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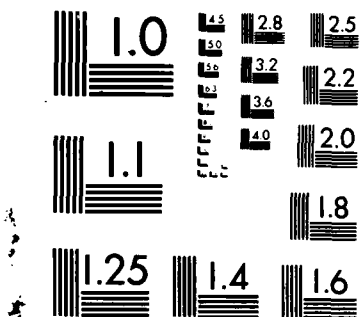
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RESERVE MANPOWER, PERSONNEL, AND TRAINING RESEARCH

AD-A173 810

Edited by

H. WALLACE SINAIKO
Smithsonian Institution

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Manpower Research and Advisory Services

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The report summarizes a meeting on research having to do with military manpower in the nation's reserve forces. The meeting focused mainly, but not exclusively, on the Selected Reserve. Specific topics for which papers were given were: personnel retention; training; the individual ready reserve (IRR); utilization of reserve units; costs of active and reserve units; reserve personnel data available for research and analysis; psychological and social issues; and the history and current perspectives of the Naval Reserve. The report includes (a) a section highlighting the speakers' main points and (b) 26 speaker-prepared summaries of papers that were presented.					
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RESERVE MANPOWER, PERSONNEL, AND TRAINING RESEARCH

*Proceedings of a Workshop
held at
Monterey, California
25-27 June 1986*

EDITORS:

H. Wallace Sinaiko
Smithsonian Institution

Kenneth J. Coffey
Naval Postgraduate School

September 1986

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The meeting reported here was judged by many of its participants as a worthwhile undertaking. As organizers, arrangers and editors we are delighted to acknowledge the contributions of three groups of participants without whom there certainly would have been no kudos. Helping with the myriad of pre-, during, and post-meeting arrangements were our aides Fecky Graham of the Smithsonian and Michelle Samarija of the Naval Postgraduate School. They unburdened us to the extent that we were able to participate actively in the meeting and actually enjoy the experience.

Second, we want to thank the session chairmen--Stanley Collyer, Kenneth Scheflen, and Robert Goldich; and the session recorders--Murray Rowe, John Enns, Robert Carroll, Neil Singer, and Michael Bryant. They kept speakers and their questioners from being too long-winded and noted the otherwise perishable points of the discussions that were stimulated by the presentations.

Third, it goes without saying that at the heart of the meeting were the speakers, who took the time to describe their work and prepare the summaries that make up this document. Our thanks go especially to them.

H. Wallace Sinaiko

Kenneth J. Coffey



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Appendices

- A - Agenda of the Workshop
- B - Participants

BACKGROUND

The notion of "total force"--an inclusive way of thinking about manning the armed forces--is not new. For at least 15 years we have increasingly recognized that defense manpower has four major components: the active force, the reserves, civilian employees of the government, and contract workers. Only recently, however, have we begun to devote substantial research resources to investigations of other than active-duty manpower. The reserves--the part-time force--and both types of civilian employees have been more or less taken for granted, at least as far as manpower research is concerned. But the high and increasing costs of military manpower in the active force--together with emerging recruiting and retention problems--have forced planners to put much more emphasis on the other categories and, in particular, on the reserves. Many missions, both peacetime and wartime, have been assigned to the reserves in each of the services as a way of shifting from an almost exclusive dependence on the active force. Somewhat behind the Army and Air Force in shifting extensive missions to the reserve, the Navy now is in a major expansion mode and is turning more and more to its reserve.

But there are significant differences between full-and part-time military people in terms of their characteristics, their availability, their readiness, how and when they train, and more. Relatively little research and analysis has been devoted to reserve manpower. Responding to the new prominence of the reserve force, we convened a meeting that had these aims: to develop a common base of information about the naval and other reserve components, and to examine and elaborate on critical reserve manpower issues in the light of previous and current research. A subsidiary objective was to frame research questions in order to start to fill the gaps in our knowledge. Starting late in 1985 we identified candidate participants for such a meeting. While we originally intended to deal exclusively with Naval Reserve matters, it became clear that some issues we thought were relevant to the Navy were not being addressed in navy reserve-related work. We also discovered that some issues were common to several of the nation's reserve components; therefore we invited some speakers whose work focused on non-navy or multiservice issues. Accordingly, speakers represented a wide range of work settings and institutions: federal contract research centers, universities, industry, non-defense federal agencies, the Office of the Secretary of Defense, and many service commands and laboratories. The meeting was held at the Naval Postgraduate School (NPS) on June 25-27, 1986. A formal agenda listing the 29 presentations is shown as Appendix A.

Appendix B provides a complete list of participants in the workshop, including affiliation and telephone number current at the time of publication. Because this report contains brief, speaker-prepared summaries rather than full technical accounts, we urge readers wishing more information to contact speakers directly.

The meeting was organized around nine topics: 1) the supply of people to reserve forces; 2) personnel retention; 3) training; 4) the individual ready reserve (IRR); 5) utilization of reserve units; 6) comparative

costs of active and reserve units; 7) reserve personnel data available for research and analysis; 8) psychological and social issues; and, 9) current research on the reserves of the Air Force. In addition, attendees were briefed on the history and current perspectives of the Naval Reserve.

HIGHLIGHTS

On the basis of presentations by the speakers and the discussions that took place, we note these main points:

Personnel Supply

- o The Naval Reserve (NR) is in a period of unprecedented growth and increased operational responsibility; by 1991 the NR will be the tenth largest navy in the world. Accession requirements are driven up by high turnover rates. In order to meet mobilization goals, the manning levels of naval reserve units have to be 20 to 25 percent greater than corresponding manning levels for active units (Megna; Patton).

- o Actual manning of army guard and reserve units varies widely--from 50 percent undermanning to 25 percent overmanning; there are significant regional differences in the supply of manpower to the Army's reserve components (Grissmer and Kirby (a)).

- o Pay and bonuses as incentives to join the NR have mixed effects across occupations and geographic regions. Further, in estimating the supply of veterans to the NR, the factors that influence active duty retention have to be taken into account (Asch).

- o The effectiveness of DoD's bonuses and other policies aimed at improving enlistment and reenlistment rates has been overstated, particularly for non-prior-service people. The supply of prior-service manpower to the reserve is relatively more elastic than that for NPS, but both elasticities are small. Given the competition between active-duty and reserve recruiting in the 18-to-24-year-old market, the selected reserve may have to increase its goals for prior-service manpower. In addition to enlistment bonuses for veterans, there may be more important non-pecuniary enlistment incentives for non-veterans, e.g., unit esprit and opportunities for social service (McNaught).

- o In forecasting personnel supply to the reserve force it is essential to gain an understanding of local recruiting markets. Patterns of

1. Names in parentheses refer, by authors, to summaries that appear in the main body of this report; in two cases, pairs of authors contributed two papers and their summaries are designated as (a) and (b).

unemployment, wages, and living costs, inter alia, have been found in studies of the Army Reserve to be critical variables (Mehay).

- o The Navy's Sea Air Mariner program, which recruits non-prior-service people into selected reserve units, will probably result in a larger force and one with a higher proportion of low paygrade people than the present force. At the same time the SAM manning policy will generate "shadow costs" in the form of relatively greater numbers of personnel inexperienced in the Navy culture (Fletcher).

Personnel Retention

- o Extensive survey research on the Navy's Selected Reserve has shown that, as a group, members are well educated; they hold good jobs, and they enjoy relatively high incomes. To put it another way, the Naval Reserve is not manned by an underclass. The motivators that seem to have the greatest influence on retention are local unit leadership and personnel management. The most volatile and attrition-prone group is made up of reservists who have served four years or less, and little is known about how to lower their attrition rate (Merritt and Boykin).

- o Among members of naval reserve aviation squadrons, non-pecuniary factors--pride in unit and patriotism--play an important part in retention. The retirement program is also a strong motivator. Navy pay, net income from other sources, and perceptions that a civilian job can be found that uses naval reserve skills do not affect intentions to stay or leave (Miller and Schumann).

- o While early attrition from army reserve components is high--from 30 to 40 percent of army reservists leave within two years--net losses to the military are tempered because about 15 percent of attriters later enlist in the active force or return to a reserve unit. As in the Navy's Selected Reserve, attrition is higher among young members in army units because they are in the primary age group for experiencing the turbulence generated by job changes, marriage, and residential moves (Grissmer and Kirby (b)).

Training

- o Case studies of Army National Guard units that participated in intensive simulated combat exercises at the National Training Center (NTC) resulted in many new insights into recruiting, retention, training, and readiness. Preparation for NTC, or "train-up," took up to a year of extraordinary training at all levels, to the extent that many NCOs and officers did not see their families on weekends for months at a time. Both train-up and NTC experiences were perceived as successful, both in terms of individual motivation and as catalysts for new policies that led to

improved retention and increased readiness. The exercises also highlighted many attractive opportunities for additional research on guard and reserve activities at NTC (Nogami and Grissmer).

- o Activation and deployment of the U.S.S. New Jersey in 1984 provided an opportunity to observe the training effects on the reservists who volunteered to serve on the ship. The performance of reservists on the battleship, and of those in reserve air squadrons who provided logistic support, was reported an "unqualified success" (Traxler and Zajkowski).

- o A "training evaluation and feedback" system for the Navy's Selected Reserve is being implemented; it will provide badly needed quality control of reserve training (Sheffield). Training research that has concentrated almost exclusively on the active-duty navy has produced many outcomes that are transferable to the training of the part-time personnel who make up the reserve force; for instance, instructional design and methods for assessing instructors' expertise (Van Matre).

- o The services train their reserve and active components under similar conditions and with similar methods. But reserves have much less time available than their active counterparts, and many reserve units are remote from the facilities needed to do effective on-the-job training. Further, there are some military skills that require more training than it is possible to provide under reserve drill schedules (Simms and Greenberg (a)).

- o Members of the Individual Ready Reserve (IRR) have special retraining requirements, but there is little in the scientific or military literature that is applicable. As a first step toward building an IRR retraining program we need baseline information on individuals' skill levels. The services also need to develop retraining options and estimates of the extent to which individuals would participate if retraining were offered. Some skills may require more training than it is possible to expect of IRRs; those skills should be taken out of the IRR inventory. (Bodilly; Wilson and Engelage).

