, and family farm preservation benefits of the program. MCAS Beaufort has a strong partnership with Beaufort County that benefits each party.

MCAS Beaufort has an aggressive program that plans to buffer the entire installation by focusing on AICUZ APZ and safety zones. The installation has a well-run buffering and outreach program with a full-time CP&LO and commander support, which contributes greatly to its success so far. However, given the amount of development already within the area and significant development pressures, it is unclear how much encroachment this installation can ultimately prevent. It is clear that given rising land values and pressures to subdivide and develop land, the installation needs to act fast before the remaining opportunity to buffer is lost. More military funds need to be invested now to stop a significant amount of encroachment. Investing now will save money over the long term given the likely increases in property values.

Another challenge for MCAS Beaufort is that the USMC/Navy process—from appraisal, project review, to final offer—is too slow. This process has taken as long as eight months. Such a long process frustrates landowners who may walk away. Part of the reason for such a long process was a learning curve, and the process is becoming faster. However, more could probably be done to streamline it.

The fact that USMC policy expects partners to match its funds may become a problem. Given different priority needs and the potential for a shortage of funds as prices rise, county matching funds may not always be available.

MCAS Beaufort has an opportunity to address environmental and regional concerns more strategically to accrue even more benefits in preventing encroachment. First, MCAS Beaufort should focus more on environmental benefits, such as choosing conservation easements over restrictive easements. For example, there would be more protection for the habitat of an endangered plant species with a conservation easement than with a restrictive one. Second, MCAS Beaufort should get more involved with regional conservation efforts, such as those involving the ACE Basin and Altamaha River corridor protection. Third, MCAS Beaufort should collaborate more with Fort Stewart and other military bases in the region to seek out joint conservation buffering and training benefits, such as buffering flight corridors across the ocean to Fort Stewart and the Townsend Bombing Range.

The installation and USMC are evolving the program, such as having a multiyear funding agreement, which is another strength of the program to make it more effective and efficient given lessons learned.

An Assessment of NAS Fallon's Buffering Activities

NAS Fallon is a major Navy training installation located in the northwestern part of Nevada. NAS Fallon-administered lands can be divided into two areas, NAS Fallon Main Station consisting of 8,266 acres and the Fallon Range Training Complex (FRTC) and the bombing ranges. The NAS Fallon Main Station is six miles southeast of the city of Fallon, Nevada, and 70 miles east of Reno, Nevada. The Main Station lies within the central portion of the Carson Desert in an area commonly referred to as the Lahontan Valley and is surrounded by federal lands (BLM and Bureau of Reclamation) and private lands. The FRTC includes four geographically separate training ranges (called the B-16, B-17, B-19, and B-20 areas) and two other training areas, the Dixie Valley training area and the Shoal Site.¹

All of these training areas are in different parts of Churchill County and are within nine to 35 miles of the main station. Their locations are shown in Figure F.1.

All of the range and training areas within the FRTC along with NAS Fallon Main Station consist of 240,953 acres and are a mixture of Navy-acquired lands and withdrawn public lands (such as BLM lands). This large number of ranges provides NAS Fallon with a premier set of training facilities for multi-Service purposes.

Installation Training and Other Activities

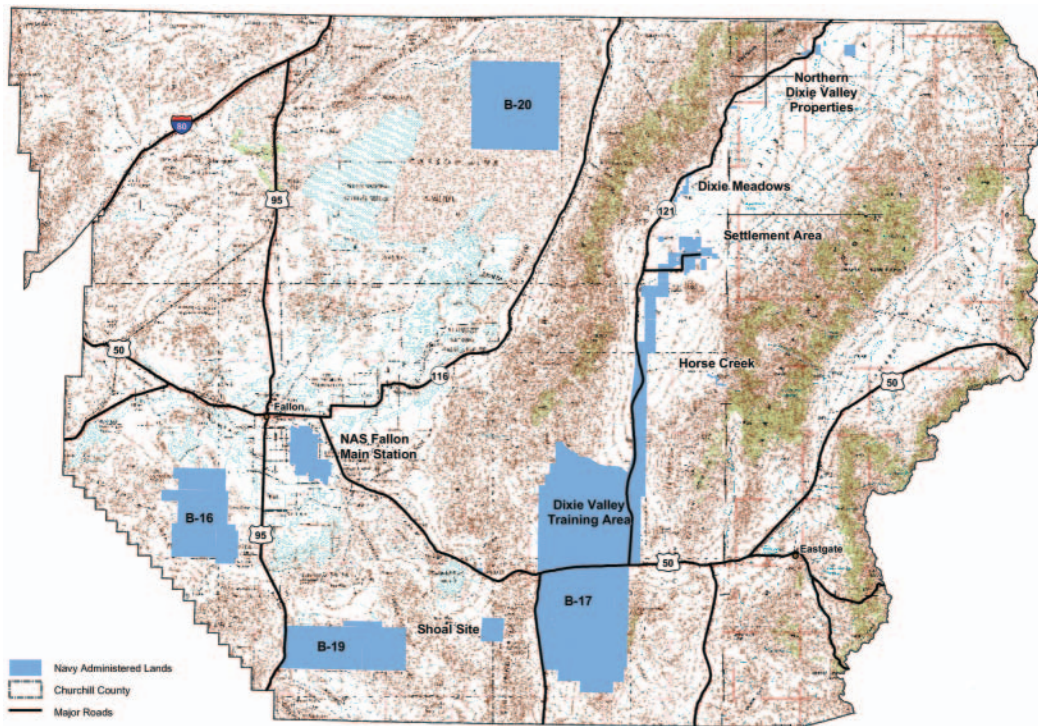
The training mission of the Navy at NAS Fallon includes advanced training for all Navy aviators whose mission is to attack enemy targets ashore or to engage enemy aircraft in air-to-air warfare. Approximately 22,000 sorties are flown out of NAS Fallon annually, and approximately 850 tons of ordnance are dropped on the ranges annually. In addition to conducting aviator training, the Navy at NAS Fallon develops tactics and procedures that are used to employ weapons or other aircraft systems to counter threats. The Navy's Top Gun training moved from Miramar Naval Air Station to NAS Fallon in the 1995 BRAC round because of encroachment around Miramar NAS in Southern California.

The Navy at NAS Fallon also provides real world support for military activities. In support of aircrew training, integrated air and ground training occurs, including Combat Search and Rescue (CSAR) and Close Air Support. CSAR consists of integrated training with ground personnel, helicopters, and fixed-wing air support. The objective of the training is rescuing and transporting ground personnel, such as downed pilots, within enemy territory.

Hill AFB and Nellis AFB staff members also use the NAS Fallon ranges for training.

¹ See Naval Air Station Fallon (2006a, pp. 1–16).

Figure F.1
NAS Fallon Administered Lands



SOURCE: "Final Integrated and Natural Resource Management Plan and Environmental Assessment for NAS Fallon, Nevada" (2006, pp. 1–17).

RAND MG612-F.1

Local and Regional Encroachment Concerns

NAS Fallon Main Station and the rest of the FRTC are in Churchill County. Churchill County comprises approximately 3,144,000 acres. Of this area about 85 percent is in federal ownership. The remaining land, approximately 400,000 acres, is in private and local public agency ownership.

About one-third of the population in Churchill County has a job associated with NAS Fallon, or is retired military, and most of the community, especially Churchill County officials and staff, have been very supportive of the NAS and its encroachment concerns. They value NAS contributions to the community. As a local paper editorial about NAS Fallon buffering program stated, "as a major employer and military location of strategic importance, NAS Fallon brings commerce and positive notoriety to the valley. Navy personnel contribute to the local economy, as well as volunteer their time and resources in the community."² However, the city of Fallon is not quite as supportive of some of the proposed buffering, since it wants more development east of the city, which is close to the NAS.

² "Editorial: Navy-County Buffer a Win-Win" (2006).

Development Pressures in Churchill County

Historically, the town of Fallon and the surrounding desert area has been a rural community with family farms. Most of the farms have been dairy farms with hayfields to support them. However, the county is seeing development pressures as more people move into the area from other places. Many farms are being sold and subdivided into ranchettes or “hobby farms” of five acres. As an example, a developer might buy a 40-acre farm, then subdivide it into eight five-acre lots, each with a new home on it. People from other areas, such as Los Angeles, Sacramento, and Las Vegas, are moving to Churchill County and buying such homes at higher prices than what local homes had cost. They may keep a few cows, goats, and horses. Many of these people from Los Angeles and Sacramento are retirees selling their high-priced California homes and moving to the Nevada desert for retirement. The county is becoming a retirement community area.

Land values have been rising sharply. Land in Churchill County has seen a CAGR in the area of 20 to 45 percent from 2003 to 2006.³ Higher CAGRs are for land well suited for development or for land with water rights. The cost of land that has development potential has increased faster than the cost of land that is already developed. That is, housing units have seen a much lower growth rate, about 10 percent CAGR over the last five years. Land within the AICUZ study zones of the NAS tends to turn over more slowly and prices are generally lower.⁴ The market slowed a bit in the second half of 2006.

In addition, Highway 50 is being expanded to four lanes (from two) all the way to the heart of downtown Fallon. As the highway is expanded, the ability to commute increases and adds pressure for growth. The Reno metro area will become a 60-minute drive from Fallon. As a result, Churchill County is facing significant commuter sprawl and retirement community development pressures.

The demographics are also starting to change as more people move in from other areas. Farming used to be the dominant force in the county, but this is no longer true. Family farms are still strong in the county. However, many of the younger generation do not want to work on farms. In addition, since the main population growth comes from people moving from more urban areas, these newcomers have different values and views of the military. Because of these changes, the military and agricultural influence in local government is decreasing.

Fernley, the town to the west of Fallon, Nevada, in Lyon County, has had significant development, becoming a suburban bedroom community for Reno and losing its agricultural way of life. Fernley has lost 90 percent of its agriculture. Fernley also exhausted its water rights. Churchill County and the Fallon community do not want that to happen to them. Most residents are interested in slowing growth, since they are starting to see similar growth pressures and the potential changes to their sense of community and way of life that such pressures bring. The community and county want to preserve family farms.

NAS Fallon has already experienced some noise complaints from increased residential development in the county. For example, as early as 2000 when new homes were built near a highway north of training area B-16, the installation started receiving many noise complaints and had to change the flight run-in route to B-16. Given such history and the development

³ For more details on the CAGR rates by property type, see Appendix I.

⁴ Personal communication with Mike Berney, Berney and Associates, November 10, 2006.

pressures, residential development and growth in the region is the main encroachment concern for NAS Fallon.

Water Issues

Water rights are a driving issue that affects land development in Nevada. Water prices have been going up and land is valuable for its water rights. Water rights often come with the land but can be sold separately. To keep water rights in Nevada, a landowner must show beneficial use, such as irrigation for agriculture and must use the water rights or lose them. Water rights determine what can be done with the land.

Churchill County is very much aware that its economic future depends on having enough water rights so, who owns the water and how it is used are major issues. Different organizations and individuals want to use water for different purposes within the county, such as for agriculture, residential development, or wildlife conservation. However, everyone in Churchill County wants to keep the water rights in the valley rather than sell them to areas outside the valley. Fernley has exhausted its water resources because of all its suburban growth. One farmer with 150 acres sold his water rights to Lyon County. There is great concern in Churchill County about water rights being sold outside the county. A Reno pipeline for water may come to Churchill County, which could affect the water market.⁵

Water's main wildlife conservation purpose is to help restore Lahontan Valley wetlands, which have faced significant declines in the past because of water diversion for agriculture. A key wetland area is the Stillwater National Wildlife Refuge (SNWR). The history and environmental benefits of the SNWR are discussed more below; however, first water rights acquisition for the SNWR is discussed because of relationships with NAS Fallon buffering activities.

FWS acquires water rights for Lahontan Valley wetlands, including Stillwater National Wildlife Refuge. It has the authority to buy land and water rights; FWS purchases agricultural properties with water rights, transfers the water to the wetlands, and then may sell the land. FWS pays \$4,000 per acre for the water rights.

FWS may sell land at auction and may give preference to people who can add water rights and will use the land for farming. For example, a farmer who had excess water bought land from FWS because he wanted better quality farmland. In exchange, FWS acquired water for wetlands from the farmer. FWS may also sell the land for open space, to developers (who can buy city or other water for the development), or for some other purpose.

FWS occasionally acquires water rights and land near the NAS. When FWS buys property next to or even close to the base, it attempts to facilitate three-way transactions to add land to the NAS buffer in exchange for water from the NAS that then goes to wetlands. For adjoining land, NAS Fallon may consider such offers, but it would need to revegetate the land with native species to prevent dust problems, since the land no longer has access to irrigation water. The natural desert plant life rebounds in less than 10 years. Some revegetation sites exist on the NAS installation itself, so installation staff members already have experience with this process. FWS will also consider placing an "open space easement" on property it sells, but it expects the Navy to provide water rights equivalent to the dollar amount lost by such an easement.

⁵ A Reno pipeline would transfer water from one basin to another. This transfer would have to be approved by the Nevada Division of Water Resources, State Engineer.

NAS Fallon has some water rights currently dedicated to existing agriculture leases and to revegetating various areas around the base. The irrigated fields in the agricultural lease program near the airfield help with dust control, weed control, and fire safety. However, land can be revegetated to native species and habitat to provide the same benefits as agricultural lands, which reduces the NAS's need for water for agricultural irrigation. NAS Fallon plans to reduce the long-term surface water requirement around the base, in cooperation with FWS, and transition toward drawing underground water through the local water treatment plant to support very minimal irrigation on a few grassy areas. However, drawing water through the treatment plant will increase the cost of utilities. Thus, NAS Fallon could provide more water rights to FWS and buy from local utilities.

Stillwater National Wildlife Refuge

Established in 1949, the Stillwater National Wildlife Refuge is located in the Lahontan Valley, 16 miles from downtown Fallon. In 1990, the refuge boundary was expanded to encompass Stillwater marsh to help maintain and restore the natural biodiversity, to provide for the conservation and management of fish and wildlife and their habitat, and to meet U.S. international treaty obligations with respect to fish and wildlife. Besides Stillwater NWR, there are two other nearby refuges—the Fallon and Anaho Island refuges. Together, these three refuges are called the Stillwater National Wildlife Refuge Complex and they contribute substantially to the conservation of wildlife and their habitat in the western Great Basin. The refuge complex is used for hunting, wildlife watching, and research. For example, limited hunting for waterfowl and upland game is conducted at Fallon NWR.

The refuge complex contains a wide diversity of wildlife habitat, including freshwater and brackish water marshes, riverine riparian areas, alkali playas, salt desert shrub lands, and sand dunes, which attract nearly 400 species of wildlife, including over 290 bird species. Waterfowl, shorebirds, and other water birds are abundant during the spring and fall migrations.⁶ “In many years, up to 70 percent of Nevada’s migrating waterfowl rely on the Lahontan Valley wetlands.”⁷

Maintenance of quality wetland habitat in the Lahontan Valley depends on a reliable, dedicated source of water. Since the early 1900s, both the quality and quantity of wetland habitat in Lahontan Valley has been significantly reduced as a result of drought and water diversion. In 1992, wetlands were receiving only irrigation drain water and reservoir spill water and fewer than 2,000 acres of wetlands remained in the Lahontan Valley. A water rights acquisition program was initiated in 1990 to dedicate water to the wetlands. Stillwater NWR management objectives include maintaining a long-term average of 14,000 acres of wetland habitat, which is estimated to require 70,000 acre-feet of water delivered to the wetlands.⁸

⁶ U.S. Fish and Wildlife Service (2003).