Individual Ready Reserve

- o The extent to which the nation's half-million IRRs would respond in a mobilization is unknown. Two overriding issues are: a) the poor quality of personnel data maintained by the services on their IRRs, and b) motivational factors--that is, expectations, perceptions, and experiences that affect an individual's propensity to report when called. A sense of camaraderie and belonging is as important for the IRR as it is for other categories of military people, both active and reserve (Wilson and Engelage).

- o A study of skill deterioration and retraining needs among IRRs in 16 critical navy occupations concluded that skills tend to deteriorate in inverse relationship to how closely an individual's civilian work resembles

his navy rating. In most of the occupations studied, however, there was no compelling need for a major retraining program beyond a brief familiarization period following mobilization. Exceptions were found in some specialties, and, for them, retraining should be mandatory at three-year intervals (Hall).

Active/Reserve Mix

- o A decision process for improving active/reserve force allocations was proposed. The process involves subjective evaluations of active and reserve capabilities, a three-step decision logic that considers specific missions and constraints (e.g., legislative rules), and a summarizing display of tradeoffs between capabilities, costs, and risks (Simms and Greenberg (b)).

- o In supporting a greater reliance on reserve forces because of its apparent economies, Congress has cited comparisons of U.S. and foreign navies. A re-examination of the nature of most non-U.S. naval reserve forces showed that when definitional problems are resolved and actual roles and missions are taken into account, the U.S. naval force mix no longer seems out of line (Domabyl, Qvester, and Sicilia).

Cost Comparisons

- o Active and reserve unit comparisons in the Navy typically favor the latter, chiefly because: a) Most reservists are pretrained (although the Sea Air Mariner program adds significantly to acquisition and training costs); and b) a lower operating tempo and more restrictive deployments favor reserve budgets. But when support, site, and other factors are considered, the differences between active and reserve costs are less striking and may even reverse when large portions of the active fleet are transferred to the reserves (Feldman).

- o Annual operating and support costs of comparable Marine Corps reserve and active units are much lower for the former. But start-up costs for new reserve units, incurred when missions are transferred from active units, partially offset the savings of using part-time components. Further, there can be serious negative consequences for military capability, depending upon the particular transfer option chosen (Kostiuk and May).

- o Annual recurring operating and support costs of comparable active and reserve units vary widely, depending on the type of the unit. Capital-intensive units (e.g., those operating aircraft or ships) have less potential for saving than labor-intensive units (e.g., infantry battalions). Non-recurring costs associated with reserve component unit changes also vary widely, depending on the circumstances of the specific unit change (Schank).

- o In estimating the costs of changes in the active-reserve balance, analysts rarely specify costs of concomitant policy changes; nor are other assumptions systematically included. The use of "unit transaction accounting" procedures addresses both deficiencies and results in more accurate estimates (Gotz).

Research Data and Procedures

- o The Defense Manpower Data Center (DMDC) maintains several reserve personnel data files that are useful to manpower managers, policy people, and analysts. Among the available files are the Reserve Component Common Personnel Data System, reserve cohort files, and the "prior service military available" file. Looking to the future, the quality of reserve personnel data is improving and the number of data elements is increasing (Brandewie).

- o Procedures used for strategic force planning pay minimal attention to the reserves. For example, there are severe shortages of medical and construction ratings in the Naval Reserve. The services should design their reserve policies around the most economical ways to perform missions (Horowitz).

- o A "reserve forces projection model" that can be run on any standard desktop PC provides fast responses to questions about a range of behavioral and policy assumptions and how they affect reserve manning. The model provides text, graphs, and tables and will soon be available for use by non-RAND researchers (Eisenman, Grissmer, and Kawata).

Social and Psychological Factors

- o Participation in the reserve is an example of an "ephemeral role," i.e., a temporary or ancillary position that meets needs that are incompletely satisfied by regular or dominant roles. (Dominant roles are associated with family or job.) Extensive surveys of naval reservists have shown that the highest role-related satisfactions were comradeship, relations with supervisors, recognition for work, prestige, and pay; the last-named factor was a necessary but not sufficient reason for remaining in the reserve. The lowest elements of satisfaction were sense of accomplishment, level of responsibility, and quality of training facilities and equipment. The voluntary nature of reserve participation underscores the importance of satisfaction; "if they don't like it they vote with their feet." Moreover, reserves are an important (and sometimes the only) bridge between the civilian and military sectors of a community (Zurcher).

R&D on Air Force Reserves

o The Air Force has planned a program of research and analysis that will investigate a number of reserve manpower issues; optimal personnel quality, the merits of indefinite terms of enlistment, criteria for promotion, formal training programs vs. OJT, pay and bonuses as enlistment and retention incentives, and the merits of an "automated legislative tracking system" that would determine whether reserve personnel are being hurt by the personnel system and what needs to be changed (Barr).

Research and Analysis: A Brief Agenda

This section contains a list of questions that came up during the meeting and that we believe are candidates for further inquiry. They have not been judged against criteria of feasibility, risk, payoff, or relative importance. After the questions is a second list: actions that we feel should be taken without further research or analysis. We present both of these lists as points of departure for those interested in addressing, more comprehensively than has been done, reserve manpower, personnel, and training issues.

Questions

Why are there regional differences in reserve units' ability to meet endstrength? How can pay, bonuses, or other incentives be used to improve supply in traditionally low areas?

To what extent does undermanning affect readiness in a reserve unit? Do "equal decrements" in manning translate to "equal decrements" in readiness? How does the type of unit that is undermanned affect readiness?

What are the root causes of high personnel turnover, particularly among those who have served for less than four or five years? (Very little is known about the experiences, attitudes, and intentions of naval reservists in that category.)

Why has turnover in the Army Guard increased with an increase in the quality of recruits?

Are there optimal recruiting strategies for different kinds of reserve units? Do bonuses work in some cases but not others? Are reserve force members themselves good recruiters? When should they be used rather than the professional recruiting force?

Given the evidence that non-pecuniary factors--e.g., unit esprit, friendship, recognition--are incentives to remain in the reserve force, how can the services exploit those findings?

What are the characteristics of civilian jobs, full- and part-time, that affect the performance of reserve units?

Given that we need better methods for projecting personnel attainability under different reserve manning policies, should new models include occupational information, pay changes, and/or skill requirements?

What are the long-term effects of intensive reserve training experiences, e.g., National Training Center exercises? What are the impacts of that type of training, and the preparation for it, on reservists' families and jobs?

What are the attributes of an optimal reserve unit training evaluation system?

How should a new training model for the reserve components differ from the standard, active force approach? (Reserve training has to take into account the limited time available, difficulty of access because of remoteness, and special training device requirements.)

What are the best ways to retrain IRRs? How often should retraining be required? What are the costs of different retraining options?

How does the "ephemeral" NR role fit in, or conflict with, the dominant roles required by family and job obligations? To what extent are reservists constructive brokers between the civilian and military communities?

Actions

Build a reliable personnel data base for IRRs: e.g., current address, physical condition, skill level, etc.

Learn more about how military skills deteriorate over time; cover at least six years beyond active duty.

As steps toward enhancing the motivations of IRRs: determine employer attitudes toward released time, and establish the types of incentives necessary to keep individuals interested in maintaining their skills.

Initiate multi-method, multi-disciplinary research on reserve manpower using qualified reservists or investigators.

A HISTORICAL PERSPECTIVE AND A VIEW TO THE FUTURE

Anthony J. Megna
Staff of Chief of Naval Operations

The following is a direct quote from the Secretary of the Navy, John Lehman:

"The Naval Reserve today is entering a new phase that is truly historic. After years of postwar talk about the integration of the Naval Reserve as a part of the total force, we are now four years into the process of making this a reality in every way. More and more we're seeing the Naval Reserve help carry the load and take on the responsibilities the President has given to the Navy all around the world."

In order to more fully appreciate this statement it is necessary to understand how the Naval Reserve has arrived at its present position, where it is today, and its planned future growth.

SELECTED RESERVE END STRENGTH

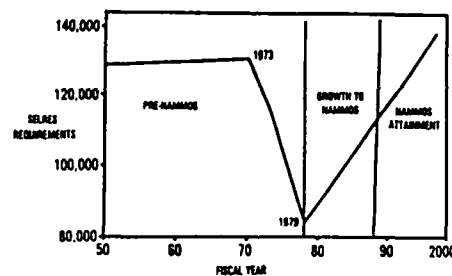


FIGURE 1

Though the Naval Reserve can trace its history back to 1916, my discussion today will center on the period covering 1950 through the 1990's - During that span three distinct periods stand-out: Pre-NAMMOS; growth to NAMMOS; and NAMMOS attainment. NAMMOS is the acronym for the Navy Manpower Mobilization System which was established in 1979 and is the foundation of the Naval Reserve's resurgence. I will discuss NAMMOS in greater detail as we go along.

The pre-NAMMOS period encompassed the years 1950 through 1978. The Naval Reserve's Selected Reserve end strength was fairly stable at 129,000 during the 50's, 60's, and early 1970's. (Figure 1)

SELECTED RESERVE = SHIP/SQUADRON MANNING DOCUMENT - BILLETS AUTHORIZED

(SR = SMD/SQMD - BA)

FIGURE 2

This end strength was derived on the ship and squadron side by utilization of the formula: SELECTED RESERVE = SHIP/SQUADRON MANNING DOCUMENT - BILLETS AUTHORIZED (SR = SMD/SQMD - BA) and on the shore side by a highly subjective determination of need by shore-based units. (Figure 2)

About 1974, the Navy made a conscious decision to meet increasing ship and squadron manning requirements with active duty instead of Selected Reserve personnel. There were many reasons for this policy with the "reduced manning"¹ concept of new construction ships being a major factor. Predictably, this policy of "buying to SMD/SQMD" resulted in a sharp decline in Selected Reserve requirements and prompted an OSD inquiry into the valid size of the Selected Reserve. A 1975 CNO staff study conducted by the DCNO for plans and programs commonly known as the "OP-605 Study" validated a Selected Reserve strength of approximately 105,000. This study did little to deter OSD which submitted a FY-78 budget which called for an end strength of 52,000. Congressional support raised that requirement to 83,000 along with direction to more fully integrate the Naval Reserve into the total force. Continued pressure from both OSD and Congress to obtain a system to determine the required size of the Selected Reserve resulted in the establishment of NAMMOS in 1979. NAMMOS did not change the original formula for determining Selected Reserve requirements on the ship and squadron side which accounts for approximately 16% of the total Selected Reserve. It's greatest impact was in the institutionalization of a standing body which screened each request for Selected Reserve manpower from the shore establishment. This system remains intact today and will continue until the shore establishment has the equivalent methodology which resulted in ship and squadron manning documents.