⁷ Churchill County (2005, p. 3-6).

⁸ Churchill County (2005, pp. 3-6 through 3-7).

T&ES Issues

NAS Fallon—administered lands contain at least 19 species with Nevada Natural Heritage Program state ranks, federal T&ES status, and/or BLM sensitive designations.⁹ Several of these species are discussed here.¹⁰

B-19 contains an active sand dune system referred to as the Blowsand Mountains, which contains four sensitive invertebrate species: the Sand Mountain aphodius scarab beetle, Hardy's aegialian scarab beetle, the Sand Mountain serican scarab beetle, and the Nevada viceroy.

California myotis and small-footed myotis are bat species. Both are listed by the state as S3B, which means rare and local throughout its range or with very restricted range, or otherwise vulnerable to extinction. During a 1997 survey, these species were observed hibernating in the mines on B-17 and foraging over the Dixie Meadows, the canals on the Main Station, and at Stinking Spring on B-19. Other bat species listed by the state are on Navy lands, such as the pallid bat, Townsend's big-eared bat, the hoary bat, and the little brown myotis.

Tui chub, a fish species, has been introduced into manmade ponds in the Dixie Valley area. This species does not have any federal protected status but concern for its status has been expressed. The state of Nevada has designated this species as an S1 species (critically imperiled because of extreme rarity, imminent threats, or biological factors). The FWS has indicated that there may be a need to place this species on the federal list if they are found to be distinct.

Sage grouse have been found on NAS-administered lands. It is a state species of concern and was petitioned to be listed as a federal T&ES, but it was not listed. In 2004, the state of Nevada produced the Greater Sage Grouse Conservation Plan for Nevada. A local NGO group, the Lahontan Valley Environmental Alliance, formed a Sage Grouse Working Group, which developed a Churchill County Sage Grouse Conservation Plan to help prevent the listing of the greater sage grouse as endangered. The FWS has stated that such collaborative efforts are what is needed to conserve and restore sage grouse habitat.¹¹

However, the sage grouse continues to decline in numbers. Its populations are found in 11 western states. However, because of increasing development, oil and gas drilling, grazing, and other activities in the West, the sagebrush ecosystem that this bird depends on is continually degraded. For example, consider activities on BLM lands in Wyoming. BLM oversees 41 million acres there and, since 2000, has approved 17,000 oil and gas drilling permits on these lands. Recent evidence shows that these oil and gas fields cause significant declines in the sage grouse populations. If such declines continue, the sage grouse will end up on the T&ES list, which will cause new T&ES encroachment on NAS Fallon.¹²

Lahontan Valley Environmental Alliance

Lahontan Valley Environmental Alliance (LVEA) "is committed to organize and coordinate the efforts to protect the natural resources and the economic vitality in the Lahontan Valley." This organization works toward maintaining an effective environmental balance through the preservation and protection of the limited water resources. Created by a local agreement, LVEA

⁹ Naval Air Station Fallon (2006a, p. 3-118).

¹⁰ For the sources of this information and more details on these species, see Naval Air Station Fallon (2006a, pp. 3-118, 3-121 through 3-123).

¹¹ "Sage Grouse Unlikely to Be Listed as Endangered" (2004, p. 2).

¹² For more information, see Kloor (2007, pp. 43–49).

members include Churchill County, the city of Fallon, the city of Fernley, the Truckee-Carson Irrigation District, and the Lahontan and Stillwater Conservation Districts.¹³

LVEA has an Agriculture Preservation Working Group that NAS Fallon staff members belong to and that supports the buffering program. LVEA has other work groups that focus on other water and environmental issues, such as the Sand Mountain Blue Butterfly Working Group, the Wilderness Study Area Working Group, and the Churchill County Sage Grouse Working Group. This latter group, as just discussed, developed a conservation plan to enhance sage grouse habitat to help prevent it from becoming an endangered species.

Installation Encroachment Program

NAS Fallon staff members saw the encroachment problems happening at Nellis AFB and the development trends in Fernley and Churchill County, both of which helped motivate them to take action. NAS Fallon started developing Encroachment Partnering outreach activities in 2003. It has developed a comprehensive long-term strategy approach to installation buffering. NAS Fallon has developed an Encroachment Action Plan (EAP), which lays out the long-term strategic plan for addressing encroachment issues. The long-term goal is to acquire interests in over 90 parcels of land on 24,000 acres. NAS Fallon has a full-time community planner/liason officer who spends a major part of his time on the buffering program.

As with MCAS Beaufort, NAS Fallon has a three-phased approach to addressing encroachment: work with local governments to create favorable zoning; implement Encroachment Partnering/easements; and, as a last resort, condemn and buy property through MILCON for areas in the AICUZ. However, most of NAS Fallon's effort has focused on Encroachment Partnering.

The initial focus of Encroachment Partnering has been on lands adjacent to NAS Fallon Main Station and the AICUZ safety and noise zones. The NAS recognizes that the noise and safety zones will change over time, growing larger as new aircraft join the fleet, as has occurred in the past. Therefore, they are buffering closest to the installation first and working their way out from there. They also are starting to work on buffering some of their bombing ranges, such as B-16 and B-20, with a three-mile and five-mile planned buffer area, respectively.

NAS Fallon's buffering program is a partnership with Churchill County focused on preserving agricultural lands. Churchill County and NAS Fallon signed an agreement in May 2006 to work together to limit development that is incompatible with the mission of the NAS and to protect open space and agricultural uses around the installation by acquiring restrictive easements or other property interests near the NAS.

The program is voluntary and depends on landowner participation and is primarily focused on keeping agricultural lands near the base in production instead of being subdivided and developed.

In implementing this partnership, NAS Fallon and Churchill County each pay 50 percent of the cost of acquiring the property interests in the form of restrictive easements. NAS Fallon requires that the county provide 50 percent of the funds. Landowners sell the development rights on their property and then can continue to use it for farming.

¹³ More information on LVEA members is available. As of April 11, 2007, <http://www.lvea.org/>.

NAS Fallon received \$2.9 million in REPI funds in FY 2006 for its buffering program. Rather than do one project at a time, NAS Fallon put this large sum of money in an escrow account to have it available. This money does not go away from year to year as it does in some other installation buffering programs.

Both the Navy and the county do land appraisals as part of the process. Usually, for each deal an official Navy appraiser completes a contract appraisal with two separate value components: a fee simple estate (in narrative format) and a restrictive easement (supplemental). The fee simple estate value is based on highest and best use. Easement value is usually based on that same highest and best use. Navy contract appraisals usually cost 1 to 2 percent of the purchase transaction. The Navy contracts out the appraisal to approved appraisers. After funding has been received and processed and a contract has been issued, the contracted appraiser usually takes about 30 working days to complete the assignment, depending on workload. Then the appraisal and deal are reviewed by various parts of the Navy, including the Navy Facilities Engineering Command Southwest (NAVFAC Southwest) (San Diego). The entire process can take a long time before the landowner receives a final offer. One county partner stated that the Navy appraisal, review, and approval process “was so slow that prices had changed between the time of appraisal, final review, and offer.” Because of this slow timeline, both the Navy and county found that three or four appraisals had to be redone.

The county also tends to have a slow appraisal and review process. However, it has procedures in place to streamline its process. The county can do a “fair market” adjustment so that it does not have to do a reappraisal if rates have changed during the process.

The slow Navy process causes timeline problems with landowners. It is hard for the Navy to compete with a fast-paced commercial deal. The Navy has been working to streamline its process, at least the review process, but more could probably be done to address the appraisal process timeline, as was discussed in the main document.

It is important to note that Churchill County has been very supportive of the NAS Fallon EAP. The county made the decision to concentrate development away from the base to the northwest of the town and to take steps to stop development east of the base. In fact, the county made some changes to its Consolidated Development Code, partly for the base’s benefit, such as allowing at most 3.2 units per acre except in limited areas designated for higher growth and concentrating the higher density west and northwest of Fallon, away from the base.

Churchill County’s Transfer of Development Rights (TDR) Program

Churchill County has developed a TDR program to generate funds for its participation in the NAS buffering program and to better concentrate growth in the county. Through the TDR program, the county intends to create a market for development rights to be purchased by developers and used in other areas away from the NAS. The County Comprehensive Plan now will allow higher density development west and northwest of the city of Fallon, which is far from NAS properties of interest. The county hopes to concentrate development there, plans to put in additional infrastructure to support it, such as sewers and roads, and is trying to protect the agricultural lands south and southeast of Fallon near the NAS. In most of the county, a developer is limited to building 3.2 units/houses per acre unless the developer participates in the TDR program. With participation, the developer can buy the extra development rights and then can build four, five, or six units per acre in the higher-density zones west and northwest of Fallon. The county will then use the developers’ money to provide Churchill County’s 50 percent cost share for NAS Fallon buffering easement deals.

The TDR approach was chosen so that the program could regenerate its own funding. However, it depends very much on the real estate market. Given the recent slowdowns in the real estate market, the county is having problems coming up with the 50-50 matching funds for the program.

Churchill County has one other source of funding for buffering. It has proceeds from a sales tax on geothermal energy production/mining. The revenue generated is used for water rights, roads, and the base's buffer program. In 2006, \$600,000 came from this tax for buffering. This is the only money the county has to invest in the buffering program without TDR funds.

Sample Buffering Projects

Since NAS Fallon's Encroachment Action Plan implementation is a newer program, beginning only in late summer 2005, it has not yet completed many buffering projects. It completed its first two projects in late August 2006 at a total cost of \$1.2 million: the Schank property on two parcels with a total of 214 acres and Card property on two parcels with a total of 314 acres. Another project was completed in December 2006 on one parcel with 160 acres. The Navy using REPI funds and Churchill County each paid nearly \$865,000 in total for the five parcels. Churchill County was the only partner in these acquisitions. Other projects are in negotiation.

Given the completion of these first three deals, currently many landowners now want to participate and sell their development rights. The problem is meeting that interest, given the lack of funds. As the real estate market has slowed, it has eased prices a bit for the Navy and the county (which is good), but this also means that there are fewer buyers of TDRs from the county and the county has less funds available to work with NAS Fallon (which is bad). The county has not been able to come up with as much funding as expected and has not been able to generate as much of the 50 percent matching funds. Developers have been cutting back on the size of their developments. The county estimates that when the real estate market is strong, developers will pay \$2 million to \$5 million through the TDR program.

Because of this funding problem, NAS Fallon is trying to expand the program with other partners. NAS Fallon is working to develop new relationships with conservation-focused NGOs and state agencies and other types of partners to find new partners and leverage their resources for more buffering projects.

Assessing NAS Fallon's Accomplishments in Addressing Encroachment

Since NAS Fallon's buffering activities are more recent it is too early to assess some of its successes. Its first buffering projects were completed in fall 2006. Since the RAND visit and main interviews with NAS Fallon staff and partners occurred in early August 2006 before the completion of these deals, interviewees mostly mentioned anticipated benefits, although some benefits were already accruing from the program. However, the completed buffering projects were examined as part of this study in fall 2006. Table F.1 summarizes the range of benefits that are starting to accrue, according to the RAND assessment. The extent of these benefits is discussed below as the assessment of the buffering program's accomplishments is presented.

The Encroachment Partnering Program and activities so far is seen as helping to maintain the NAS and facilitate the joint mission. It also will help facilitate future training. The NAS

Table F.1
Actual and Anticipated Benefits from NAS Fallon's Buffering Activities

Benefit Categories	Sample Benefits
Promoting military readiness and other mission benefits	Helps maintain the NAS mission and facilitate the joint mission Ultimate benefit will be to ensure no restrictions on flight operations and training More training can be conducted at the base
Addressing sprawl and limiting other incompatible land use	Prevented incompatible development Developer stopped a 40-acre cluster development off the end of the runway County stopped a cluster development under the base flight path Prevented 50-acre farm from being subdivided and developed County Master Plan and Development Codes have focused on concentrating development away from the NAS Helped create collaboration between the county and base over long-range land use planning
Preserving habitat and other environmental benefits	Helps with groundwater recharge Provides wind erosion and dust control Helps provide farmland wildlife habitat
Community relations and partnership benefits	Improved NAS public communications process and community relations Navy perceived as a contributor to the community Increased visibility with the local community Improved relations with some of the surrounding landowners Helped improve installation management attitudes about collaboration
Additional community benefits	Helps keep the installation as an economic force in the community Helps preserve the agricultural lands and way of life Helps farmers get some income from land Helps prevent some unwanted growth in areas where the county does not want it to concentrate Helps protect open space in Churchill County

Fallon installation commander stated that the ultimate benefit will be when “NAS Fallon can say we are protected—no impact from encroachment” and that it will take several years to get to such a point. Namely, NAS would then be a base whose mission operations are not affected by the community. It is unclear, at this point, if the installation will fully achieve this benefit.

Even before the first buffering deal was signed, the program had already helped to prevent incompatible development. Three such cases occurred in the AICUZ noise zones. First, a 40-acre cluster development off the end of the runway was stopped by the developer when he learned about the program. Second, because county officials knew about the buffer program, the county let the Navy know about another proposed cluster development, which would have been under the base flight path. The Navy explained its concerns and the County Planning Commission stopped this development because of the Navy's concerns and for safety reasons. Third, a farmer next to the installation was going to subdivide

his 50 acres into five-acre parcels to sell to a developer. However, the developer heard about the Navy buffer program and the Navy concerns and dropped the offer to buy the land.

NAS Fallon's development and outreach about the buffering plan has helped influence the Churchill County planning process so that the county focused on concentrating development away from the NAS. Considerations were made in the 2005 Master Plan and the Churchill County open space/agricultural protection planning process. The county also made some changes to the consolidated development code, partly for the base's benefit. Specifically, it restricted development to at most 3.2 units per acre except in limited areas designated for higher growth and concentrated the higher density west and northwest of Fallon, away from the base.

The EP program has also helped create collaboration between the county and base over long-range land use planning in the region, which is a key strategic benefit.

Since NAS Fallon's buffering program has focused only on preserving agricultural lands, the environmental benefits are minimal compared to other installations' environmental benefits. By protecting agricultural lands, the buffering projects help recharge shallow aquifers and reduce fugitive dust. They also help provide some habitat for wildlife that take advantage of farmlands, such as certain bird species. NAS environmental staff members have reviewed deals, but very little consideration has been given for relationships with the INRMP, species, or ecosystem concerns. The NAS is not strategically addressing regional or long-term species, habitat, and biodiversity loss issues with buffering activities. Long-term conservation issues, such as T&ES, may become an issue in the future and could become an encroachment threat. As more development occurs in the region, more habitat and biodiversity will be lost, likely causing more T&ES concerns. The Navy should consider T&ES, habitat, and environmental issues more in its buffering. There is an opportunity to look more broadly at environmental issues because of LVEA and the SNWR. For example, the NAS should participate more in Churchill County and LVEA's efforts to conserve sage grouse habitat and look for synergies with potential buffering projects. Similarly, the NAS should work more with FWS and develop mutually beneficial projects for military buffering and the SNWR. Since the program is expanding to involve conservation partners, this situation will likely change.

The EP program has had a number of community relations and partnership benefits. It has improved the NAS Fallon communications process and relations with the public and the community, which includes farmers, other landowners, county staff, county commissioners, LVEA, USDA NRCS, BLM, water conservation districts, and county economic development staff. The county now understands better what needs to be done to protect the mission. Churchill County staff and elected officials now think about the potential effect on the NAS when they hear about potential development. County staff members stated that the program has "increased the NAS visibility with the local community."

The program has also helped improve installation management attitudes about collaboration with nonmilitary organizations regarding installation management issues of mutual concern.

Overall, the program has helped improve the installation's community reputation and its working relationship with the community. Such benefits relate not just to buffering activities but also to other working relationships with the community. It also helps show that military flight operations and agriculture are compatible land uses.

Many landowners or their families were residing in Churchill County before the base was established in the 1940s. They saw some loss in the value of their land from the creation of the

NAS because of noise issues. Some of them also lost part of their property. These neighbors have had some negative feelings about the installation. This program helps them recapture some of the value of their land and has helped improved their view of the NAS.

There have been a number of additional community benefits from this program, including protecting open space, helping to keep land in agriculture, and helping to preserve the rural community way of life. The program also helps farmers get some income from land besides farming so they will not sell to developers. It also helps to prevent some unwanted growth in areas where the county does not want it to concentrate.

Conclusions About NAS Fallon

NAS Fallon has a long-term strategic program to buffer 90 parcels of land on 24,000 acres around its main station and three to five miles around key training ranges. The Navy has invested in the staff to conduct outreach to the local community and manage the program. The program has had some initial successes, such as preventing incompatible land use, improving community relations, and helping to preserve the local agricultural way of life. The NAS has a strong working relationship with Churchill County, which has contributed to county efforts to concentrate development away from the installation. NAS Fallon has a good chance of addressing many of its encroachment threats to promote and enhance military training and readiness. The program is evolving over time, based on lessons learned, which is good, but some challenges remain.

First, the Navy project appraisal, review, and approval process takes too long and costs too much, especially compared to other service installations, such as Fort Stewart. Some appraisals have had to be redone because the process is so lengthy. This is frustrating to partners, NAS staff, and landowners. It makes it difficult for the buffering program to be competitive with developers. Part of this was a learning stage. Namely, the Navy project appraisal, review, and approval process has taken a significant amount of time to establish a foundation for a long-term approach in reducing encroachment threats. The Navy is revising this process. Once the process is refined, acquisition should be administered more effectively and efficiently. However, more could probably be done to improve the process. The acquisition process must be more streamlined and efficient to compete with developers.

Second, the Navy's requirement of a 50 percent funding match from a partner has become a problem. Navy headquarters staff say that this is not a requirement but in implementing the program, Navy regional staff members have insisted on a 50 percent cost share. The county has an innovative TDR program to raise funds, but the program depends on a hot development real estate market. Since the market has slowed a bit, the county has not yet been able to use the TDR to generate funds and projects have not been completed because of this lack of funds. NAS Fallon is starting to seek out other partners to address this issue, but relaxing the 50 percent match requirement would also help.

Third, long-term conservation issues, such as T&ES, may arise in the future and could become an encroachment threat. As more development occurs in the region, more habitat and biodiversity will be lost, likely causing more T&ES concerns. The Navy should consider T&ES, habitat, and environmental issues more in its conservation buffering. NAS Fallon is in the process of engaging a new conservation NGO partner and seems to be evolving in this direction. NAS Fallon should also engage in regional efforts to help preserve habitat and

species, as Eglin AFB did with the GCPEP and Fort Carson with the CSP partnership. For example, they could work with LVEA on sage grouse habitat issues.

On conservation, water, and land issues, there is an opportunity to collaborate more with FWS for mutual benefits. NAS Fallon and FWS have worked together somewhat, but more could be done. Specifically, NAS Fallon should collaborate more to help FWS efforts to acquire water rights for Stillwater NWF in exchange for more FWS help in installation buffering activities.

An Assessment of NAS Whiting Field's Buffering Activities

NAS Whiting Field is a naval aviation training complex located north of Milton, Florida, in Santa Rosa County in the western Florida Panhandle and southern Alabama. The installation comprises 9,400 acres, including 4,000 acres at the main base and 5,400 acres at 14 other locations consisting of Navy Outlying Landing Fields in two counties of Florida and three counties of Alabama. As discussed above in Appendix B, NOLF Choctaw is located on Eglin AFB but falls under Navy-managed airspace under a long-term lease and is used extensively by NAS Whiting Field as the 14th NOLF.

Installation Training and Other Activities

Naval Air Station Whiting Field is responsible for an estimated 43 percent of the Chief of Naval Air Command's total flight time and 11 percent of Navy and Marine Corps total flight time. Over 1,200 students complete their flight training annually at Whiting Field. The installation's mission is "to effectively support the mission accomplishment of multiple tenant commands training of U.S. Navy, Marine Corps, Air Force, Coast Guard and International students, by efficiently providing high-quality installation facilities and operational services at two primary airfields and 14 Navy Outlying Landing Fields."

The primary tenant command is Training Air Wing FIVE (TW-5), the largest air wing in the Navy. TW-5's mission is to train student naval aviators in the primary and intermediate phases of fixed-wing aviation and in the advanced phases of helicopter training. TW-5 consists of three fixed-wing training squadrons, three helicopter training squadrons (one to be commissioned in May 2007), and two instructor training units (one fixed-wing and one helicopter).

NAS Whiting Field hosts a fleet of 150 T-34Cs and nearly 120 TH-57s. The Naval Air Station is composed of two separate airfields. Primary and intermediate fixed-wing flight training is conducted at North Field. Helicopter flight training is conducted at South Field. The 14 outlying fields (nine fixed-wing and five helicopter) support a majority of the flight hours for student training.

Local and Regional Encroachment Concerns

Just like nearby Eglin AFB, NAS Whiting Field faces significant development pressures because of the growing population in the Florida Panhandle and Alabama coastal area. Because of the

surrounding area's beautiful beaches and mild climate, it has seen a growth in resort and retirement communities.

Santa Rosa County has been one of the fastest-growing counties in Florida. Existing and future encroachment threatens NAS Whiting Field mission as the surrounding agricultural lands receive increasing pressure for residential development. A developer has recently purchased acreage just east of NAS Whiting Field and is already selling building lots. On the west side of NAS Whiting Field, the state of Florida is planning to expand Highway 87 from two lanes to four lanes in the next three to five years, likely causing more development near NAS Whiting Field's main gate.

If efforts fail to buffer the installation, the training mission will clash with the community's expansion and increased need for residential housing. Recent hurricanes have destroyed existing housing, driving up demand for new housing. Given these trends, over the past few years prices per acre have significantly increased. According to Florida Department of Revenue data, Santa Rosa real property values have seen a CAGR between 2002 and 2005 of 15.4 percent (annual rates are 22.9 percent for 2004 to 2005, 14.31 percent for 2003 to 2004, and 9.3 percent for 2002 to 2003).¹ Given this growth rate, waiting four years could add over another 75 percent to the cost of the conservation easement or land purchase in real terms.² Land prices have held flat or have slightly declined since mid-2006; however, coastal and waterfront properties have experienced more of this decline than have inland properties. Prices are expected to stay level for a year or so and then increase again.

State and Local Government Support of the Military

Santa Rosa County and the state of Florida have been very supportive of NAS Whiting Field. Santa Rosa County recognizes and appreciates the economic contributions of NAS Whiting Field to the local economy. Military bases are the largest economic contributor to Santa Rosa County. County staff members also value the NAS as an "essential piece that is important to national defense."

County staff members have been eager to work with NAS Whiting Field to protect the future vitality of the base. Staff members of both NAS Whiting Field and Santa Rosa County have known and regularly worked with each other over many years addressing issues of mutual concern, especially those related to land use and encroachment concerns.

Santa Rosa County's Comprehensive Plan and implementation policies include provisions to support NAS Whiting Field. The county has created military airport zones (MAZs) around NAS Whiting Field and its outlying fields.³ Santa Rosa County has prohibited high-density development and upzoning in the MAZ around NAS Whiting Field and the NOLFs. These MAZs are larger than the APZs in the AICUZ and include lighting controls. Civilian commercial airports are also not permitted in the MAZ. These policies were a result of the JLUS for NAS Whiting Field, which will be discussed further below.

Santa Rosa County's support of NAS Whiting Field also reflects in its 2001 refusal to accept a proposal to build a general aviation runway at Peter Prince Field (Santa Rosa County

¹ Florida Department of Revenue (2006).

² This value would be slightly less when corrected for inflation. These numbers are not shown, because the RAND team did not wish to imply a level of precision given the approximate nature of the entire calculation.

³ For maps of these MAZs, see Santa Rosa County (n.d.d).

Public Airport) with a 5,000-foot runway (for small aircraft) because it was too close to NAS Whiting Field. This had the potential to be an economic loss to Santa Rosa County, but protecting the NAS was more important to the county than the tax benefits from this proposed project.

The state of Florida also recognizes the contributions of its military installations to the state economy and national security. Florida has been very supportive of NAS Whiting Field, as it is of other military installations throughout the state. As was discussed in Appendix B, a number of state activities support military installation buffering activities, including Florida State Senate Bill 1604, Florida Defense Alliance (FDA), and Florida Forever. As mentioned above, Florida State Senate Bill 1604 requires local governments to notify the commanding officer of a military installation of any proposed changes to the comprehensive plan and land development regulations that would affect the intensity, density, or use of land adjacent to the installation; to amend their comprehensive plans for military compatibility needs; and to give each military base a nonvoting member on all local government planning boards for local governments near the installation so that they could see the potential impact of plans on the bases. The FDA is a nonprofit partnership between state organizations, base commanders, community leaders, and business executives to help support the military installations in Florida, including providing funds and other support for conservation buffering. Florida Forever is a 10-year \$3 billion land conservation acquisition program to preserve key habitat, ecological greenways, and other important natural resource areas throughout the state. Florida Forever has also been very supportive of installation buffering activities, giving priority to projects that buffer military installations while conserving habitat. All these state programs have been used to help in buffering, as is discussed below.

Environmental Issues

As with Eglin AFB, NAS Whiting Field contains and is located near key ecological resources that are rich in biodiversity. NAS Whiting Field is in the Perdido-Escambia River basin. Drainage from NAS Whiting Field flows via drainage ditches and unnamed perennial streams westward into Clear Creek and eastward into Bucket Branch and Coldwater Creek, all of which eventually flow into the Blackwater River.⁴

Several rare plants and vertebrates are within or outside NAS Whiting Field. For this reason, preserving off-base habitat for T&ES and other species at risk is also a consideration of the NAS Whiting Field conservation buffer program. Rare plants include spoon-leaf sundew, Florida anise, primrose-flowered butterwort rose, and the white-top pitcher plant. Rare vertebrates include the gopher tortoise, eastern diamondback rattlesnake, Henlow's sparrow, snowy egret, the great heron, and the little blue heron.

Florida conservation groups, such as TNC, value connecting Clear Creek with Blackwater River State Park to provide a corridor for wildlife.

Installation Encroachment Program

NAS Whiting Field has a strategic and comprehensive program to assess compatible uses and buffering of the entire installation and many outlying fields as part of its Encroachment Part-

⁴ U.S. Navy Southern Division (2000, p. 57).

nering Program. A main focus is to prevent development within the AICUZ safety and noise zones. However, the NAS emphasizes that the dimensions of defined areas may change over time with new aircraft, so buffering efforts expand over a wider area. They carefully consider T&ES issues in their buffering program, although it is not as much of a focus as with Eglin AFB.

As with NAS Fallon, NAS Whiting Field has a staff member who is responsible for the installation Encroachment Partnering Program and who devotes the majority of his time on it. This staff member is well known and respected in the community and works closely with Santa Rosa County staff, as well as state staff, on buffering issues. He sits on the Santa Rosa County Planning Board, representing both NAS Whiting Field and Eglin AFB.

This Encroachment Partnering Program has a long history. As early as 1999, Santa Rosa County officials, NAS Whiting Field officials, TNC, FWS, the Florida Department of Transportation (FDOT), and Florida DEP came together to talk about encroachment around the NAS properties. They recognized that growth in the area was commencing and started discussing buffering and where to get funding. Lack of funds was the main hindrance to significant action at that time.

JLUS and Local Government Buffering Support

In December 2002, these various entities completed the NAS Whiting Field Land Use Study. It was a precursor to the Santa Rosa County Joint Land Use Study completed in 2003. As intended, this JLUS is a true cooperative land use planning effort between Santa Rosa County and the NAS. The recommendations from the JLUS provide a policy framework to support adoption and implementation of compatible development measures designed to prevent urban encroachment, safeguard the military mission, and protect public health, safety, and welfare. Unlike many other areas, Santa Rosa County has actually implemented the JLUS recommendations.

The JLUS established the MAZs near the NAS and outlying fields. The JLUS looked at a 0.5-mile area around NAS Whiting Field and all the outlying fields within the county to help prevent incompatible development in these areas. To do this, there were four key recommendations:

1. The county will continue to work with the state to purchase lands in the MAZ, which includes the AICUZ safety and noise zones.
2. The county will work with state land preservation organizations for joint projects in the buffer areas.
3. The county will work with NAS Whiting Field to create conservation easements with willing sellers.
4. No upzoning is allowed near the installation, i.e., no increase in zoning density near the installation.

Santa Rosa County has implemented all the recommendations, aggressively working with the state and the NAS to purchase and preserve lands around NAS Whiting Field, as will be discussed more below with some sample buffering projects. Santa Rosa County strictly enforces the no upzoning recommendation even though it can take away from their future tax base. In fact, if a developer chooses to develop within a one-mile area of the base, no upzoning

is allowed within 0.5 mile of the installation, and the county requires, where possible, that the developer cluster development away from the installation.

Leveraging Diverse Partner Resources

NAS Whiting Field has over 20 projects with diverse partners to buffer the entire installation. The partners include Santa Rosa County, Florida Forever, the Florida Defense Alliance, TNC, and USDA. In most cases, these partners are finding and providing most of the funding for the projects. The NAS has been very successful at leveraging diverse compatible uses around the base to help find funding for completing buffering projects. For example, county lands will be used for an aviation park and an off road recreation area, i.e., an all-terrain vehicle (ATV) park. Florida Greenways and Trail funds were tapped to acquire land to build a trail around the base. This trail will benefit the community as well as base personnel and their families. USDA efforts help to protect agricultural lands, and conservation funds, such as from Florida Forever, are being used to protect Clear Creek habitat. See Figure G.1 for a map that shows NAS Whiting Field and current and potential future buffering areas. Some of these projects cannot be completed at this time because of the shortage of funds.

It is important to note that NAS Whiting Field would also benefit from the Northwest Florida Greenway, since it helps protect joint airspace (see Appendix B on Eglin AFB for more details on this effort).