1

"reduced manning" ...new ship classes such as DD-963, FFG-7 and LHA were designed with fewer manpower requirements based on a change in maintenance and other manpower intensive policies to save on cost.

Though the downward spiral of Selected Reserve end strength ended in 1979 with the inception of NAMMOS, it wasn't until the arrival of Secretary Lehman in 1981 that the Naval Reserve embarked on a course to have SELRES end strength match NAMMOS requirements. This is the growth to NAMMOS era with attainment programmed for FY-88.

SELRES GROWTH

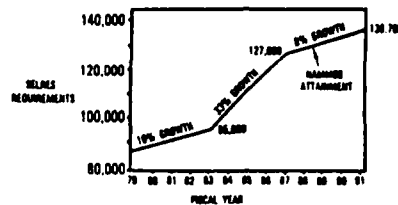


FIGURE 3

We are currently in the middle of the steepest ramp of the programmed growth of the Naval Reserve from 1979-1991. (Figure 3)

END STRENGTH VS NAMMOS

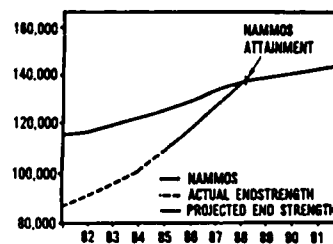


FIGURE 4

The significance of the growth can be seen when the actual FY-81 end strength is compared to FY-81 NAMMOS requirements (though NAMMOS grows approximately 20,000 billets, inventory must grow 49,000 people). (Figure 4)

ENLISTED SELRES HISTORICAL TURNOVER RATES

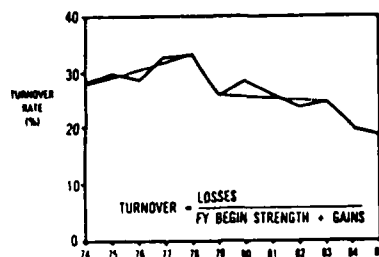


FIGURE 5

When the turnover rate is factored into the equation, the number of accessions necessary to attain NAMMOS by FY-88 is staggering. Shown is the historic turnover rate of the Naval Reserve over the past eleven years. A turnover rate rather than a retention rate is used because Naval Reservists are volunteers and cannot be tracked by reenlistment as we do on the Regular Navy side.

FY-86 RECRUITING GOALS

SAM PROGRAM -	10,000
ACTIVE MARINERS -	5,600
NAVETS/OSVETS -	16,000
APG	<u>2,000</u>
	33,600
TURNOVER 20% -	22,200
GROWTH -	<u>7,300</u>
	29,500

FIGURE 6

Figure (6) shows the actual accessions necessary to attain a net growth of 7,300 people, the FY86 planned growth. These facts among others were presented to Navy decision-makers in early 1984 in the Naval Reserve's first-ever baseline area appraisal (BAA). With the assistance of the Center for Naval Analyses (CNA) projection model, the Director of Naval Reserve was able to present the required programs necessary to attain NAMMOS within the secretary's desired time frame. More importantly the BAA uncovered many far-reaching impacts on the Naval Reserve if the Navy were to continue its active/reserve mix policy.

END STRENGTH % OF FORCE		
INVENTORY	FY-84	FY-91
E1-E4	38%	51%
E5-E9	62%	49%
PROS	CONS	
• YOUNGER FORCE	• LESS EXPERIENCED	
• MEETS REQUIREMENTS	• INCREASED TRAINING	
	• COST MORE	
	• HIGHER TURNOVER RATE	
	• FEWER VACANCIES FOR VETS	

FIGURE 7

Figure (7) highlights what the BAA uncovered and what direction we are now headed.

As you can see, the Selected Reserve inventory in FY-84 was heavily weighted in the E5 to E9 paygrades. This is a direct result of the veteran's pool being comprised mainly of E4 and E5 petty officers. However, the majority of Selected Reserve requirements were in the E1-E4 Petty Officer group. Substitution criteria had enabled the Naval Reserve in the past to meet these junior requirements with more senior petty officers. However, when the Secretary of the Navy made the decision to attain NAMMOS and was briefed that the majority of the requirements were E1-E4 and that the veteran's pool could not provide sufficient numbers, he approved the SEA/AIR MARINER PROGRAM (SAM) at the start-up rate of 10,000 per year to provide the necessary people. Continuing this policy would result in a FY-91 inventory which would have 51% of the Selected Reserve inventory in the E1-E4 paygrades. Though we would have a younger force which would meet NAMMOS requirements, that force would be less experienced, require more training, cost more, have a higher projected turnover rate and leave fewer vacancies for returning active duty veterans. The BAA asked the question "Is this what we want?"

During the period 1984 to 1986 various Navy working groups wrestled with that question, each with varying amounts of success as divergent program policies collided. However, in the past two months an active/reserve mix working group convened by CNO was able to formulate a reserve policy which was acceptable to all concerned.

Signed into effect during the past three weeks, it defines a different approach to mobilization for ship and squadron augment units and raises the Selected Reserve requirement out of the junior (E1-E4) and into the senior paygrades (E5-E9). Without

going into detail it basically answered the question put forth by the 1984 BAA by stating that a junior less experienced force is not what we want, especially in ship and squadron augment units. The Naval Reserve should fully utilize the talent available in the veteran's pool and the SAM program should only provide those personnel for which there are not sufficient numbers in the veteran's pool. Changes are now underway to adapt the mobilization system to real world scenarios and should be in place during FY-88. Basically, one-half of the ship and squadron augment units were removed as mobilization requirements for the Naval Reserve and replaced by shore-based active duty personnel. The Naval Reserve would then back-fill those vacated shore billets with petty officers.

With those decisions made, the NAMMOS attainment period though not without some major hurdles to overcome, now presents a much brighter picture. With knowledge that the Naval Reserve can look forward to a senior, more stable, and more readily available force, the emphasis can shift to the areas of training and retention. The dark cloud on the horizon as we enter into the NAMMOS attainment period is sustaining what we have attained and meeting future growth requirements.

Already predictions are being made that as it becomes economically and politically more difficult to support active duty end-strength increases, the Naval Reserve will be called upon to grow even bigger.

When Secretary Lehman made the historic decision to attain NAMMOS by FY-88, the NAMMOS requirement stood at approximately 125,000. Today less than 5 years later, NAMMOS has grown to approximately 137,000. Not only is the growth significant but what that growth entails is more dramatic - on the shore requirements side hospital corpsman and construction force ratings continue to grow and on the ship and squadron side skilled technicians which are unaffordable on the active side become increasingly critical as Selected Reservists. Can the Naval Reserve meet these challenges? I cannot predict an answer to that question today but the lessons learned during the past five years as we have strived mightily to attain the original NAMMOS level will do much to make our task easier. All parties concerned, the Navy, OSD and the Congress now know that total force is more than a catchy phrase and must be supported by programs, policies, and funding to be able to achieve its goals. The journey has been exciting so far but the future holds even more excitement and more importance in the overall defense of our nation.

TOTAL FORCE INTEGRATION

James M. Patton
Office of Chief of Naval Operations

Over the last three years the United States Navy has developed a program aimed at the complete integration of the Active and Reserve components of the Navy's Total Force. This "Active/Reserve Mix" program is in step with the growth of the Navy's force structure toward the goal of 600 ships and is consistent with the Navy's Maritime Strategy. Progress on the program is reported annually to the Congress in accordance with a congressional mandate. These reports are prepared by the Active/Reserve Mix Branch of the Office of the Chief of Naval Operations and they detail the missions and equipment being introduced into the Naval Reserve as well as the process of integrating the components.

The main emphasis of the Navy's integration effort is on manpower. Analytical methods have been designed with the assistance of the Center for Naval Analyses to determine the share of the Navy's responsibilities which should be borne in peacetime by part-time naval personnel. The fundamental Navy responsibility is preparation for a protracted conventional war involving the national mobilization of manpower and other resources. Analysis, supported by experience, indicates that the pre-trained manpower required by the Navy during at least the initial phases of such a war is greater by 20% to 25% than the peacetime requirements for full-time personnel. This establishes the size of the Navy's Selected Reserve which is composed of part-time naval personnel whose principal peacetime task is to train for preplanned wartime/mobilization assignments. A small number of full-time Naval Reserve personnel are assigned the primary peacetime duty of training and administering the Selected Reserve (hence, the term "TARs"). As Figure 1 indicates, the Selected Reserve and its associated TARs constitute less than 9% of the whole Navy Total Force, but are equal to about 25% of the Active component.

NAVY TOTAL FORCE

1572,539

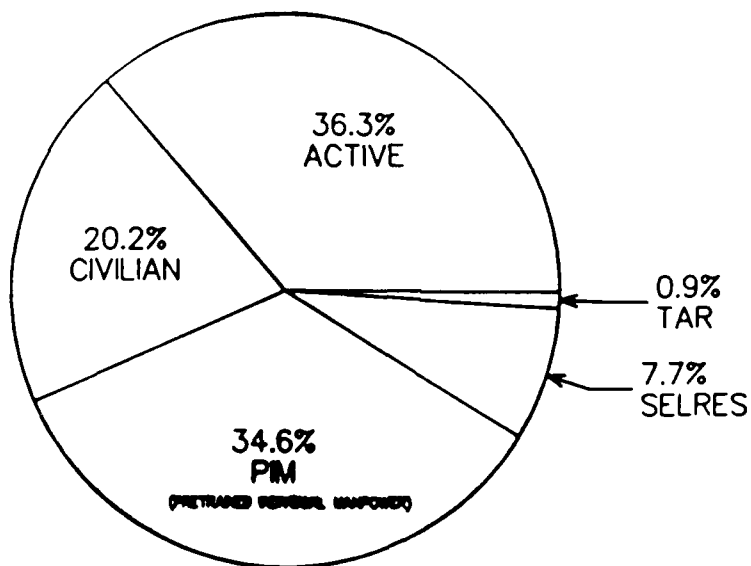


Figure 1

Figures 2 and 3 indicate the growth in end strength for the Active and Selected Reserve components respectively, as well as the distribution of personnel currently assigned.