As a general rule the Navy expects its partners to pay 50 percent of the acquisition costs in joint buffering projects. In Florida, the partners have spent much more than this. In fact, in most of the projects so far, the state agencies, Santa Rosa County, and other partners have paid for most or even all of the acquisition costs. Navy headquarters staff members have come to expect Florida partners to pay more. Almost every NAS Whiting Field, Santa Rosa County, and state agency staff member interviewed about NAS Whiting Field buffering expressed a desire for the military, i.e., Navy and OSD, to contribute more funding for the buffering projects that benefit the NAS. It seemed unfair that the partners had contributed so much more than the military, including other investments, such as staff time and county loss of tax revenues from the no-upzoning next to the NAS. Partners were concerned partly because funding is limited and other state and local projects can and have out-competed NAS buffering projects for the limited conservation funds. Given the rising concerns, this unequal funding issue also has the potential to hurt partnership relations in the future. In addition, the partners should be given more credit for all their contributions, not just the funds for acquiring land.

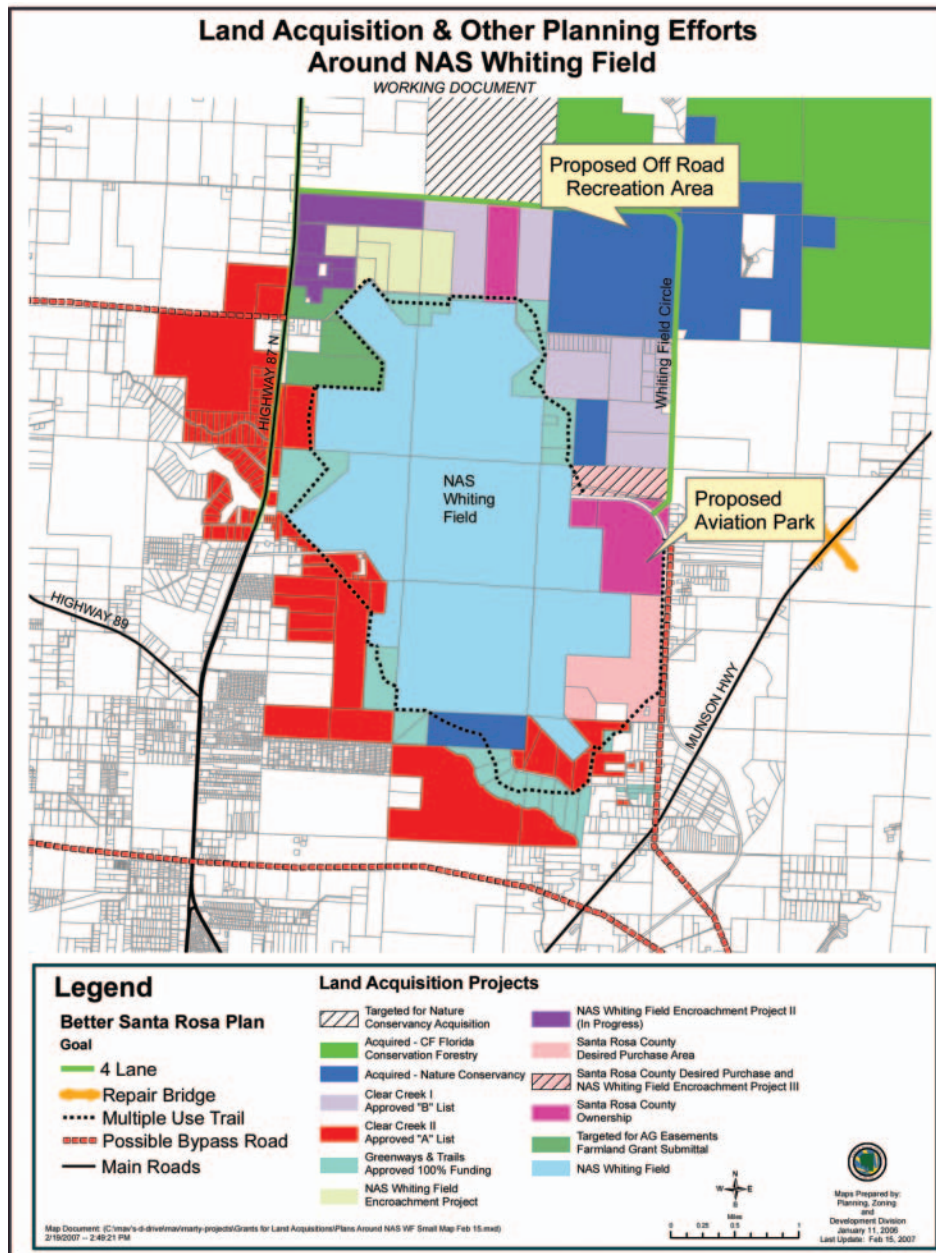
As with NAS Fallon, any NAS Whiting Field EP project that uses Navy or OSD funds must go through the Navy appraisal, project review, and approval process, which takes as long as eight months. This process is much too slow to be competitive in a real estate market and needs to be streamlined.

Sample Buffering Projects

To illustrate the range of buffering projects for NAS Whiting Field, several that are completed or near completion are discussed below. Some of these projects have been phased over time because of insufficient funding at the current time to complete them.

- 1. Santa Rosa County: 268 Acres, December 2001/2003.** Santa Rosa County used the Field Land Use Study and JLUS to help it identify some property to purchase that helped buffer the base. Santa Rosa County purchased about 268 acres in December 2001 and December 2003. In December 2001, the county bought property near the end of the runway. Santa

Figure G.1
Map of NAS Whiting Field Buffering



SOURCE: Map courtesy of Santa Rosa County, February 2007.

RAND MG612-G.1

Rosa County also bought some property just east of the NAS Whiting Field fence line. Florida Defense Alliance grants funded the county purchases. Part of this property will become an aviation park, a compatible use. (See the area in dark pink in Figure G.1.) Before the county purchase, developers had planned to construct apartment complexes on some of this property.

2. Santa Rosa County: Over 100 Acres, January 2004. In January 2004, over 100 acres of property north of the base was purchased by Santa Rosa County to buffer the NAS. The trail

around the NAS goes through this property. The house on the property will become a trail office.

3. NAS Whiting Field Clear Creek Project: 236 Acres in FY 2007. The Navy, partnering with Santa Rosa County, Florida, intends to acquire restrictive easements on four parcels totaling about 236 acres adjacent to the north field runway. These properties would remain in private ownership as active agricultural land. Santa Rosa County is paying \$100,000, and the Navy, using REPI funds, is paying \$700,000. (See the area in light green called NAS Whiting Field Encroachment Project in Figure G.1.)

4. Clear Creek I and II: 4,000 Acres in FY 2006–FY 2007. This area surrounding NAS Whiting Field is proposed as a purchase for trail and habitat protection. NAS Whiting Field is partnering with the state of Florida to secure deed restrictions on about 186 parcels totaling 4,000 acres surrounding NAS Whiting Field. In FY 2006, the Navy and the state agreed to combine funds to purchase about 51 parcels totaling about 1,500 acres. The state will be purchasing these parcels as part of its Florida Forever program and as part of the Greenways and Trails program. The Navy would obtain deed restrictions for its contributions. Most of the properties are located within the APZs, high noise contours, flight tracks, and within a military planning zone one-half mile around the base. REPI will pay \$5 million, as the initial funding for the military's 25 percent of the acquisition cost. (See the Greenways and trails and Clear Creek I and II areas on the map in Figure G.1.)

5. Yellow River Ravine Project: 16,000 Acres near NAS Whiting Field and NOLF Harold, Partially Completed in 2006. This is a large land acquisition project by TNC of International Paper lands using a variety of state funds. This acquisition benefits multiple military bases, including Eglin AFB (as discussed in Appendix B), NAS Whiting Field, and NOLF Harold. These properties help buffer the military sites and protect key habitat.

First, part of this acquisition project protects land on two sides of NOLF Harold. Florida Forever funds were used. This acquisition helps protect a future night-vision-goggle training facility.

Second, an 11,528-acre parcel connects Whiting Field Naval Air Station with the Blackwater River State Forest and will provide additional habitat for such wide-ranging species as the Florida black bear and various waterfowl and bird species. It includes a key section of Coldwater Creek, a sand-bottomed, clear water creek with a natural floodplain fed by numerous small seepage streams. The project will protect six miles of the Coldwater Creek Canoe Trail, a state-designated canoe trail.

Third, about two 100-acre (approximately) parcels adjacent to NAS Whiting Field also will be acquired by TNC and sold to the Florida Office of Greenways and Trails (OGT). The two tracts will be the first purchases as part of OGT's Blackwater Heritage Trail/Coldwater Creek/Whiting Field Trail and Buffer Project. The route will surround the base and expand recreational opportunities already available on an existing trail.

Funding for some of these projects also came from the West Florida Water Management District.⁵

6. USDA Agricultural Easements: 243 Acres, Ongoing. USDA-identified parcels are planned for easement acquisitions to keep them as agricultural land near the NAS. USDA

⁵ For more information, see Florida Department of Environmental Protection (2006d) and The Nature Conservancy (2006e).

grants would be used to preserve these farmlands. So far, there are three designated parcels: 54, 65, and 124 acres each around NAS Whiting Field.

In addition, USDA/NRCS has a \$477,500 grant for the purchase of farmland preservation easements around NOLF Pace.

Buffering activities in the Escribano Point area near NOLF Choctaw on Eglin AFB were already discussed in Appendix B on Eglin AFB, so they are not repeated here. Since this was a joint effort that also benefited NAS Whiting Field's mission, it is important to note it here as well.

The county intends to acquire an additional 405 acres.

Assessing NAS Whiting Field's Accomplishments in Addressing Encroachment

NAS Whiting Field has a strong EP program, which has had some clear benefits in addressing encroachment, especially sprawl near the NAS. Table G.1 summarizes the range of benefits that are starting to accrue, as determined by the RAND assessment. The extent of these benefits is discussed below where the assessment of the buffering program's accomplishments is presented.

The NAS buffering projects are helping to promote readiness by protecting and enhancing the training mission of NAS Whiting Field. They support the NAS Whiting Field training mission by maintaining flexibility in the use of installation land and facilities. They help buffer the airspace, APZ, and noise contour areas. As an installation commander stated, buffering "helps with the ability to do the mission" at NAS Whiting Field.

Because they prevent housing and other encroachments near the NAS, the buffering activities help prevent and minimize noise and other complaints; help minimize radio frequency interference; and help minimize light interference. The latter helps protect night training activities.

The buffering activities benefit the Navy and other Services. They have helped facilitate joint use of training space, such as at NOLF Choctaw. NOLF Choctaw's location places it on Eglin AFB but underneath Navy-managed airspace. NOLF Choctaw provides touch-and-go and primary flight training to Navy, Marine Corps, Coast Guard, Air Force, and other fixed-wing, helicopter, and UAV flight students. An Army Special Forces Group will also be using this training area. In addition, the coordination and collaboration with Eglin AFB and strategically looking at buffering airspaces throughout the Florida Panhandle benefit both the Air Force and Navy.

The buffering activities also improve public safety by preventing some residential development within the APZs and clear zones. This ultimately helps to protect the military mission.

The buffering activities have prevented some incompatible development near the installation, such as preventing residential development in the AICUZ. For example, Santa Rosa County bought a piece of property near the end of the runway, which, as mentioned above, stopped three apartment complexes from being built there. In fact, Santa Rosa County's purchase of about 268 acres near NAS Whiting Field in 2001 and 2003 likely stopped some residential development. More strategically, the buffering activities help support the JLUS and facilitate county growth management activities. Santa Rosa County has been concentrating development away from the NAS.

Table G.1
Actual and Anticipated Benefits from NAS Whiting Field's Buffering Activities

Benefit Categories	Sample Benefits
Promoting military readiness and other mission benefits	- Protects and enhances the mission by protecting operational flexibility - Minimizes noise and other complaints from housing near the fence line - Minimizes light interference, which helps night training - Helps facilitate joint training space - Helps minimize radio frequency interference - Military mission is safer by keeping development out of AICUZ study zones
Addressing sprawl and limiting other incompatible land use	- Prevented incompatible development - Prevented residential development in the AICUZ - Stopped three apartment complexes from being built near the end of the runway - County purchase of 268 acres most likely stopped residential developments - County has focused on concentrating development away from the NAS - Helped create collaboration between the county and base over long-range land use planning - Helps support and facilitate county growth management activities
Preserving habitat and other environmental benefits	- Helps protect key habitats, T&ES, and biodiversity - Provides wildlife corridors - Protects watersheds and water quality - Helps support state and local conservation efforts
Community relations and partnership benefits	- Improved NAS public communications process and community relations - Has helped community relations with state and local governments and environmental groups - Promotes image of the Navy as a committed partner in conservation - Helps reinforce the county's commitment to the NAS and its cooperation with the NAS - Has improved installation management's attitudes about collaboration with nonmilitary organizations
Additional community benefits	- Protects largest and most stable economic contributor to Santa Rosa County - Helps local ecotourism - Provides trails, recreation areas, and facilities - Helps preserve agricultural lands - Provides economic benefit to farmers and other landowners

The NAS Whiting EP program also helps to preserve habitat and protect other natural resources. The buffering projects help protect key habitats, T&ES, and wildlife corridors. For example, projects are helping to protect rare habitat for rare plant and animal species, such as the spoon-leaf sundew, Florida anise, the white-top pitcher plant, the gopher tortoise, eastern diamondback rattlesnake, snowy egret, the great heron, and the little blue heron. The projects also help protect watersheds and water quality, such as near Clear Creek. In addition, the buff-

ering helps support the efforts of state and local authorities to maintain and plan growth and environmental conservation in the region.

The EP program has also helped with public relations and community relations, including with state and local governments and environmental groups. It promotes the image of the Navy as a committed partner in conservation. It helps NAS Whiting Field be viewed as a community member. The NAS staff has worked creatively to develop projects that benefit both the NAS and the community. Creating the trail around the NAS is an example of how the program has benefited the community as well as the base.

The EP program has helped develop a close working partnership with Santa Rosa County. The county has been tremendously supportive, even providing GIS analysis and mapping support because of this partnership.

The buffering program also provides other key benefits to the community. Buffering helps sustain the economic vitality of NAS Whiting Field to the local economy. As one local government official stated, the program is important to help keep the NAS open as a “stable economic foundation” for the county. It is not affected by hurricanes as are tourism and other parts of their economy.

The buffering activities also help local ecotourism by protecting key natural areas and providing access to them. It also helps provide and protect outdoor recreation areas and facilities, such as trails for hiking and waterways for fishing access. The trail that will circle the perimeter of the NAS is a community asset. The buffering activities also help protect family farms and other agricultural interests within the county. It helps landowners economically so they do not need to sell family farms to developers.

Conclusions About NAS Whiting Field

NAS Whiting Field has an assertive and strategic buffering program with a large amount of county and state support that leverages diverse funding sources and different compatible uses around the NAS. By analyzing and planning these diverse uses (such as the trail around the installation, the aviation park, and protecting farmlands), NAS Whiting Field and its partners have helped to buffer the installation while at the same time providing valuable recreational facilities and preserving key natural areas for the community. The program has been helping to protect the installation’s training mission, prevent incompatible development, and protect important habitat. NAS Whiting Field’s investment in staff and resources for buffering and community outreach is an important contributing factor to the progress of this program. NAS and Santa Rosa County staff members have a strong, close working relationship for mutual benefit. Santa Rosa County has instituted policies to concentrate development away from the NAS.

However, the program faces funding limitations. Many projects have been identified, but there are not enough funds to complete them, which hurts the credibility of the program and limits opportunities with landowners. The Navy’s expectation that state and local partners provide the majority of funding has also hurt the program because projects are left waiting for funding.

The military needs to contribute more buffering funds or NAS Whiting Field will miss the opportunity to complete its buffering plan because of existing development pressures and increasing land costs. In addition, some landowners will not be willing to wait for the NAS and

partners to come up with funds and will sell their land to developers. Limits in local and state funding and the possibility that local and state programs will change over time also means that the military should invest more money now to buffer while it can.

The slow Navy acquisition and appraisal process also causes the NAS to miss some buffering acquisition opportunities.

Last, it is important to acknowledge that NAS Whiting Field's partners, especially Santa Rosa County, have invested a lot in conservation buffering for the NAS's benefit. Santa Rosa County has enacted and enforced special zoning for the NAS, clustered development, purchased buffering lands without any military funds, provided GIS analysis and support, and invested numerous staff hours and time. Such exemplar support should be given more acknowledgment and credit by the Navy and OSD in the buffering process.

In conclusion, NAS Whiting Field has a strong EP program that is making progress in addressing encroachment problems. Its efforts promote military readiness, prevent incompatible land use, and preserve habitat. It also has strong community relationships and has provided community benefits, such as providing a trail for the community. With continued and ongoing support, especially additional funding, NAS Whiting Field has a strong chance of preventing a majority of its encroachment problems around the NAS.

Background Information on Selected Buffering Projects

Since this study examined some additional case studies besides those studied in depth, some background information is provided on some of them here. This appendix presents one-page summaries from OSD or the Services of some of the other cases that are discussed in the main report. These cases are:

- Camp Blanding, Florida
- Camp Ripley, Minnesota
- Fort Bragg, North Carolina
- MCB Camp Lejeune, North Carolina
- NAS Pensacola, Florida
- U.S. Army Garrison, Hawaii.

The information that follows has not been edited or revised in any way. It was taken directly from the cited source. Some of the information may be out of date or may describe only part of an installation's buffering program. However, the information is intended only to provide general background information about these installation buffering activities.

Camp Blanding, Florida

The following is taken directly from the 2005 ACUB report (U.S. Army Environmental Center, 2005, pp. 7–8).

Camp Blanding, Florida

- The first installation to submit a proposal under the 10 U.S.C. §2684a legislation that enabled the Army Compatible Use Buffer guidance.
- This ACUB protects military training for light infantry and special operations exercises through direct buffering of training land and protection of endangered species. All branches of service, the Coast Guard, and federal, state, and local law enforcement agencies use Camp Blanding and it serves as a federal/state logistical support site for emergencies such as hurricanes and wildfires.
- Part of the Florida Forever state wide initiative to protect the state's unique natural resources which encompasses a wide range of goals, including: protection of endangered species habitat including the red-cockaded woodpecker and Florida Panther, restoration of damaged environmental systems, water resource development and supply, increased public access, public lands management and maintenance, and increased protection of land by acquisition of conservation easements.
- The Florida Department of Environmental Protection funds more than 90% of the project with the remaining costs contributed by The Army National Guard Bureau, The Nature Conservancy, Acquisition & Restoration Council, St. Johns River Water Management District, Suwannee River Water Management District, Clay & Bradford Counties, Greenways and Trails and other non profit and government organizations.

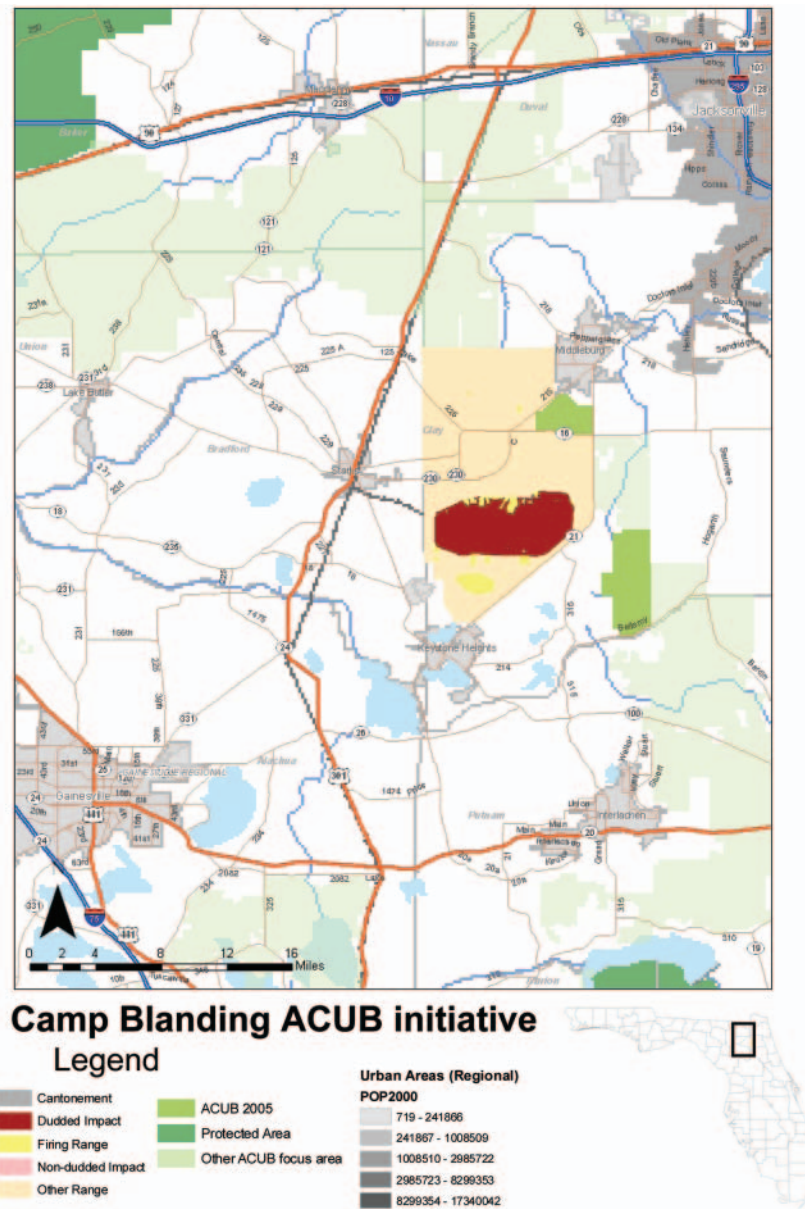
ACUB Proposal Approval Date: September 23, 2003

Funding History:

Fiscal Year	DoD	Partner(s)
FY03	\$0.5M	\$12.5M
FY04	\$0.5M	\$19.0M
FY05	\$0.0M	\$0.0M
Totals	\$1.0M	\$31.5M

Parcel History:

Fiscal Year	Number of Parcels	Acres
FY03	1	8,666
FY04	1	4,000
FY05	0	0
In Progress	2	15,000
Totals	4	27,666



RAND MG612-H.1

Camp Ripley, Minnesota

This document is taken directly from the REPI 2007 fact sheet for Camp Ripley (Office of the Secretary of Defense, 2007).



CAMP RIPLEY

MINNESOTA

**Readiness and
Environmental
Protection
Initiative**

Conservation Easements Provide Camp Ripley Noise Buffer

The Department of Defense (DoD) partners with state & non-government organizations to protect land and military training activities



\$500,000 from DoD's Readiness and Environmental Protection Initiative was used to jumpstart a multi-million dollar conservation partnership that protects Camp Ripley's military mission and open land in Minnesota.

Conservation easements on more than 4,600 acres were purchased by a partnership that included DoD, the Minnesota Department of Natural Resources, and The Nature Conservancy. These easements led to the formation of a noise buffer zone by preventing development on three parcels of bordering lands. The noise buffer land now serves as a key area for habitat and recreation.

"These buffer projects represent an extraordinary win-win partnership bringing together federal, state, local, and non-profit groups to achieve their mutual interests."

Peggy Booth
Community Assistance Manager
Minnesota Department of Natural Resources

KEY FACTS

Mission: Military training site Challenge: Residential home development in areas subject to high noise levels during military training Action: The partnership acquired \$10.8 million in conservation easements from neighboring land owners to preserve 4,659 acres of buffer land Accomplishments: - Military training capability preserved - Incompatible development prevented - Threatened and endangered species habitat enlarged	Area Conserved: 4,659 acres Project Cost: \$10.8 million Partners: Minnesota Department of Natural Resources, The Nature Conservancy, and DoD Project Contacts: Ms. Alisa Dickson U.S. Army National Guard alisa.dickson@us.army.mil Ms. Peggy Booth Minnesota Dept. of Natural Resources peggy.booth@dnr.state.mn.us
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The Readiness and Environmental Protection Initiative (REPI), DoD's conservation buffer program, enables the military to partner with outside stakeholders to promote land conservation that supports military missions and preserve natural habitat.

Updated 3/1/07

Fort Bragg, North Carolina

The following is taken directly from the 2005 ACUB report (U.S. Army Environmental Center, 2005, pp. 13–14).

Fort Bragg, North Carolina

- The Private Lands Initiative, established to recover the red-cockaded woodpecker's habitat and protect the military mission at Fort Bragg, provided the basis for the development of the Army Compatible Use Buffer program, which is now replicated throughout the Army and other military entities.
- Fort Bragg is the Army's premiere power projection platform and is home of the XVIIIth Airborne Corps and the U.S. Army Special Operations Command. It also has the second largest concentration of endangered Red-Cockaded Woodpecker (RCW).
- Part of the "North Carolina Sand Hills Partnership," which exists to protect the distinct Sandhills ecosystem and recover the red-cockaded woodpecker.
- The Army had funded approximately one third of the project with other resources contributed by the State of North Carolina Wildlife Resources Commission, The Nature Conservancy, Sandhills Ecological Institute, North Carolina Department of Transportation, Sandhills Area Land Trust, US Fish and Wildlife Service and other government and nonprofit organizations.

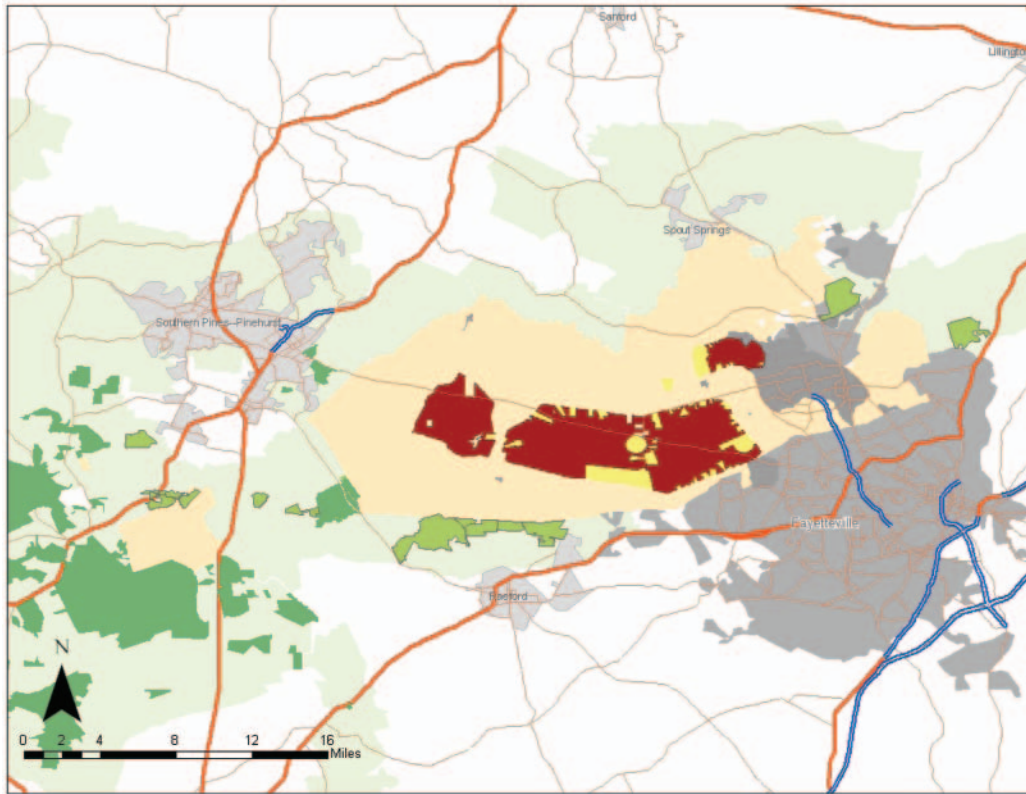
ACUB Approval Date: August 5, 2005 (Prior to legislation it operated as the Private Lands Initiative under the Sikes Act authority)

Funding History:

Fiscal Year	DoD	Partner(s)
FY99	\$0.5M	\$1.3M
FY00	\$0.2M	\$1.0M
FY01	\$5.1M	\$5.6M
FY02	\$0.015M	\$0.2M
FY03	\$0.0M	\$3.9M
FY04	\$0.0M	\$4.1M
FY05	\$2.0M	\$1.2M
Totals	\$7.8M	\$17.3M

Parcel History:

Fiscal Year	Number of Parcels	Acres
FY99	1	549
FY00	2	576
FY01	2	3,641
FY02	1	88
FY03	4	2,122
FY04	3	2,189
FY05	2	628
In Progress	0	0
Totals	15	9,793



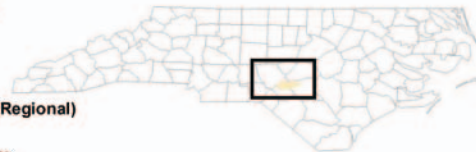
Fort Bragg ACUB initiative

Legend

- Cantonment
- Dudded Impact
- Firing Range
- Non-dudded Impact
- Other Range
- ACUB 2005
- Protected Area
- Other ACUB focus area

- Urban Areas (Regional)**
POP2000
- 719 - 241866
 - 241867 - 1008509
 - 1008510 - 2985722
 - 2985723 - 8299353
 - 8299354 - 17340042

North Carolina



MCB Camp Lejeune, North Carolina

This document is taken directly from the REPI 2007 fact sheet for MCB Camp Lejeune (Office of the Secretary of Defense, 2007).



CAMP LEJEUNE

NORTH CAROLINA

**Readiness and
Environmental
Protection
Initiative**

1,000 Acres near Camp Lejeune Saved from Development

Purchase buffers noise from Marine training, adds state wildlife land



\$500,000 from DoD's Readiness and Environmental Protection Initiative served as the catalyst for a nearly \$5 million purchase of land to buffer Marine Corps training at Camp Lejeune from existing houses and proposed residential development while preserving open space.