ACTIVE COMPONENT DISTRIBUTION

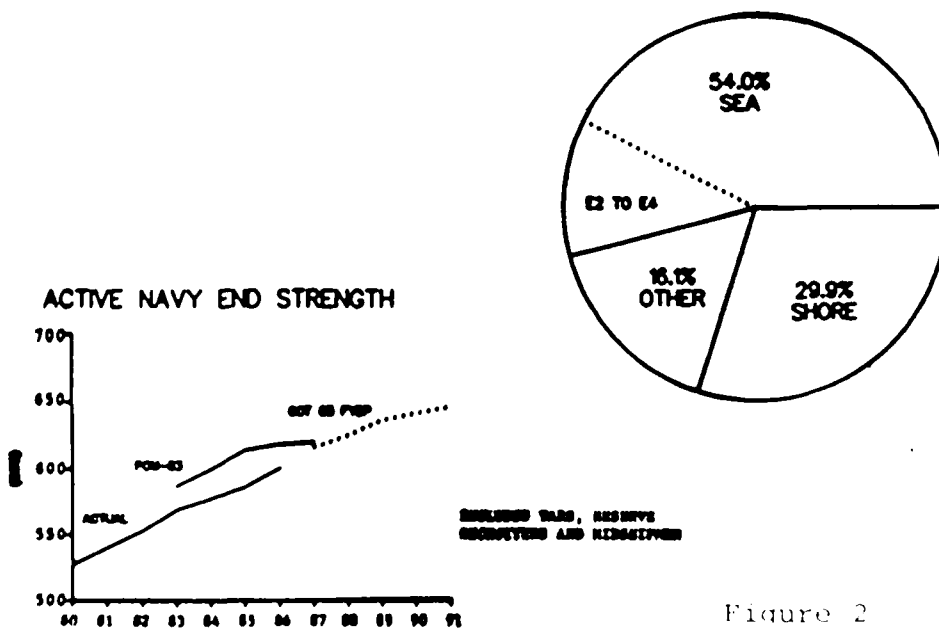


Figure 2

RESERVE COMPONENT DISTRIBUTION

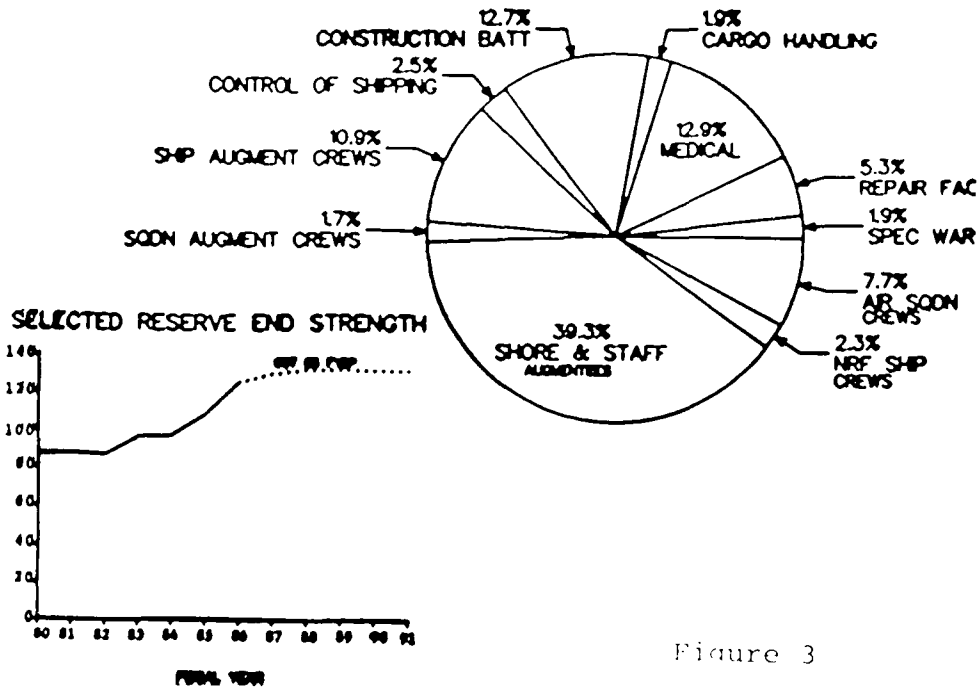
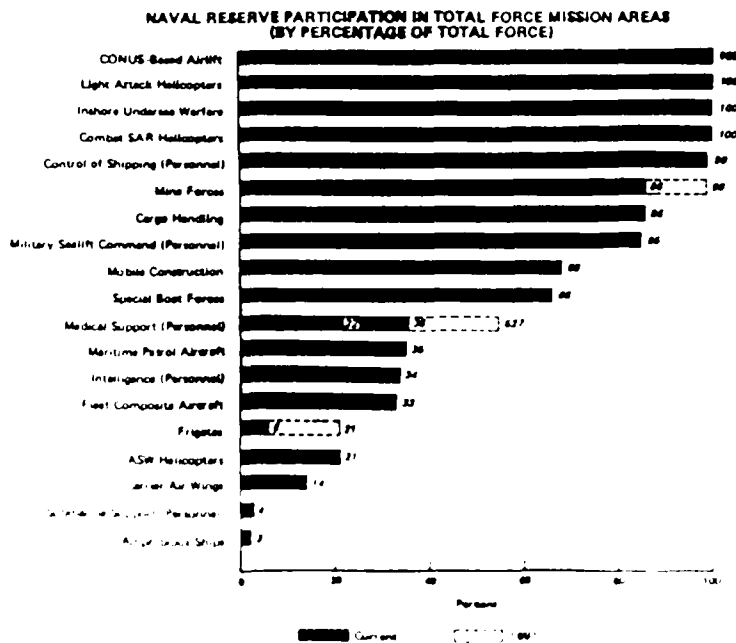


Figure 3

Although the emphasis of the Active/Reserve mix effort is on manpower, it is essential to plan the assignment of missions and equipment to the Selected Reserve carefully in order not to preclude a full spectrum Navy response to any non-mobilization contingency. Figure 4 indicates the percentages of Selected Reserve participation in the Navy Total Force missions. These Reserve contributions are under continuous review and changes are reported annually to the Congress.



The sources of initiatives for changing the Active/Reserve mix, the methods of making changes, and the process involved are noted in Figure 5.

• **SOURCES OF ACTIVE/RESERVE MIX INITIATIVES**

- MARITIME STRATEGY
- OPNAV SPONSORS/PDRC
- WARFARE APPRAISALS/CPAM'S/CEB'S
- RESERVE BOARDS/ASSOCIATIONS

• **METHODS FOR CHANGING ACTIVE/RESERVE MIX**

- TRANSFERS WITHIN TOTAL FORCE
- ADDITIONS TO TOTAL FORCE
- SELECTIVE MODERNIZATION

• **PROCESS FOR CHANGING ACTIVE/RESERVE MIX**

- PDRC REVIEW
- POM PROCESS
- EXECUTABILITY ANALYSIS

Figure 5

Within the mix process, executability analysis plays a key role. The core of this "go/no-go" analysis is a decision logic which tests each initiative according to three criteria: Readiness, Demographics, and Cost. Only those initiatives that will not impact adversely on Total Force readiness, that can be supported by adequate sources of potential Reservists, and that will save funding will be executed by the Navy.

The Selected Reservist end product of the Navy's Active/Reserve mix effort is currently programmed to be as shown in figures 6 and 7.

PROJECTED NAVAL RESERVE (1991)

SEA FORCES

26 FRIGATES (FF/FFG)
1 DESTROYER (DD)
24 MINESWEEPERS (MCM/MSH)
4 AMPHIBIOUS SHIPS (LST/LSD)
4 SALVAGE SHIPS (ARS)
5 FLEET REPLENISHMENT OILERS (AO)

TOTAL: 64 SHIPS

SHORE/SUPPORT FORCES/FACILITIES

13 CARGO HANDLING BATTALIONS (CHB)
19 MOBILE CONSTRUCTION BATTALIONS (MCB)
28 MOBILE INSHORE UNDERSEA WARFARE UNITS
22 CRAFT OF OPPORTUNITY UNITS (COOP)
4 SPECIAL BOAT UNITS
2,500 REINFORCING AND SUSTAINING UNITS
219 NAVAL RESERVE CENTERS
18 NAVAL RESERVE FACILITIES
6 NAVAL AIR STATIONS
2 NAVAL AIR FACILITIES
7 NAVAL AIR RESERVE (AREA)
8 NAVAL AIR RESERVE CENTERS

Figure 6

PROJECTED NAVAL RESERVE (1991)

AIR FORCES

2 CARRIER AIR WINGS
4 FIGHTER SQUADRONS (VF)
4 STRIKE FIGHTER SQUADRONS (VFA)
2 MEDIUM ATTACK SQUADRONS (VA)
2 CARRIER AIRBORNE EARLY WARNING SQUADRONS (VAW)
2 TACTICAL ELECTRONIC WARFARE SQUADRONS (VAQ)
2 PATROL AIR WINGS
13 PATROL SQUADRONS (VP)
1 HELICOPTER AIR WING
2 HELICOPTER COMBAT SUPPORT SQUADRONS (HCS)
2 HELICOPTER ANTISUBMARINE SQUADRONS (HS)
3 HELICOPTER ANTISUBMARINE SQUADRONS (HSL)
2 HELICOPTER MINE COUNTERMEASURE SQUADRONS (HM)
1 FLEET LOGISTIC SUPPORT WING
2 FLEET COMPOSITE SQUADRONS (VC)
12 FLEET LOGISTICS SUPPORT SQUADRONS (VLR)

TOTAL: 50 AIRCRAFT SQUADRONS

Figure 7

DETERMINANTS OF ARMY NATIONAL GUARD AND ARMY
RESERVE MANNING LEVELS

David W. Grissmer and Sheila Nataraj Kirby
The Rand Corporation

There are over 6,000 distinct Army National Guard and Army Reserve units located throughout the United States. Each unit has a particular function (such as infantry, combat support, administrative etc.) and a particular mobilization mission. Each unit is assigned an authorized manpower strength that is its peacetime manning goal; the ability to attain and maintain this strength level forms part of its readiness evaluation. Reserve units have been differentially successful in meeting these manning goals. These manning rates vary widely : from undermanning by more than fifty percent to overmanning by more than twenty-five percent.