The Department of Defense (DoD) and the North Carolina Wildlife Resources Commission partnered to create a 1,062-acre buffer zone near Marine Corps Base Camp Lejeune. The buffer prevents commercial development around sensitive training grounds. As a result, the installation may continue its training while lessening the noise impacts on surrounding communities. The new buffer land also serves as a key area for habitat and recreation.

“This effort is a real ‘win-win’ for the Marine Corps and the State of North Carolina.”

William G. Ross, Jr.
Secretary
NC Dept. of Environment and Natural Resources

KEY FACTS

Mission: Major base for Special Forces and amphibious assault training Challenge: Residential home development in areas subject to high noise levels during military training Action: DoD partners with NC Wildlife Resources Commission (WRC) and Marine Corps to purchase 1,062 acres of land. Accomplishments: - Military training areas buffered - Airspace corridor enhanced - State hunting and fishing areas created - State wildlife preserves enlarged	Area Conserved: 1,062 acres Project Cost: \$5 million Partners: North Carolina Wildlife Resources Commission and DoD Contacts: Ms. Sharon S. Davis U.S. Marine Corps daviss@hqmcmc.usmc.mil Mr. Tommy Cline North Carolina State Property Office tommy.cline@ncnet.net
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The Readiness and Environmental Protection Initiative (REPI), DoD's conservation buffer program, enables the military to partner with outside stakeholders to promote land conservation that supports military missions and the natural habitat.

Updated 2/1/07

NAS Pensacola, Florida

The following is a copy of the NAS Pensacola press release (Naval Air Station Pensacola, 2004).

NASP TO PURCHASE EASEMENT IN FIRST EVER EVENT

NAS PENSACOLA, FLA.---After a year of cooperative partnering between Naval Air Station Pensacola and the Escambia Board of County Commissioners, Capt John Pruitt, Commanding Officer, NAS Pensacola, will present a check for \$500,000 for the purchase of a restrictive easement around the Bayou Grande Plantation parcel at the Board of County Commissioners meeting on June 3 at 3 p.m. restricting the land to recreational uses for perpetuity.

Almost a year ago to the day, NAS Pensacola (NASP) and the Board of County Commissioners (BCC) began a process to partner against encroachment on the air stations boundary and mission.

The Bayou Grande Plantation parcel consists of 48 acres abutting NASP's airfield boundary, less than one mile from runways and control tower. Much of the area is within the airfield's accident potential zone meaning heightened risk to future residents in the event of an aircraft mishap. Capt Pruitt immediately identified a planned single family home development as a potential threat to the air station's mission, and incompatible with goals of the ongoing efforts by the county and the Navy to achieve compatible growth, as articulated in the then-ongoing Joint Land Use study (JLUS) and the county's comprehensive plan.

Escambia County acquired the parcel from the owner with the intent to use the parcel as a low impact recreational facility, a usage compatible with the station's aviation mission. Subsequently Capt Pruitt received word from the Assistant Secretary of the Navy for Installations and Facilities approving the \$500,000 purchase of the restrictive easement for the County on the parcel. This represents the first encroachment partnering expenditure by the Navy and will ensure the future use of the parcel remains compatible despite changing administrations and zoning ordinances.

U.S. Army Garrison, Hawaii

This document is taken directly from the REPI 2007 fact sheet for U.S. Army Garrison, Hawaii (Office of the Secretary of Defense, 2007).



U.S. ARMY GARRISON, HAWAII OAHU, HAWAII

**Readiness and
Environmental
Protection
Initiative**

Six Groups Partner to Buy 1,875 Acres in Waimea Valley from Developer

Pristine Hawaiian land preserved, Army training area buffered



Funding of \$2 million from DoD's Readiness and Environmental Protection Initiative was leveraged into a \$14 million cooperative conservation partnership to protect lands from development next to a key Army training installation in Hawaii.

The Department of Defense (DoD) entered into a partnership with the City and County of Honolulu, the State of Hawaii, the National Audubon Society and the Trust for Public Land to purchase 1,875 acres of land in Oahu, Hawaii. The purchase prevented residential development that could have restricted training. The new buffer preserves the island's pristine Waimea Valley as a cultural resource and open space with significant historical and natural value.

"This historic agreement will allow us to preserve one of the most pristine and treasured [areas] on Oahu for future generations."

Mufi Hannemann
Mayor of Honolulu, Hawaii

KEY FACTS

Mission: Base of operations for 70,000 Army personnel across the Pacific

Area Conserved: 1,875 acres

Challenge: Potential development threatened to restrict training activities and destroy valuable open space in Hawaii's famous North Shore

Project Cost: \$14.8 million

Action: DoD and partners conserved 1,875 acres of undeveloped land bordering sensitive training area of US Army Garrison, Hawaii

Partners: DoD, City and County of Honolulu, State of Hawaii, Office of Hawaiian Affairs, National Audubon Society, and the Trust for Public Land

Accomplishments:

Military training area protected
Land with significant cultural, historical, archaeological, and botanical value preserved

Contacts:

Ms. Nancy Natoli
U.S. Army Environmental Command
nancy.natoli@us.army.mil

Mr. Lea Hong
Trust for Public Land
lea.hong@tpl.org

The Readiness and Environmental Protection Initiative (REPI), DoD's conservation buffer program, enables the military to partner with outside stakeholders to promote land conservation that supports military missions and the natural habitat.

Updated 3/1/07

The Land Price Trend Analysis

Where possible, RAND analysts acquired some information about land prices near the six case-study installations examined in depth. After the site visits, it became clear that such an analysis was needed to confirm the cost savings from buffering sooner rather than later. However, given the remaining timeline of this study, not many data were available. RAND researchers found for the most part that historical information on land values and trends is not readily available. Although most areas have available records on tax assessments, sorting through and aggregating these data in a meaningful way would have taken resources and time that were beyond the scope of this study. The RAND team acquired what was readily available and performed some rough assessments. More research is needed on this topic.

The rough analysis showed that there have been some high increases in property values the last few years, but prices leveled off in most areas in 2006 and are expected to stay flat for a few years. However, given all the development trends and pressures discussed in Chapter Two, prices are likely to increase again. Given these facts, the current real estate market offers DoD an opportunity to acquire property now before prices significantly increase again.

This appendix assesses land price trends near two case study installations where more data were acquired. Data are presented for areas near Fort Carson, Colorado, and NAS Fallon, Nevada.

Land Price Trend Analysis Near Fort Carson, Colorado

Fort Carson is in Pueblo County on the northern portion and in El Paso County on the southern portion. According to a Colorado Conservation Trust report, El Paso was one of the fastest-growing counties in Colorado between 1990 and 2000. Development pressures in the area are expected to continue—both El Paso and Pueblo Counties are projected to have significant acreage converted to developed land over the next couple of decades.¹ A detailed analysis of land sales data in Colorado indicated that Pueblo County saw a compound annual growth rate of 16 percent from 2000 to 2005 for parcels over 35 acres; and El Paso County had a compound annual growth rate of 24 percent over the same timeframe. Statewide averages were 17 percent.² Additional evidence is provided by two appraisals prepared for The Nature Conser-

¹ Colorado Conservation Trust (2005).

² The compound annual growth rate is a calculated value that shows the smoothed annual growth rate for the period the investment was held. It is calculated using the value of the initial investment, the ending value, and the number of years the investment was held. In reality, the value of investments fluctuates and does not necessarily grow monotonically, any given year, therefore this term is best used to compare investments over the same or similar timeframes.

vancy. These appraisals were prepared for two portions of the Walker Ranch, which is adjacent to the south and east sides of the base. Supporting data for the appraisal indicated that ranch land in the area of Fort Carson has been appreciating at a rate of 12 percent per year, with some appreciating over 20 percent per year between 2000 and 2005.³

Conservation leases are one tool being used to preserve lands temporarily near Fort Carson. However, in a rapidly appreciating real estate market, such a strategy may have significant costs if a conservation easement is eventually purchased. This is exemplified in the following example taken from the Walker Ranch appraisals. Table I.1 shows the appraised values for conservation easements for two similar pieces of property. The first parcel was appraised in 2002 at an easement cost of \$360 per acre. Not quite four years later, a similar parcel, albeit much smaller, was appraised at nearly \$1,085 per acre, a CAGR of 37 percent.

Table I.2 shows the total estimated expenditures for purchasing a conservation easement on 30,000 acres of this property, assuming that 30,000 acres were going to be used for an

Table I.1
Walker Ranch Conservation Easements' Appraised Value

Date	No. of Acres	Easement Cost	Cost per Acre
November 2002	14,170	\$5,100,000	\$359.92
May 2006	2,880	\$3,120,000	\$1,083.33

SOURCE: Peterson Appraisal Company (2002, 2006).

Table I.2
Example of the Cost of Waiting for Purchasing a Conservation Easement on Walker Ranch

	November 2002	November 2003	November 2004	November 2005	November 2006
Inputs					
Acres for conservation easement	30,000				
Annual lease cost, \$ ^a	115,000	115,000	115,000	115,000	115,000
Cost per acre to purchase conservation easement, \$	360	493	676	926	1,268 ^b
Calculations					
Total lease cost, \$	0	115,000	230,000	345,000	460,000
Conservation easement cost, \$	10,797,459	14,792,907	20,266,813	27,766,260	38,040,773
Total cost (real dollars)	10,797,459	14,907,907	20,496,813	28,111,260	38,500,773
Escalation factor ^c	0	0.04	0.11	0.16	0.22
Total cost (constant tear 2002 dollars)	10,797,459	14,281,621	18,543,663	24,215,219	31,594,079
2006 cost compared to 2002, %					300
Sensitivity Analysis					
CAGR = 15%, 2006 cost compared to 2002, %					147
CAGR = 50%, 2006 cost compared to 2002, %					419

^a The Walker conservation easement lease is \$115,000. The cost may rise to \$150,000 in 2006 but a sensitivity analyses on these numbers showed that this modest change had no significant affect on the end result.

^b This value differs from the one shown in Table I.1 because growth for four additional months (May to November) is included.

^c As of April 11, 2007, the GDP deflator can be found at <http://www.gpoaccess.gov/usbudget/fy05/hist.html>.

³ Peterson Appraisal Company (2006).

easement. Before a conservation easement is purchased, lease expenditures may be incurred. Therefore, the total costs include the expenditures on prior years' leases plus the cost of the easement purchase. In this case, RAND researchers assume a 37 percent annual increase over the base cost of nearly \$360 per acre based on the Walker Ranch appraisals. Costs are shown in real and constant dollars. The actual lease expenditure of \$115,000 per year is taken from information provided on the Walker parcel.⁴ Because the land value is rising so rapidly, at the end of a five-year period, DoD might have to pay nearly \$21 million more for the easement—300 percent more in real terms (using the gross domestic product deflator) when land appreciation and lease expenses are taken into account. These numbers illustrate that the potential additional costs of waiting five years in an appreciating real estate market can be high. Sensitivity analyses on the CAGR for the easement value are shown at the bottom of the table.

Land Price Trend Analysis NAS Fallon, Nevada

NAS Fallon, Nevada, is in Churchill County in northeastern Nevada. As discussed in Appendix F, NAS Fallon's main air station has historically been surrounded by agricultural lands, which are slowly being divided up into "hobby farms" of five to 10 acres. Commuter sprawl from Reno, Nevada, has been growing toward Fallon, especially because of the widening of the highway.

Anecdotal information provided by the Churchill County Manager suggests that prime land in the area has seen a CAGR in the area of 80 to 85 percent over the last three years. This is for land well suited for development or for land with water rights. Housing units have seen a much lower growth rate, about 10 percent CAGR over the last five years.⁵ A more detailed analysis based on recent sales in Churchill County was provided by Mike Berney of Berney Realty; see Table I.3.

Given such growth rates, it would have cost the NAS approximately 75 to 200 percent more to acquire property in 2006 than in 2003 (not including any lease expenditures).

According to Mike Berney, future values are anticipated to appreciate at a rate closer to historical values of 3 percent to 5 percent per year. Building codes within the AICUZ have additional requirements in these areas. Moreover, land within the AICUZ area of the base tends to turn over more slowly and prices are generally lower. However, it is not known whether this property increases at the same rate as nearby property. It depends on the intended use. If price trends follow historical rates before the recent spike, a property purchase in 2009 instead of 2006 would cost the NAS only about 16 percent more. However, it is unclear what would happen to the prices of large tracts of agricultural land as such land becomes scarce in the region. In addition, as land is subdivided and sold, the NAS would have to deal with more landowners, making it more difficult and more expensive because of the extra transaction costs of dealing with multiple landowners, even if land prices remained flat. For example, if the NAS bought an easement now on 100 acres from one landowner it would be cheaper and easier than trying to buy multiple easements in a year or two after the property had been subdivided into five- or 10-acre lots and sold to 20 or 10 new owners. Thus, even if land prices do not increase as much, buying sooner rather than later is still likely to be more cost efficient.

⁴ Various lease values building up to \$150,000 for 2006 were considered as well with little affect on the total cost.

⁵ Personal communication with Brad Goetsch, Churchill County Manager, October 16, 2006.

Table I.3
Churchill County Property Price Trends

Property Type	Price Ranges (\$1,000s)	Calculated Compound Annual Growth Rate (%)
Single family homes	2003: 80–85 2006: 145–155	20–25
Building sites with water rights	2003: 65–80 2006: 150–200	25–45
Building sites without water rights	2003: 30–40 2006: 80–90	25–45
Water righted properties with homes	2003: 330 2006: 595	22

SOURCE: Personal communication with Mike Berney, broker/owner of Berney Realty, Ltd., January 2007.

Bibliography

- American Farmland Trust, *Agricultural Conservation Easements*, fact sheet, Washington, D.C., September 1998.
- Angello, Joseph J., Jr., (Acting) Deputy Under Secretary of Defense Readiness on Constraints and Challenges Facing Military Test and Training Ranges, May 22, 2001.
- Beaufort County, South Carolina, "Beaufort County Rural and Critical Land Preservation Board Rural Lands Criteria," work sheet, n.d.a.
- , "Beaufort County Rural and Critical Land Preservation Program," n.d.b. As of November 18, 2006: http://www.bcgov.net/Public_Info_Officer/Rural_Critical_Lands/R&CL_main.php
- , "Restrictive Easement [for the Winn property]," August 25, 2004.
- , "Conservation Easement [for the Rathbun property]," November 29, 2005.
- , "Restrictive Easement [for the Lucky property]," April 28, 2006.
- Boddy, Chet, "Rural Sprawl," *Mendocino Coast Real Estate Magazine*, January 1995.
- Brewer, Richard, *CONSERVANCY: The Land Trust Movement in America*, Hanover, N.H.: Dartmouth College Press, 2003.
- Burchell, Robert W., and Sahan Mukherji, "Conventional Development Versus Managed Growth: The Costs of Sprawl," *American Journal of Public Health*, Vol. 92, No. 9, September 2003.
- Burget, Mark, Nancy Fishbein, Melinda Helmick, et al., *Central Shortgrass Prairie Ecoregional Plan*, The Nature Conservancy, April 1998.
- Byers, Elizabeth K., *The Conservation Easement Handbook*, 3rd. ed., Washington, D.C.: Land Trust Alliance, 2004.
- Cahlink, George, "Green Troops," *Government Executive*, October 1, 2002.
- Carlton, Jim, "Resort Communities Become Suburbanized," *Wall Street Journal Online*, October 6, 2004.
- Churchill County, Nevada, *Churchill County Master Plan* (2005 Update), 2005.
- , "Bill 2006–F, Ordinance 32: An Ordinance Adding Chapter 16.14 Transfer of Development Rights, to the Consolidated Development Code," May 2006.
- Clarion Associates, Inc., "The Costs of Sprawl in Pennsylvania, Executive Summary," Philadelphia, Pa., January 2000.
- Clayton, Mark, "Private Land Conservation Booms in US," *The Christian Scientist Monitor*, December 14, 2006. As of April 6, 2007: <http://www.csmonitor.com/2006/1214/p03s03-ussc.html>
- Colorado Conservation Trust, *Colorado Conservation at a Crossroads*, Boulder, Colo., 2005.
- Colorado Department of Natural Resources, "Mountain Plover: Species of Special Concern," n.d. As of June 14, 2006: <http://wildlife.state.co.us/WildlifeSpecies/Profiles/Birds/MountainPlover.htm>

Colorado Open Lands, "About Us," web page. n.d. As of April 6, 2007:
<http://www.coloradoopenlands.org/site/about/index.php>

Colorado Open Lands and The Nature Conservancy, "Peak to Prairie Conservation Project," Lakewood, Colo., 2006.

"Community Profiles," *Rural Matters*, Summer 2005, p. 15.

Costanza, R., et al., "The Value of the World's Ecosystem Services and Natural Capital," *Nature*, No. 387, 1997, pp. 253–260.

Daily, Gretchen C., et al., "Ecosystem Services: Benefits Supplied to Human Societies by Natural Ecosystems," *Issues in Ecology*, No. 2, Ecological Society of America, 1997.

Defense Base Closure and Realignment Commission, *2005 Defense Base Closure and Realignment Commission Report*, Washington, D.C., September 8, 2005.

De Nittis, Chris, "State Funds to Purchase 750 Acres Near Lejeune," *Jacksonville Daily News*, July 14, 2004.

Department of the Army, *The Army Strategy for the Environment*, Washington, D.C.: Army Environmental Policy Institute, October 2004. As of April 6, 2007:
<http://www.asaie.army.mil/Public/ESOH/doc/ArmyEnvStrategy.pdf>

Department of Defense, "Camp Ripley, MN, 2005 REPI Project," fact sheet, Washington, D.C., n.d.a.

———, "Fort Carson, CO, 2005 REPI Project," fact sheet, Washington, D.C., n.d.b.

———, "LaPosta, CA, 2005 REPI Project," fact sheet, Washington, D.C., n.d.c.

———, "MCAS Beaufort, SC, 2005 REPI Project," fact sheet, Washington, D.C., n.d.d.

———, "MCB Camp Lejeune, NC, 2005 REPI Project," fact sheet, Washington, D.C., n.d.e.

———, "Readiness and Range Preservation Initiative Fact Sheet," Washington, D.C., n.d.f.

———, "U.S. Army Garrison, Waimae Valley, 2005 REPI Project," fact sheet, Washington, D.C., n.d.g.

———, "Whitehouse OLF, 2005 REPI Project," fact sheet, Washington, D.C., n.d.h.

———, *Sustainment of Ranges and Operating Areas*, DoD Directive 3200.15, Washington, D.C., January 2003.

———, Office of Economic Adjustment, *Joint Land Use Study Program*, Washington, D.C., July 8, 2004.

———, Office of Economic Adjustment, "Programs: Compatible Use," last updated July 21, 2006. As of February 27, 2007:

<http://www.oea.gov/OEAWeb.nsf/Encroachment?readform>

———, Readiness and Environmental Protection Initiative, "Camp Lejeune, North Carolina," REPI fact sheet, Washington, D.C., February 1, 2007a.

———, "Camp Ripley, Minnesota," REPI fact sheet, Washington, D.C., March 1, 2007b.

———, "US Army Garrison Hawaii, Oahu, Hawaii," REPI fact sheet, Washington, D.C., March 1, 2007c.

Department of Defense and U.S. Fish and Wildlife Service, "Protecting Endangered Species on Military Lands," Washington, D.C., September 2002.

Doyle, Mary, "Retirement Communities: The Nature and Enforceability of Residential Segregation by Age," *Michigan Law Review*, the Michigan Law Review Association, November 1977.

EDAW, Inc., "Fort Stewart Joint Land Use Study," Coastal Georgia Regional Development Center, Brunswick, Ga., September 2005.

"Editorial: Navy-County Buffer a Win-Win," *Lahontan Valley News and Fallon Eagle Standard*, May 11, 2006.

Eglin Air Force Base, *Eglin Range General Plan*, Eglin Air Force Base, Fla., n.d.

———, *Eglin Air Force Base Integrated Natural Resources Management Plan, 2002–2006*, Natural Resources Management Branch, Fla., 2002.

———, "FY07 REPI Proposal North Nokuse Conservation Easement Acquisition Sustaining Range Access for the Joint Strike Fighter," Eglin Air Force Base, Fla., 2007.

- Environmental and Natural Resources Division, *Integrated Natural Resources Management Plan 2001–2005*, Fort Stewart and Hunter Army Airfield, Georgia, Directorate of Public Works (DPW), Fort Stewart, 2001.
- Ewing, Reid, Rolf Pendall, and Don Chen, “Measuring Sprawl and Its Impacts,” *Smart Growth America*, 2002. As of April 6, 2007:
<http://www.smartgrowthamerica.org/sprawindex/MeasuringSprawl.PDF>
- “Examples of Training Constraints and Environmental Encroachment on Army Installations,” briefing at Office of the Deputy Under Secretary of Defense (Installations and Environment)/Environmental Quality (DUSD(IE)/EQ) Compatible Land Use Partnering Workshop, April 22–24, 2003.
- Farley, Scott M., and Scott C. Belfit, “Addressing Encroachment with Cooperative Agreements and Conservation,” *Federal Facilities Environmental Journal*, Vol. 12, No. 2, Summer 2001.
- Florida Defense Alliance, “Florida Defense Alliance Draft Strategic Plan,” Revised April 2004. As of April 6, 2007:
<http://www.floridadefense.org/index.asp>
- Florida Department of Community Affairs, “Military Base Encroachment: Base Realignment and Closure (BRAC) and Joint Land Use Study (JLUS), Division of Community Planning,” n.d.a. As of September 4, 2006:
<http://www.dca.state.fl.us/fdcp/dcp/militarybase/index.cfm>
- , “Rural Lands Stewardship Program,” n.d.b. As of September 5, 2006:
<http://www.dca.state.fl.us/FDCP/DCP/RuralLandStewardship/index.cfm>
- Florida Department of Environmental Protection, “State Acquires 1,166 Acres in Escribano Point,” press release, October 14, 2003a. As of April 6, 2007:
http://www.dep.state.fl.us/secretary/news/2003/oct/1014_esribano.htm
- , “Gateway Opens to Northwest Florida Greenway,” press release, November 12, 2003b. As of November 26, 2006:
http://www.dep.state.fl.us/secretary/news/2003/nov/1112_gw_gov.htm
- , “Florida Joins Forces with Defense Department to Conserve Land,” press release, June 28, 2004. As of October 12, 2006:
http://www.dep.state.fl.us/secretary/news/2004/june/0628_defense.htm
- , “17,302 Acres Added to Northwest Florida Greenway,” *The Post: The Latest News from the Department of Environmental Protection*, Vol. 5, No. 5, February 4, 2005a. As of April 6, 2007:
<http://www.dep.state.fl.us/SECRETARY/Post/2005/0204.htm>
- , “Yellow River Ravines,” *The 2006 Florida Forever Five Year Plan*, December 2005b.
- , “DEP Celebrates Partnerships for Protecting the Panhandle,” press release, March 31, 2006a. As of November 26, 2006:
http://www.dep.state.fl.us/secretary/news/2006/03/0331_02.htm
- , “The August 2006 Report of the Florida Forever Program,” 2006b, p. 141.
- Florida Department of Revenue, *2005 Property Valuations and Tax Data*, Table 1, May 2006. As of December 19, 2006:
<http://dor.myflorida.com/dor/property/05FLpropdata.pdf>
- “Florida’s Statewide Greenways Planning Project,” n.d. As of November 26, 2006:
<http://www.geoplan.ufl.edu/projects/greenways/greenwayindex.html>
- Fort Stewart, Proposal: Army Compatible Use Buffer for “Coastal Georgia Private Lands Initiative,” Fort Stewart, Ga., 2003.
- , “Threatened and Endangered Species,” January 20, 2004. As of December 2, 2006:
<http://www.stewart.army.mil/dpw/fish/FISH%20CONCL2b%20TES.htm>
- , *Army Compatible Use Buffer (ACUB) Annual Report*, Fort Stewart, Ga., May 8, 2006.

Frost, Peter, "Beaufort Voters Favor County Land Preservation," *The State.Com* (South Carolina's Home Page), November 12, 2006. As of November 18, 2006:
<http://www.thestate.com/mld/thestate/living/home/15990025.htm>

Fuhr, Jordan, "BRAC's Training and Education Impact," *Military Training Technology*, Vol. 10, No. 5, July 26, 2005.

Gardin, Stefanie, "Partnership Preserves Hawaii's Waimea Valley," Fall 2006. As of February 4, 2007:
<http://aec.army.mil/usaec/publicaffairs/update/fall06/fall0602.html>

Gasteyer, Stephen, and Jason Gray, "Rural Sprawl: How Is Infrastructure Development Impacting the Quality of Life in Rural Communities," *Rural Matters*, Summer 2005.

Georgia Tech, "Retirement Communities: An Innovative Retiree Attraction and Eldercare Living Strategy for Rural Georgia," Atlanta, Ga., July 27, 2006.

"GOCO Overview," n.d. As of April 6, 2007:
<http://www.goco.org/>

Godfrey, Joel, "Oahu Conservation Partnership and the Army Compatible Use Buffer Program," powerpoint presentation, Environmental Division, Directorate of Public Works, U.S. Army Garrison, Hawaii, June 2006.

Grunau, Lee, et al., "Prairie Dog Animal Community Management Template," *Central Shortgrass Prairie Ecoregional Assessment and Partnership Initiative, Final Report*, Appendix X, The Nature Conservancy, July 2006.

Gulf Coastal Plain Ecosystem Partnership, "Gulf Coastal Plain Ecosystem Partnership," flyer, Jay, Fla., 2005.

Gustanski, J. A., and R. H. Squires, eds., *Protecting the Land: Conservation Easements Past, Present, and Future*, Washington, D.C.: Island Press, 2000.

Hansen, Andrew J., et al., eds., "Land-Use Change in Rural America: Rates, Drivers, and Consequences," *Ecological Applications*, Vol. 15, No. 6, 2005.

Hass, William H., and William J. Serow, "The Baby Boom, Amenity Retirement Migration, and Retirement Communities: Will the Golden Age of Retirement Continue?" *Research on Aging*, Vol. 24, No. 1, January 2000, pp. 150–164.

Hipes, Dan L., and Dale R. Jackson, "Rare Invertebrate Fauna of Camp Blanding Training Site, a Potential Landscape Linkage in Northeastern Florida," *Florida Scientist*, Vol. 59, No. 2, 1996, pp. 96–114.

Holman, Barry W., "DOD Approach to Managing Encroachment on Training Ranges Still Evolving," GAO Director for Defense Infrastructure Issues, testimony before the U.S. Senate Committee on Environment and Public Works, GAO-03-62IT, April 2, 2003.

Howard, Parish, "River Groups Merging to Protect Ogeechee Basin," *The News and Farmer and Wadley Herald*, May 5, 2005. As of December 9, 2006:
<http://www.gwf.org/gawater/may5.html>

Installation Management Agency Southeast Region, "Fort Stewart Facts," February 13, 2006. As of December 2, 2006:
<http://www.stewart.army.mil/ima/sites/about/facts.asp>

"Integrated Natural Resources Management Plan for the Marine Corps Air Station, Beaufort, South Carolina," Marine Corps Air Station, Beaufort, S.C., July 2006.

Johnson, Josh, "County, Navy Seal Deal to Prevent Encroachment Near NAS Fallon," *Lahontan Valley News and Fallon Eagle Standard*, February 8, 2006.

Kellert, R. S., and E. O. Wilson, *The Biophilia Hypothesis*, Washington, D.C.: Island Press, 1993.

Kirchhoff, Sue, "Hot Real Estate Prices Extend to Rural Land," *USA Today*, March 9, 2006. As of January 5, 2007:
http://www.usatoday.com/money/economy/housing/2006-03-09-farmland-usat_x.htm

Kloor, Keith, "Sagebrush Showdown," *Audubon*, January–February 2007, pp. 43–49.

- Knott, Joseph L., and Nancy Natoli, "Compatible Use Buffers: A New Weapon to Battle Encroachment," *Engineer*, October–December 2004.
- Lachman, Beth E., Peter Schirmer, David R. Frelinger, Victoria A. Greenfield, Michael S. Tseng, and Tiffany Nichols, *Installation Mapping Enables Many Missions: The Benefits of and Barriers to Sharing Geospatial Data Assets*, Santa Monica, Calif.: RAND Corporation, MG-552-OSD, 2007. As of August 30, 2007: <http://www.rand.org/pubs/monographs/MG552/>
- "Lahontan Valley Environmental Alliance," home page, n.d. As of November 26, 2006: <http://www.lvea.org/>
- Land Trust Alliance, home page, n.d. As of January 16, 2007: <http://www.lta.org/>
- , *National Land Trust Census*, Washington, D.C., September 12, 2001.
- , *2005 National Land Trust Census Report*, Washington, D.C., November 30, 2006.
- Lattin, Christy, "Navy, County Celebrate Buffer Zone Agreement," *Lahontan Valley News and Fallon Eagle Standard*, May 8, 2006.
- "Legacy Resource Management Program," n.d. As of January 18, 2007: <http://www.dodlegacy.org/legacy/>
- Lind, Brenda, *The Conservation Easement Stewardship Guide*, Washington, D.C.: Land Trust Alliance, 1991.
- Litman, Todd, "Smart Transportation Investments: Reevaluating the Role of Highway Expansion for Improving Urban Transportation," Victoria, BC, Canada: Victoria Transport Policy Institute, October 1, 2006.
- Lowcountry Council of Governments, "Lowcountry Joint Land Use Study (JLUS) Plan," September 2004.
- Marine Corps Base, Camp Lejeune, "Camp Lejeune's Role in RCW Conservation," August 13, 2002. As of October 11, 2006: <http://www.lejeune.usmc.mil/EMD/TE/rcwhome.htm>
- Marshall, R. M., S. Anderson, M. Batcher, P. Comer, S. Cornelius, R. Cox, A. Gondor, D. Gori, J. Humke, R. Paredes Aguilar, I. E. Parra, and S. Schwartz, *An Ecological Analysis of Conservation Priorities in the Sonoran Desert Ecoregion*, prepared by The Nature Conservancy of Arizona Chapter, Sonoran Institute, and Instituto del Medio Ambiente y el Desarrollo Sustentable del Estado de Sonora with support from Department of Defense Legacy Program, Agency and Institutional partners, April 2000.
- McElyea, J. R., and G. L. Cory, "Resort Investment and Development: An Overview of an Evolving Market," *Economic Research Associates White Paper*, Los Angeles, Calif., 1998.
- McKeown, Bill, "Land Wrangle," *The Gazette* (Colorado Springs), December 4, 2005.
- Meador, Mitch, "Lands Added to Sill Buffer," *The Lawton Constitution*, August 17, 2004.
- Minnesota Army National Guard (MNARNG), "Executive Summary Army Compatible Use Buffer (ACUB) Camp Ripley Training Site," March 8, 2004.
- National Association of Realtors, "Beyond the Fence: A REALTORS® Guide to Military Base Closure, Realignment and Encroachment," 2006.
- Naval Air Station Fallon, "Encroachment Action Plan, Naval Air Station Fallon, Nevada: Executive Brief," July 2005.
- , "Final Integrated Natural Resource Management Plan and Environmental Assessment for Naval Air Station Fallon, Nevada," Fallon, Nev., March 2006a.
- , "Escrow Agreement: NAS Fallon, Nevada," May 2006b.
- Naval Air Station Fallon and Churchill County, "Agreement Between the Department of the Navy and Churchill County, Nevada," May 5, 2006.
- Naval Air Station Pensacola, "NASP to Purchase Easement in First Ever Event," press release, NAS Pensacola Public Affairs Office, June 8, 2004.