While undermanning of units clearly represents a degradation of personnel readiness, the precise relationship between readiness and undermanning is hard to decipher. It is entirely possible that equal decrements in manning do not translate into equal decrements in readiness. For example, a unit whose manning rate declines from 1.0 to 0.95 may suffer less of a decline in readiness than a unit whose manning rate declines from 0.80 to 0.75. It may also be the case that undermanning of certain types of units may have considerably more serious implications for overall force readiness than equivalent undermanning in others (for example, combat versus administrative units).

Assuming that authorized strength levels are based on sound military judgement, it is clear that the highest level of peacetime personnel readiness will be achieved if all units meet their strength objective. As such, understanding the reasons for the differential success in manning becomes important for several reasons: to help achieve this goal through the proper use of recruiting resources (broadly defined to include recruiters, enlistment and reenlistment bonuses) and in deciding locations for new units. Current plans call for significant expansion of the Army Selected Reserve components; to ensure manning success, the location decision must take into account the factors determining such success.

There are approximately 3,000 Army National Guard and 3,000 Army Reserve units. The distribution of units by unit mission and size differs between the two components. Guard units have predominantly combat or combat-related functions whereas the Army Reserve tends to have more combat-support and general support functions. The Guard also tends to have relatively fewer small (authorized strength less than 40) and large (authorized strength greater than 160) units. Together, these units account for only 17 percent of all Guard units. In contrast, 17 percent of Army Reserve units are small and another 20 percent are large units. Compared to the Army Reserve, Guard units tend to be located in

smaller counties. The Guard also appears to be more successful in meeting authorized strength levels than the Reserve. In 1980, the average "percent fill", defined as operating strength/authorized strength, was approximately .90 for Guard units as compared to only .84 for the Army Reserve. Regardless of component, however, larger units appear to have a harder time meeting strength levels.

The present study analyzes the determinants of unit manning among approximately 2,400 Army National Guard and 2,200 Army Reserve units. While it has several important limitations, it offers some useful insights for policymakers dealing with issues such as location decisions for new units or allocation of recruiting resources. The study uses data on units' operating and authorized strengths and functions from 1980 (FORSCOM 1R tape) and county-level Census data from the 1980 Census matched by the county location of the units. This allows us to account for both unit-specific and locational characteristics in our analysis.

The actual manning level attained by a unit is the outcome of a complex interaction of several levels of decisionmaking. At one level, individuals decide to enlist or reenlist in the Reserves and their motivations will partially determine unit manning success. Reserve participation is primarily a secondary occupation. An individual's decision to enlist or reenlist in the Reserves is a function of several factors: demographic characteristics (age, sex, marital status), taste for military life, economic characteristics (predominantly civilian wage, hours worked on the primary job, and civilian employer's attitude), availability of other secondary jobs, and the level of reserve compensation, broadly defined to include both pay and benefits.

At the other end of the spectrum is the component which makes decisions regarding the authorized strength levels of units and their location. The location decision is important because of the presence of and potential competition from other units already in the area. If the component decides to locate a unit in an already saturated area, the likelihood of this unit achieving manning success is smaller; in addition, the overall manning levels of other units in the area are likely to be affected. The component also makes decisions regarding the allocation of recruiting resources including number of recruiters, enlistment and reenlistment bonuses. Earlier research has shown that supply is sensitive to these factors. The component can conceivably shift the supply curve for all units through the use of these resources or for particular units by targeting bonuses.

The component's policy on the permissible extent of overmanning will also strongly affect which units are likely to be demand constrained. A unit's demand for labor is basically dependent on the attrition experienced by the unit and the component's policy on overmanning. Supply to a unit depends on the competition among units, its function, and its own resources. The unit itself may have the ability to shift out of its own labor supply curve by adopting an aggressive policy of using its members as recruiters or of being particularly vocal in its demands on official recruiters. Earlier

surveys and other anecdotal evidence confirm the importance of both these factors.

In this analysis, we treat the component's location decision as exogenous; while this may not be entirely true, we believe this assumption can be justified on several grounds. We are dealing with cross-sectional data on units that have been in existence for at least one year; we also do not have any real evidence as to the factors affecting the component's decision to locate units in particular areas. Later research may well reveal that the location decision and the authorized manning levels assigned to units are not independent of each other, thus requiring a simultaneous equation estimation method.

The basic analytical model deriving from a consideration of these factors defines the "fill rate" (or percent fill) of a unit (operating strength/authorized strength) as a function of unit-specific characteristics (unit size or authorized strength, unit mission, competition among units) and location-specific characteristics (size and nature of the recruiting pool, economic and demographic characteristics, region/state, etc.). The empirical model was estimated using percent fill in 1980 as the dependent variable for the Army National Guard and Army Reserve separately.

Unit size and unit size squared were included as independent variables to allow for a nonlinear relationship between percent fill and size. Both were extremely significant in the regression: other things equal, larger units are harder to fill. We can offer some plausible reasons for this finding. Larger units may face diseconomies of scale in both recruiting and management. Part-time personnel may be less adept at managing larger units. Such units may also be characterized by poorer promotion possibilities, less camaraderie or some inherent disadvantage not captured by other variables. As expected, unit mission also has an important effect on manning: combat and combat-related units are considerably harder to man than service support units.

Several population variables were included in the analysis to capture different factors that might impact on manning. The size of the recruiting pool (proportion of population 16-34 years) and the proportion of veterans in this pool, the latter included to account for a possibly higher taste for the military, were both positively related to unit fill rates as expected. In all but one case, the effects were highly significant.

We had hypothesized that the size of the county and its growth rate over time would both have an impact on manning levels but the direction of these effects was theoretically indeterminate. Larger counties would tend to have a larger recruiting pool; on the other hand, the alternative job and leisure opportunities available to individuals were likely to be more numerous and diverse. Similarly, counties which were increasing rapidly would be likely to offer more civilian job opportunities; at the same time, the competition for these jobs was likely to be greater. In the analysis, we found that counties with faster growth rates tended to favor higher manning. For the Army

Reserve, larger counties did tend to have significantly higher manning levels.

The effects of economic characteristics of the county (measured by unemployment rate, average household income, and percent of labor force with a high school education) were all in the expected direction and strongly significant for the Guard. Higher unemployment as expected leads to higher manning levels and the effects are significant for both components. Higher unemployment would tend to increase both enlistments (as other job opportunities became curtailed) as well as retention. Higher income counties tended to have lower manning levels, as did counties with higher average levels of education.

We also found strong regional effects: the South tends to have relatively higher overall manning although the effects for the other regions is not consistent across components. State dummies were included for the Guard to allow for the effect of unmeasured characteristics or state policies and management; these effects varied widely across states and most were highly significant.

There are several caveats that must be mentioned regarding these results. This analysis is based on cross-section data for a single year, 1980. Considerable changes in Reserve policies have been implemented since then and our results may not hold in such a changed environment. Nevertheless, the analysis is useful in documenting the fact that unit manning levels are strongly correlated with the size and mission of the unit and several locational characteristics. A policy implication deriving from this analysis is that significant resources may be needed to offset these inherent differences in manning, and that careful assessments of location decisions are needed to ensure success in manning.

THE PART-TIME SOLDIER IN THE ALL-VOLUNTEER FORCE

William McNaught
U. S. General Accounting Office

Introduction

During the 1970's assigned strength in all components of the selected reserve had decreased 10 percent since the start of the AVF period. These declines were concentrated in the Army components which play a particularly critical role in any large mobilization. In FY 1979, the Defense Department introduced the use of bonuses and educational incentives at both the enlistment and reenlistment points for early deploying units and critical occupations in the selected reserve. Since FY 1979 the personnel strengths of the reserves have increased steadily. The Secretary of Defense [Weinberger, 1982, page III-169] has attributed these strength increases directly to the FY 1979 compensation initiatives. If true, this assertion implies that reservists are sensitive to increased pay levels and therefore that changes in the reserve compensation package are an effective management tool.

This paper analyzes the policies which the Defense Department has credited as significant factors in filling the manpower shortage in the reserve forces. This paper argues that the effectiveness of these programs has been overestimated--that reservists, particularly those without prior service, are not especially sensitive to pay incentives.

Modelling the Reserve Enlistment Decision

Most analyses of the decision to enter military service have been straightforward applications of the economic theory of occupational choice. These studies generally agree on the following list of variables as being important incentives or disincentives toward active duty enlistment:

1. The military wage
2. The civilian wage
3. The unemployment rate
4. The information available about enlistment opportunities (recruiting effort)
5. The population of eligible recruits
6. Draft pressure

In addition to these commonly used active duty enlistment variables, I identify some incentives which must be considered when studying reserve force enlistment behavior. These reserve specific variables are:

7. The wages of moonlighting jobs in the civilian sector
8. The average hours worked per week on the primary civilian job

Combining the two sets of variables yields the basic functional relationship tested in this paper. Because the data are for 1977, the draft pressure variable is omitted. This model is generally similar to that utilized by previous studies of reserve enlistments.

For the non prior service (NPS) analysis, I define reserve supply as the sum of enlistments in a state by Category I through III male high school graduates. For the prior service (PS) analysis, I sum all enlistments, male and female regardless of mental category or educational attainment. The exclusion of the "lower quality" recruits--NPS enlistees who score in Category IV, have not graduated from high school, or are female--is necessary to identify the system. Because the percentage of high quality NPS personnel entering the two air components and the Navy Reserve was relatively high during 1977, demand constraints may have limited even the number of high quality enlistments to these components. Therefore I concentrate my analysis on the behavior of reserve enlistees in the two ground components--the Army National Guard and the Army Reserve.

In constructing a measure of annual pay for both PS and NPS reservists, I assume that reservists attend all scheduled drills, 48 in number and a 15 day summer camp. I estimate that the average reservist earned \$864 in 1977. The reserve earnings variables included in the model are deflated by estimates of state price levels so that they are comparable to the value of time foregone through reserve service. To transform the estimate of annual reserve pay to a present value over the NPS enlistment term, I assume that annual growth rate in military pay to be 7.05 percent, the size of the pay raise received by all military personnel in October 1977. Because NPS enlistees spend the first six months of their enlistment undergoing full-time military training, the pay calculations are modified to include the full-time equivalent of pay received during this period. Because most PS enlistments are for a single year, in the analysis of PS enlistments, I ignore present value calculations and use annual pay estimates only.