Nebel, Bernard J., and Richard T. Wright, *Environmental Science: The Way the World Works*, Englewood Cliffs, N.J.: Prentice Hall, 1993.

Neely, B. S., et al., *Central Shortgrass Prairie Ecoregional Assessment and Partnership Initiative, Final Report*, The Nature Conservancy, July 2006.

"Nokuse Plantation," home page, n.d. As of November 26, 2006:
<http://www.nokuse.org/>

North Shore Community Land Trust, "Campaign for Pupukea-Paumalu," n.d. As of February 4, 2007:
<http://www.northshoreland.org/Campaign.htm>

Office of the Secretary of Defense, "Bayou Grande Encroachment Partnering Project Summary," point paper, n.d.

———, "OSD Readiness and Environmental Protection Initiative Navy Project Sheet FY06—Project Name: Clear Creek I and II," July 13, 2005a.

———, "OSD Readiness and Environmental Protection Initiative Navy Project Sheet FY06—Project Name: Naval Air Station Whiting Field Clear Creek Project," July 31, 2005b.

———, "Fort Carson, Colorado, 2005 REPI Project," fact sheet, 2006a.

———, "MCAS Beaufort, SC, Phase II Buffer Land Partnering Projects," Draft Summaries of Projects Receiving FY 05 REPI Funding, January 2006b.

———, "2006 Sustainable Ranges Report," March 10, 2006c.

———, "OSD Readiness and Environmental Protection Initiative: Project Sheet FY07 for NAS Fallon FY07 Phase II," June 21, 2006d.

———, "The Department of Defense Conservation Partnering Program Guide," July 2006e.

———, "OSD Readiness and Environmental Protection Initiative Navy Project Sheet FY07—Project Name: Clear Creek I and II," July 10, 2006f.

———, "OSD Readiness and Environmental Protection Initiative Navy Project Sheet FY07—Project Name: North Field," July 10, 2006g.

———, "OSD Readiness and Environmental Protection Initiative Navy Project Sheet FY07—Project Name: Santa Rosa County Commerce Park," July 10, 2006h.

———, "Report to Congress on the Readiness and Environment Protection Initiative (REPI)," March 2007.

Paulson, Amanda, "The New Pioneers of Sprawl," *The Christian Science Monitor*, March 29, 2004.

Peterson Appraisal Company, *Restricted Appraisal Report of Walker Ranch Conservation Easement Valuation, Pueblo County, Colo.*, Lakewood, Colo., November 18, 2002.

———, *Complete Self-Contained Appraisal Report of Walker Ranch Conservation Easement Valuation, Pueblo County, Colo.*, Lakewood, Colo., May 1, 2006.

Pimentel, David, et al., "Economic and Environmental Benefits of Biodiversity," *BioScience*, Vol. 47, No. 11, December 1997.

Porter, Douglas R., *Managing Growth in America's Communities*, Washington, D.C.: Island Press, 1997.

Proposal: Army Compatible Use Buffer for "Sustaining Colorado's Great Outdoors," Fort Carson, Colo., December 2003.

Reeder, Rick, et al., "Rural Sprawl: Problems and Policies in Eight Rural Counties," U.S. Department of Agriculture, Economic Research Service, 2000.

"Roadless Conservation Act Introduced in Congress," *Environmental News Service*, June 5, 2003. As of January 2, 2007:
<http://forests.org/articles/reader.asp?linkid=23298>

Roper, Peter, "Colorado Springs Approves Buffer Near Fort Carson," *Pueblo Chieftain* (CO), January 30, 2006.

- "Sage Grouse Unlikely to Be Listed as Endangered," *LVEA in Action*, Winter 2004.
- Santa Rosa County, Board of County Commissioners, "Comprehensive Plan 2000–2020," Milton, Fla., n.d.a.
- , "Comprehensive Plan Policies Implementing the Joint Land Use Study," n.d.b. As of February 4, 2007:
<http://www.santarosa.fl.gov/zoning/jlus/compplanpolicies.html>
- , "Santa Rosa County Citizen Service Center: Maps," n.d.c. As of February 4, 2007:
<http://www.santarosa.fl.gov/zoning/maps.html>
- , "Santa Rosa County Citizen Service Center: Maps of Airport Zones," n.d.d. As of February 4, 2007:
<http://www.santarosa.fl.gov/zoning/airports.html>
- "SERDP: Strategic Environmental Research and Development Program," n.d. As of January 18, 2007:
<http://www.serdp.org/>
- Sierra Club, "Fish and Wildlife: Department of Defense Range Tours," n.d. As of February 4, 2007:
http://www.sierraclub.org/wildlife/species/range_tour/base2.asp
- , "Sprawl Costs Us All: How Your Taxes Fuel Suburban Sprawl," 2000.
- Skoglund, Marty, "Camp Ripley Army Compatible Use Buffer (ACUB) Talking Points," Little Falls, Minn.: Camp Ripley, May 21, 2004.
- Smith, Robert Leo, and Thomas M. Smith, *Ecology & Field Biology*, 6th ed., New York: Benjamin Cummings, 2001.
- Soto, Christina, "The Farm Bill: Tools for Land Trusts from America's Biggest Conservation Program," *Exchange: The National Journal of Land Conservation*, Vol. 26, No. 1, Winter 2007.
- Stahl, Greg, "Resort Towns Struggle with Growth," *Idaho Mountain Express and Guide*, August 25, 2004.
- State of Florida and County of Escambia, "Restrictive Easement," easement document for NAS Pensacola, Escambia County, Fla., June 2, 2004.
- Stein, B. A., L. S. Kutner, and J. S. Adams, eds., *Precious Heritage: The Status of Biodiversity in the United States*, New York: Oxford University Press, 2000.
- Stensland, Jessie, "Hoypus yes, Boyer no, advisors say," *Whidbey News Times*, May 20 2006a.
- , "Boyer Land Offer Made," *Whidbey News Times*, August 30, 2006b.
- Stohr, Kate, "Go West, Not-So-Young Man," *U.S. News & World Report*, June 14, 2004.
- Streib, Gordon, "An Introduction to Retirement Communities," *Research on Aging*, Vol. 24, No. 1, January 2002, p. 3.
- Sturm, R., and D. A. Cohen, "Suburban Sprawl and Physical and Mental Health," *Public Health*, Vol. 118, No. 7, 2004, pp. 488–496.
- "Sustainable Fort Bragg," May 8, 2006a. As of December 31, 2006:
<http://www.bragg.army.mil/Sustainability/>
- "Sustainable Fort Bragg: Goal 5: Compatible Land Use Objectives," May 8, 2006b. As of December 31, 2006:
<http://www.bragg.army.mil/Sustainability/goal5-objs.htm>
- "Sustainable Sandhills: Our Mission and Our Vision," home page, n.d. As of December 31, 2006:
<http://www.sustainablesandhills.org/>
- Tassel, Sandra, "Conservation by Computer," *LAND & PEOPLE*, Spring 2005.
- Teton County Planning Department, *Jackson/Teton County Comprehensive Plan, May 9, 1994 with Amendments Through the Current Date*, Teton County, Wyo., 1999.
- "The ACE Basin Project," n.d. As of November 18, 2006:
<http://www.acebasin.net/>
- The Nature Conservancy, "Northwest Florida Greenway Project," fact sheet, n.d.

- , “The Nature Conservancy, Department of Defense Partner to Protect Critical Habitat on and Near Military Installations in Georgia,” press release, November 12, 2003. As of December 2, 2006: <http://www.nature.org/wherework/northamerica/states/georgia/press/press1257.html>
- , “The Altamaha River,” 2006a. As of November 20, 2006a: <http://www.nature.org/wherework/northamerica/states/georgia/preserves/art6633.html>
- , “Faces of Conservation: John Townson,” 2006b. As of October 12, 2006: <http://www.nature.org/wherework/northamerica/states/northcarolina/features/art17283.html>
- , “International Paper, The Nature Conservancy and The Conservation Fund Protect 218,000 Acres of U.S. Forestland Through Historic Land Acquisition Project,” press release, March 28, 2006c. As of September 6, 2007: <http://www.nature.org/wherework/northamerica/states/georgia/press/press2341.html>
- , “The Nature Conservancy Joins Environmental, Forestry and Military Officials, International Paper and The Conservation Fund to Celebrate Historic U.S. Forestland Acquisition Project,” press release, March 31, 2006d.
- , “Partners to Dedicate Little Nokasippi Wildlife Management Area,” press release, April 24, 2006e. As of February 3, 2007: <http://www.nature.org/wherework/northamerica/states/minnesota/press/press2396.html>
- Theobald, David M., “Defining and Mapping Rural Sprawl: Examples from the Northwest US,” Fort Collins, Colo.: Colorado State University, September 16, 2003.
- The Trust for Public Land, “Fort Stewart/Hunter Army Airfield: Coastal Georgia Private Lands Initiative,” February 2004.
- , “Grant of Agricultural Conservation Easement [Floyd and Gill tract],” August 1, 2005.
- , “A Description of The Trust for Public Land’s Conservation Vision Program,” January 18, 2006a.
- , “Grant of Agricultural Conservation Easement [Sands tract],” August 31, 2006b.
- “Truckee-Carson Irrigation District,” home page, n.d. As of November 26, 2006: <http://www.tcid.org/index.htm>
- United Nations Development Programme, “Biodiversity, Context” n.d. As of January 11, 2007: <http://www.undp.org/biodiversity/context.html>
- University of Florida, “Phase II Final Report Statewide Greenways System Planning Project,” January 21, 2004. As of November 26, 2006: <http://www.geoplan.ufl.edu/projects/greenways/finalreport.html>
- U.S. Air Force Headquarters USAF/LEEV, “Handbook for Interagency/Intergovernmental Coordination for Environmental Planning,” Washington, D.C., November 1988.
- U.S. Army, “Army Compatible Use Buffer Program (ACUB),” n.d.a. As of January 27, 2007: http://www.sustainability.army.mil/tools/programtools_acub.cfm
- , “Sustainable Range Program (SRP),” n.d.b. As of April 11, 2007: http://www.sustainability.army.mil/tools/programtools_srp.cfm
- , “Fort Carson Regional Partnership,” fact sheet, n.d.c.
- U.S. Army Center for Health Promotion and Preventive Medicine, “Estimated Annual Cost of Noise to the Army,” n.d. As of November 6, 2006: <http://chppm-www.apgea.army.mil/enp/costs.htm>
- U.S. Army Environmental Center, “Environmental Update: Florida Guard Gets First Compatible Use Buffer Under New Provisions,” Summer 2004. As of February 3, 2007: <http://aec.army.mil/usaec/publicaffairs/update/sum04/sum0409.html>
- , “Army Compatible Use Buffer Program: End of Year Report FY05,” 2005.

- , “Environmental Update: Camp Ripley Guards Minnesota Environment,” Summer 2006a. As of February 3, 2007:
<http://aec.army.mil/usaec/publicaffairs/update/fall06/fall0601.html>
- , “Environmental Update: Local Partner Signs on to First Fort Sill Buffer Agreement,” Fall 2006b. As of February 3, 2007:
<http://aec.army.mil/usaec/publicaffairs/update/fall06/fall0601.html>
- U.S. Army Headquarters, “The Army Sustainable Range Program,” Army Regulation 350–19, Washington, D.C., August 30, 2005.
- U.S. Department of Agriculture Forest Service, “Forest Legacy Program,” n.d. As of February 12, 2007
<http://www.fs.fed.us/spf/coop/programs/loa/flp.shtml>
- U.S. Department of Agriculture Natural Resources Conservation Service, “Farm and Ranch Lands Protection Program,” n.d.a. As of January 28, 2007:
<http://www.nrcs.usda.gov/programs/frpp/>
- , “NRCS Conservation Programs,” n.d.b. As of January 28, 2007:
<http://www.nrcs.usda.gov/programs/>
- , “Healthy Forests Reserve Program,” January 10, 2007: As of August 30, 2007:
<http://www.nrcs.usda.gov/programs/HFRP/ProgInfo/Index.html>
- U.S. Department of the Navy, “Air Installations Compatible Use Zones Report for Marine Corps Air Station Beaufort, Beaufort, South Carolina,” North Charleston, S.C.: Naval Facilities Engineering Command, February 2003.
- U.S. Environmental Protection Agency, “Smart Growth,” November 17, 2006. As of January 16, 2006:
<http://www.epa.gov/dced/>
- U.S. Fish and Wildlife Service, “The Sikes Act—A Dynamic Partnership,” n.d. As of January 28, 2007:
http://www.fws.gov/habitatconservation/sikes_act.htm
- , “Stillwater National Wildlife Refuge Complex,” brochure, Fallon, Nev.: Stillwater National Wildlife Refuge, March 2003.
- U.S. General Accounting Office, “Military Training: DOD Lacks a Comprehensive Plan to Manage Encroachment on Training Ranges,” GAO-02-614, Washington, D.C., June 2002.
- U.S. Marine Corps, Marine Corps Order 11011.22A, *Encroachment Control*, n.d.
- , Headquarters, *United States Marine Corps Installation Commanders’ Guide to Encroachment Partnering*, Washington, D.C., 2006.
- U.S. Navy, *OPNAV INSTRUCTION 11010.40: Encroachment Management Program*, Washington D.C.: Chief of Naval Operations, 2007.
- U.S. Navy Southern Division, Naval Facilities Engineering Command, “Environmental Assessment for the Replacement of the T-34C Training Aircraft with the Joint Primary Aircraft Training System (JPATS) Aircraft at Naval Air Station Whiting Field, Florida,” North Charleston, S.C., May 2000.
- “Work on Sand Mountain Blue Butterfly Conservation Plan Continues as Lawsuit Looms,” *LVEA in Action*, Fall 2005.