Variations in the flow of information about reserve enlistment opportunities to eligible recruits would affect the observed rate of enlistments. Reserve enlistees probably gain most of their knowledge about reserve service from a friend already participating in the reserves. Consequently, I specify the information variable for recruiting effort as the proportion of reservists in the total state population.

Empirical Results

Of all the results presented in the paper, the most interesting are probably the values of the reserve supply elasticities implied by the coefficients in the regressions fitted to the model and data briefly summarized above. Table 1 below shows these elasticities. The table also compares these estimates to prior values cited in two other studies--by Bernard Rostker [1974] and by Robert Kelly [1979].

There are two possible reasons for the generally statistically insignificant elasticities for NPS enlistments observed in this study. (The only significant elasticity is for the Army reserve but that elasticity has a theoretically implausible negative sign.) First, the pay elasticities could, in fact, be large, that is, above 1. Rostker's study of Air Force Reservists suggested elasticities in this range. If this is the case, measurement errors in the pay variables used here might explain the small size of these elasticities. However, although the data used here are not as accurate as any analyst would like, they are comparable to the data used by Rostker in his work.

A second possibility is that the elasticities are, in fact, small. Although this conclusion conflicts with Rostker's results, it is consistent with both these results and those of Kelly. Also preliminary results of a social experiment testing the responsiveness of NPS reservists to reenlistment bonuses seems consistent with a low value for this elasticity.

TABLE 1. COMPARISONS BETWEEN ESTIMATES THE ELASTICITY OF RESERVIST ENLISTMENT SUPPLY							
Variable	National Guard		Army Reserve		USAFR Reserve ^a	DOD ^b	
	NPS	PS	NPS	PS	NPS	NPS	PS
Reserve pay	+0.11	+1.56	-1.94 ^c	+0.96 ^c	+1.30 ^c	+0.20	+0.35
Primary pay	+0.51	-0.36	-0.52	-1.08 ^c	-2.46 ^c	-0.20	-0.35
Secondary pay	-0.23	-0.24	-0.14 ^c	+0.03	N/A	N/A	N/A
^a Rostker [1974]							
^b Kelly [1978]. Formulation assumes reserve and primary pay elasticities are equal.							
^c Statistically significant.							

The nature of the PS supply elasticity is also uncertain. The three sets of results, all products of similar models and

at this time is that PS reservist supply is relatively more elastic than NPS reservist supply.

Policy Implications

If the reserve pay elasticity is small as these results suggest, other reasons besides the compensation incentives of FY 1979 must be sought to explain the turnaround in reserve strengths since that year. A better explanation for this increase lies in the sharp change in the composition of the reserve forces which occurred in FY 1979. Prior to FY 1973, virtually all enlistees to the reserve forces were heavily draft motivated. Because the typical reserve enlistment is six years, these enlistees, hardly disposed toward long military service, remained in the reserve forces through FY 1979. During this same period, the AVF by eliminating draft pressure also eliminated the reserve forces' prime recruiting source. In other words, from FY 1973 through FY 1979, the reserves suffered the worst of both worlds--low enlistments and low reenlistments.

After FY 1979, the reserves began to reap some of the same benefits of the AVF already being received by the active forces. Reenlistments increased sharply. Burright, Grissmer and Doering [1982] estimate that AVF reserve reenlistment rates are more than twice the draft-era rates. It is this increase in retention, predictable before the FY 1979 compensation incentives, which is the major force driving the increase in reserve strength levels.

As long as active duty forces are enlisting large portions of the 18 to 24 year old population, increases in reserve compensation sufficient to offset the greater attractiveness of active service may be prohibitively expensive. When the coming decline in the size of this age cohort is added as an enlistment problem, NPS enlistments do not appear to be a promising source for future reserve strength increases.

Although some estimates of the PS pay elasticity are nearly as low as the NPS elasticity, it does appear that PS personnel are more responsive to pay incentives than NPS personnel. Thus if reserve planners desire to increase enlistments through monetary incentives, PS enlistment bonuses appear to be the most promising policy option.

The lessons of these results for reserve force managers are not completely negative however. Other results of this paper provide some evidence that factors such as personal friendships, unit esprit-de-corps, and opportunities for social service could be important recruiting incentives. Capitalizing on these attitudes will certainly require some modification of present reserve enlistment programs and perhaps even require major changes in the reserve forces themselves. Such changes however may be necessary if large increases in reserve force levels are programmed.

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MODELING LOCAL MARKET POTENTIAL FOR THE U.S. ARMY RESERVE

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I. Introduction

I would like to discuss recent research undertaken here at the Naval Postgraduate School in conjunction with our work for the U.S. Army Recruiting Command. A major purpose of this effort is to develop a local market data base, which will provide a comprehensive profile of local geographical areas. These areas must be partitioned in such a way that they constitute natural marketing areas for the U.S.A.R. The data base will be used to establish the potential of each individual market to support new or existing reserve centers. The data base will be automated and will address the following issues:

1. Can indicators of market potential be devised to measure the ability of the market to support additional manpower authorizations at existing reserve centers, or to support locating new units (TPUs) in markets where none currently exist?
2. Can we identify and measure the demographic and economic characteristics most important in supporting reserve manpower authorizations?

Do the economic and demographic characteristics vary by the type of unit (medical, engineering, etc.)?

3. Can models be developed to forecast accessions (both NPS and PS) into TPUs from the local market area?

II. Characteristics and Structure of the U.S.A.R.

USAR selected reserve enlisted paid drill strength currently is 230,000, which is about one-fourth of total Army strength. The USAR accessed approximately 75,000 new members in FY1985. This production was accomplished with a separate recruiting force of 1717 AGR recruiters. Organizationally, there are over 4,000 reserve units located at the 1,000 or so reserve centers around the country. The nation is divided into 5 recruiting brigades, 56 battalions, 259 recruiting companies, and 1,964 recruiting stations.

The key geographical unit for Army Reserve recruiting and resourcing is the local market level. The importance of the local area is highlighted by the fact that about 40 percent of new accessions are non-prior service, which means they are drawn directly from the local labor market. Also, while the Army has an in-service recruiting program, many veterans return to their home areas and are then recruited by local USAR recruiters. Hence, the USAR must rely on the local labor market to produce a majority of accessions.

The importance of the local nature of reserve manpower supply is also underscored by the close proximity of members to their drilling sites.

Approximately 85 percent of Army reservists travel 35 miles or less to attend drill, and 95 percent travel 50 miles or less. Thus, the 'scope' of the market for reserve recruiting is very limited geographically.

The local nature of the market has been ignored in previous studies of reserve manpower supply, which have often used highly aggregated data, such as states. This creates biases because states do not constitute natural market areas nor are they used for reserve recruiting and management.

III. Components of U.S.A.R. Local Market Data Base

A. Market scope. Given the pattern of reserve membership, one definition of a local market would be the area circumscribed by a 35 mile radius from an existing reserve center. While these 'markets' would be the basic units of observation, most USAR data is collected at the zip code level. Thus, a market would encompass all zip codes located within a 35 mile radius of a reserve center. The reserve center itself is assumed to be located at the centroid of its zip code. An algorithm is then be used to determine all zip codes that lie in the pre-determined radius, and the zip code data aggregated to form the market data base.

While USAR data are based on zip codes, most Census and other conventional data sources are based on other jurisdictions, such as counties, cities, and SMSAs. To overcome this problem, we have constructed files that match any market area with its coterminous county, city, or SMSA. Thus, we can align the available census data with USAR market areas.

B. Data base components. The data base effort involves three elements: (1) Identifying relevant data and data sources: (2) Aligning data with the market area; and (3) Determining the impact of each factor on NPS accessions, PS accessions, membership patterns, and reserve unit fill ratios. The first task is to profile the local civilian labor market and to determine how demographic and economic factors impact on market potential and unit success. Previous analysts have stressed that reservists normally hold primary civilian jobs, and that serving in the reserves is a second, part-time job. Thus, we intend to determine the characteristics of the market that are most important in determining civilian part-time and second jobholding, and investigate whether these characteristics, in turn, affect reserve unit success.

The military factors include three measures of the qualified military available (QMA) population pool:

- (1) primary QMA, 17-21 years old;
- (2) secondary QMA, 22 to 29 years old; and
- (3) prior service QMA (17-29).

Competition is also an important factor in profiling accession rates and unit success. The competition may stem from several sources, including the Army Guard, other reserve components, the regular Army, or other services. The extent of the competition may, of course, depend on the type of unit since competition may be more intense when the units located in the same area are of the same type (e.g., medical), or contain similar occupational specialties.

Previous studies have pointed out that so-called military manpower "supply" studies are, in fact, often examining the result of the interaction

of both supply and demand factors. Thus, it is important to control for demand or mission in cross sectional studies of manpower supply because some areas may be demand constrained. We have attempted to control for mission by including the number of authorizations in the data base. This variable indicates the overall level of reserve manpower requirements for the area. An alternative method of controlling for demand is to omit observations from demand-constrained markets.

IV. Illustrative Results: A Supply Model

Equation [1] displays some preliminary results of estimating a manpower supply equation using the local market data base. There are numerous deficiencies in this estimation at this stage, and we present it only as an illustration of the type of model that can be estimated with this data base. The data are drawn from the 1983-1985 period.

$$\begin{aligned}
 \text{[Eqn. 1]} \quad \text{NPS} = & -4.56 + .703 \text{ REC} - .187 \text{ ACT} + .034 \text{ AUTH} \\
 & (4.33) \quad (24.41) \quad (4.58) \quad (2.42) \\
 & - .074 \text{ QMA} + .138 \text{ ARNG} + .346 \text{ UN} + .721 \text{ INC} \\
 & (3.86) \quad (5.32) \quad (12.29) \quad (6.92)
 \end{aligned}$$

$$\overline{R^2} = .58; F = 176.2; N = 895$$

Where,

QMA = primary military available population 17-21
 NPS = male non-prior service accessions per QMA population
 REC = USAR recruiters per QMA population
 ACT = regular army recruiters per QMA population
 AUTH = authorizations per QMA population
 ARNG = National Guard members per QMA population
 UN = unemployment rate
 INC = family income

The dependent variable in Eqn. [1] is the non-prior service accession rate, which indicates the "take" from the local market. All of the estimated coefficients are statistically significant. Since the equation is in logs, the coefficients are elasticities. The total population elasticity is given by $(1 + b_1 - b_2 - b_3 - b_4 - b_5)$, which is approximately +.25. While this is a fairly low population elasticity, note that the dependent variable is the accession rate, and the total elasticity takes into account the effect of population changes on all of the QMA-adjusted independent variables. Another noteworthy result is the very large coefficient on the number of USAR recruiters, and the negative coefficient on the number of regular army recruiters. The latter suggests that active recruiters do not complement USAR recruiters at least for NPS accessions.

Equation [2] displays the results of estimating a prior service supply model. The main difference between this and Eqn. [1] is that this equation uses the prior service military available in the local market as the population base. The population elasticity in this case is approximately +.02. While the number of USAR recruiters has a positive and significant effect on prior service enlistments, the number of regular army recruiters also appears to have a positive effect. That is, regular army recruiters appear to be complements rather than substitutes in the case of prior

service accessions.

$$\begin{aligned} \text{[Eqn. 2]} \quad PS &= -10.83 + .492 \text{ REC} + .303 \text{ ACT} + .006 \text{ AUTH} \\ &\quad (11.51) \quad (5.82) \quad (0.25) \\ &= .140 \text{ PSQMA} + .034 \text{ ARNG} + .480 \text{ UN} + 1.010 \text{ INC} \\ &\quad (4.71) \quad (0.96) \quad (11.15) \quad (6.13) \end{aligned}$$

$$\overline{R^2} = .81; F = 512.2; N = 828$$

where PSQMA is the male prior service population, and PS is male prior service accessions; REC, ACT, AUTH, and ARNG are adjusted by PSQMA.

V. Future Work

Future tasks on this project will involve extending the work currently underway. One issue we will continue to research is the geographical scope of local markets. In particular, we will investigate whether a circular market with a radius of 35 miles is the best single approximation to a USAR market area. Second, we hope to develop a more comprehensive index of competition from the other reserve components and from the regular service branches. In addition, we must also account for the fact that USAR market areas in urban areas often overlap. That is, a given reserve market area is often shared with other reserve centers. Third, we hope to develop improved measures of demand (mission) in the accession models. Fourth, we intend to investigate differences between the prior service and non-prior service local market. For example, are these markets segmented by age, sex, race, and educational status?

FORECASTING NAVAL RESERVE ENLISTED ENDSTRENGTH

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As the Naval Selected Reserve (SELRES) has continued its rapid expansion, the number and complexity of personnel issues has also grown. The need for a quick-response enlisted personnel strength projection model became apparent early in this decade when decisions were made to program SELRES endstrength to grow to Navy Manpower Mobilization System (NAMMOS) requirement.

CNA developed the Selected Reserve Growth Attainability (SRGA) model, a simple strength projection algorithm, to provide expected SELRES enlisted strength under alternative sets of policy variables (enlistment program goals, recruiter allocation, bonus authorizations, etc.). The model uses historical continuation rates and planned accessions by enlistment program and length of service to forecast enlisted strength over a six year period. The model can either be used to generate aggregate enlisted strength forecasts or specific rating (military occupational specialty) group projections; by varying the basic continuation and affiliation rates, the model can evaluate policy alternatives.

Model Description

The projection model forecasts enlisted SELRES personnel strength for up to six years. The SELRES inventory at any time, t , can be described as:

$$I_t = \sum_{k=1}^m \sum_{y=t-21}^t A_{ky} \prod_{j=0}^{t-y} C_{kj},$$

where k represents the various accession programs, A is the size of the accession cohort in year y (up to 21 years in the past; all cohorts with greater than 20 years of service are combined), and C is the annual continuation rate which varies by length of service and accession program. Historical values of A and C have been determined. In this model, the continuation rates are from the end of one fiscal year to the end of the next; the exception is when $j=0$. The continuation rate for $j=0$ is a partial year rate for new accessions.

Previous CNA efforts have developed data bases and calculated Selected Reserve affiliation and continuation rates (see, for example, references 1-3). Figure 1 shows SELRES continuation profiles by enlistment program and length of service.

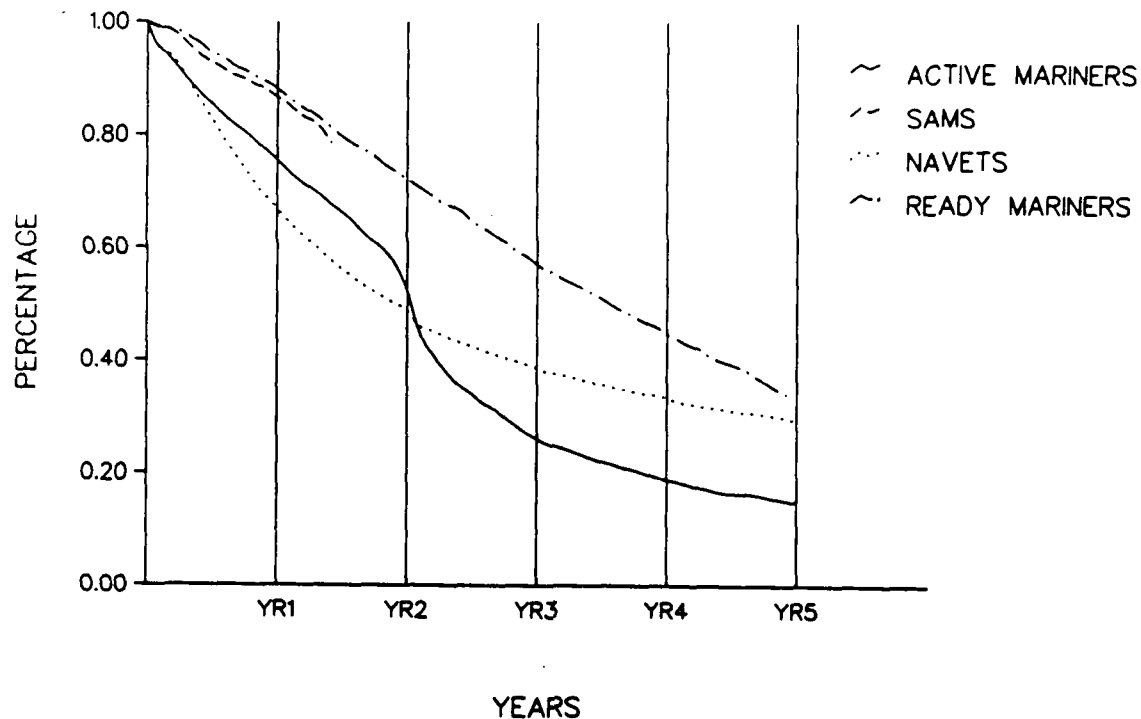


Figure 1: SELRES Continuation Profiles

Inventories can be projected for future years by assuming expected future accession levels and continuation rates (A and C) as follows:

$$I_{t+n} = \sum_{k=1}^m \sum_{y=1-21}^t A_{ky} \prod_{j=0}^{t-y} C_{kj} \prod_{j=t-y+1}^{t-y+n} \hat{C}_{kj} + \sum_{k=1}^m \sum_{y=t+1}^{t+n} \hat{A}_{ky} \prod_{j=0}^{t+n-y} (\hat{C}_{kj})$$

Econometric affiliation and retention models have attempted to relate A and C to underlying economic and demographic factors. If estimates of future continuation rates and accession levels can be related to underlying policy variables, then the model can produce forecasts of the inventory effects of various policy changes or other exogenous changes, such as the unemployment

rates. Past econometric studies to identify factors affecting SELRES affiliation and continuation have been hampered by data limitations. New efforts are now underway as data availability and quality have improved in recent years.

A number of issues have been addressed with the SELRES enlisted projection model. The rating-specific version has been used to identify future problem areas in meeting growth goals. Another example of the model's use is projecting the effect on SELRES future inventories of the Sea and Air Mariner (SAM) program.

Beginning in FY 1984, 10,000 non-prior-service recruits have entered SELRES annually through this program. Model forecasts show that continuing this policy over a six-year horizon will result in an enlisted force that is 25 percent larger (holding all other programs constant) and is projected to increase the proportion of junior personnel (pay grades E-1 to E-4) from 36 to 43 percent.

As the Naval reserve programs grow in strength and expand in role, the need for a methodological process of projecting personnel attainability as a result of policy differences becomes even more acute. The projection model described here is but the first major step toward reaching that goal. Occupational-specific differences in alternative civilian job opportunities, pay changes, and training and skill needs all must be more closely scrutinized for inclusion in the model. This involves not only an understanding of the policies of the Navy as they relate to SELRES, but also the climate in the civilian labor market and the recruiting postures of other military components and services.

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ESTIMATING THE EFFECT OF COMPENSATION ON
PRIOR SERVICE ENLISTMENTS BY GEOGRAPHIC AREA

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The size of the Navy's Selected Reserves has been increasing in the last three years and is programmed to increase even more in the future. The policy question the Navy faces is how to achieve its programmed growth in a cost-effective way. To answer this question one issue that must be analyzed is the effect of policy tools, such as Reserve pay and affiliation bonuses, on enlistments to the Reserves.

The goal of this research effort was to provide an accurate estimate of compensation effects on affiliations or enlistments by geographic and occupation area. To achieve unbiased estimates, one factor which must be considered is demand constraints. This issue is discussed in detail below and was incorporated into the analysis.

This research focused on prior service enlistments because the Navy has relied traditionally on its veterans to man the Selected Reserves. It also focused on geographic supply because Selected Reservists are civilians who live in specific geographic locations. Therefore, the Naval Reserves must fill their requirements, generally, by drawing on the civilian population in the area where the requirement is located.

The data used in this analysis were DMDC data on individuals who left the Navy between FY 1980 and FY 1983 and on individuals who joined the Reserves between FY 1980 and FY 1984. To facilitate the estimation of compensation effects, the data were grouped by geographic areas, defined as census regions, and was grouped into 24 occupation groups based on substitutability among occupations. These broad groupings facilitated the estimation because using more narrowly defined groups would result in too few observations which in turn would affect the accuracy of the estimates.

The supply model underlying the estimation process in the theory of why people moonlight or take second jobs. Joining the Reserves is one way individuals can moonlight. Variables which influence the decision to moonlight or join the reserves were included as explanatory variables in the estimation equations. These variables were income, family characteristics, and economic environment variables.

Schematically, the estimation approach was to estimate the probability that Navy Veteran in a specific geographic area and occupation group affiliates with the Selected Reserves. To get an unbiased estimate of the effect of bonuses and pay on this probability, demand constraints must be accounted for. Demand constraints refer to situations where in a given location, the Navy's requirements or demand for Reservists is very small relative to potential supply in the location. Observed enlistments will appear to be small. If one attributed the small number of enlistments to supply conditions rather than to demand conditions, the estimated supply probabilities will be biased downward.

Two demand constraints which are relevant to geographic and occupation specific affiliation analysis are local billet availability and the Navy's national recruiting management system, RAMOS. Under the RAMOS system, the Navy compares, using national data, the number of requirements in an occupation to the number Reservists in that occupation. For occupations that are overmaned, the RAMOS system directs recruiters to restrict entry into those occupations. For occupations experiencing shortages, RAMOS directs recruiters to allow entry in these occupations.

These demand constraints interact at the local area. RAMOS and local billet availability are compatible in a given area when local billets are vacant and RAMOS allows entry into the occupation or when there are no vacant local billets and RAMOS restricts entry into the occupation. These demand constraints are incompatible when there are no vacant billets and RAMOS encourages entry into the occupation or when there are vacant local billets and RAMOS restricts entry. When these incompatibilities arise, the situation is resolved by cross-assigning and reassigning Reservists. Recruiters can recruit reservists even when local billets are full by assigning them for mobilization purposes to units in other areas which have vacancies and by allowing them to train with the local unit. Recruiters who are faced with vacant local billets and a restraint, via RAMOS, on entry, can take individuals previously cross-assigned to other areas and reassign them to local billets.

The results, therefore, is that RAMOS always supercedes the local billet situation. Therefore, to eliminate the effect of demand constraints, observations on individuals whose occupation was restricted by RAMOS are deleted from the sample.

The effect of compensation on affiliation probabilities by occupation group was estimated using west coast data. The results were mixed. For many of the occupation groups, compensation effects were statistically insignificant. For a few others, the effects were negative and significant and for a few other groups, the effects were positive and significant.

One possible reason for the negative relationship between bonuses and affiliations is that bonuses were offered when Active Duty retention was rising. Individuals who leave Active Navy when Active duty retention is high tend to be individuals with a lower propensity to join the Reserves. Therefore, bonuses were being offered at the same time affiliation rates were falling.

One possible reason that bonuses had a statistically insignificant effect on affiliations is that the size of bonuses varies by occupations. Bonus size is directly related to the number of months an individual leaving Active Duty has left of his 6 year universal military obligations. For individuals who are on Active Duty for 5 or 6 years, the size of the bonus will be very small.

Another possible reason for the west coast findings is the limited time-series data used. As stated earlier, observations were deleted if they were demand constrained. For occupation groups which were demand constrained for most of the 4 years, the number of unconstrained observations was small. Estimates were therefore based on small sample sizes in some cases.

Finally, civilian income opportunities were included by using data on civilian earnings by month and state. To the extent that this does not capture Navy Veteran civilian opportunities, the Reserve pay variable (which was divided by civilian earnings) is measured with error and can therefore appear to have no statistically significant effect.

The implications for future research is to use longer time-series data, include active duty retention rates in the estimation process, and more generally, to include in the affiliation model the determinants of the pool of Navy Veterans. To the extent that active duty retention affects the size and composition of this pool, Reserve affiliations should be modeled in tandem with a model of the factors that influence Active Duty retention.

SOCIOECONOMIC STATUS AND TURNOVER BEHAVIOR IN THE
UNITED STATES NAVAL RESERVE

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A consolidation of four survey research projects conducted during the past decade presents a continuum of consistent findings related to Naval Reserve manpower issues. The central questions are how to recruit qualified individuals, and how to retain those who are making a positive contribution to the organization. It was found that Reservists of higher socioeconomic status tend to participate in the organization at greater levels than persons of lower socioeconomic status. Naval Reservists constitute a stable group which has the background to contribute responsibly to carrying out the mission of the Naval Reserve.

The most recent study was conducted in 1982 to determine what incentive package would encourage a reservist to exchange the comparative convenience of a Naval Reserve Center for the life aboard a Naval Reserve Force Ship. Because of practical considerations, it was decided to modify the procedures used in the earlier studies by introducing a multi-stage systematic probability sampling technique. From the population of male reservists with sea-going ratings 1,351 enlisted respondents were selected from 21 Naval Reserve Centers on the East Coast.

Two pilot studies and a national survey were conducted from 1974 through 1980. The 1974 West Coast Naval Reserve Study consisted of a structured, self-reporting questionnaire administered to 2,287 enlisted and 967 officers at sixteen reserve centers and four reserve facilities in San Francisco and Los Angeles, California. The 1979 East Coast Naval Reserve Study was administered to 1,834 enlisted and 336 officers at 11 Reserve Centers in Readiness Command Region SEVEN located in North and South Carolina and parts of Georgia. To obtain a more representative sample of the 87,000 members of the Selected Naval Reserve, the 1980 National Reserve Study was based upon a stratified random sample drawn from the personnel records in New Orleans. Questionnaires were administered to 1,057 enlisted and 464 officers. A comparison for the reasons for joining the Naval Reserve among enlisted personnel is presented in Table 1.

TABLE 1

COMPARISON OF THE REASONS FOR JOINING THE NAVAL RESERVE
AMONG ENLISTED PERSONNEL: WEST COAST STUDY (1974), EAST COAST STUDY (1979) AND
THE NATIONAL RETENTION STUDY (1980)

Reasons	Rank Order		
	National Study 1980	East Coast Study 1979	West Coast Study 1974
Drill Pay	1	1	1
Retirement Benefits	2	2	2
Patriotism	3	4	4
Training	4	6	6
Change of Pace	5	5	5
Social Contacts	6	7	7
Status	7	9	9
Influence/Authority	8	8	8
Mandatory	9	3	3

Sources: 1979 REDCOMREG SEVEN Survey, 1974 REDCOMS SFRAN & LOSA 1974 Survey.

In these studies it was found that most Naval Reservists are white, Protestant, married males with approximately two dependents. They are well-educated, have a good job, and think of themselves as either working or middle class. They are not alienated from their civilian pursuits, but instead they feel useful and are serious about their work. During a time when the relationship between citizenship and military service is fading, Naval Reservists show a sense of civic responsibility and express no hesitation about serving the nation in a time of crisis. Most reservists are strongly identified with the Navy as a subculture and rather like calling floors, "decks"; walls, "bulkheads"; and ceilings, "overheads." Although economic incentives are the main reason for initial enlistment and are necessary for retention, the decision to stay in the program is influenced dramatically by psychological variables such as job satisfaction and democratic leadership styles. Clearly participation in the Naval Reserves fulfills psychological, social, and economic needs that are not being met by the dominant role an individual plays in society.

Very few Naval Reservists (Officers and Enlisted) indicate that they do not intend to reenlist. On the contrary, most either hope to reenlist or definitely plan to reenlist. Socioeconomic status is a relevant factor in the reenlistment and participation decisions of Naval Selected Reservists. High socioeconomic status, which most often comes with age and experience, is an excellent predictor of retention. However, as Table two shows the main reenlistment problem is with younger reservists who have four years or less reserve experience. This cohort by its very nature has low socioeconomic status. Most of them are still working out their own identity and social status within the larger society. Naval veterans express the highest intentions to reenlist regardless of longevity.

A reservist's sociological condition is related to his attitude toward drilling aboard Naval Reserve Force ships. Length of service, seniority, marital status, and race are associated with a preference for an afloat billet. Reservists who remember their active-duty experience positively and who find their Reserve drill satisfying are those most likely to prefer an NRF ship assignment. Economic incentives are effective in persuading reservists to drill aboard ships. The addition of sea pay would raise the percentage of sailors willing to accept an afloat billet by 13 percentage points; and if a bonus of \$10.00 per drill was added to this, it would raise the percentage another 12 points. However, the degree of responsiveness to these incentives is conditioned by the attitudes of the reservist to the Navy.

Drilling reservists are generally motivated to maintain their affiliation primarily through sound leadership and management within the reserve unit. Economic factors in manpower planning research are easier to measure and therefore often the chosen path for useful research. Social-psychological factors are more difficult to measure but should not be overlooked simply because of expediency. In-depth longitudinal analysis utilizing questionnaire-based survey research techniques covering the initial five year period of a reservists experience could contribute substantially to explaining the variables associated with retention of reservists in the critical age cohort.

TABLE 2

RELATIONSHIP BETWEEN SELECTED SOCIAL VARIABLES AND THE INTENTION
TO REENLIST IN THE NAVAL RESERVE FOR ALL ENLISTED PERSONNEL
AND FOR THOSE WITH LESS THAN FOUR YEARS LONGEVITY

*Item							
	Total Number % (N)	Total Enlisted Reenlist		Gamma	Less Than Four Years Longevity Reenlist		Gamma
		Yes	No		Yes	No	
Sex							
Male	86% (1036)	74%	26%	.30	57%	43%	.39
Female	14% (178)	80%	20%		75%	25%	
Race							
White	86% (533)	66%	34%	.03	63%	37%	.04
Black	10% (65)	58%	42%		56%	44%	
Other	3% (20)	38%	62%		33%	67%	
Religion							
Protestant	47% (270)	72%	28%	.30	69%	31%	.30
Catholic	28% (163)	70%	30%		66%	34%	
Jewish	0% (2)	50%	50%		0%	100%	
Other	25% (142)	49%	51%		45%	55%	
Marital Status							
Single	31% (193)	45%	55%	.40	43%	57%	.44
Married	56% (347)	74%	26%		69%	31%	
Previously Married	11% (69)	72%	28%		74%	26%	
Other	1% (8)	75%	25%		71%	29%	
Dependents							
None	42% (259)	49%	51%	.40	47%	53%	.26
1	17% (107)	72%	28%		69%	31%	
2	17% (106)	78%	22%		72%	28%	
3	11% (70)	80%	20%		79%	21%	
4 or more	12% (75)	73%	27%		70%	30%	

ECONOMIC AND PSYCHOLOGICAL FACTORS IN THE RETENTION OF MILITARY PERSONNEL IN THE NAVAL AIR RESERVE

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The focus of this paper is on an empirical model of Naval Air Reservist retention. A model is developed that uses psychological and economic constructs, and that is estimated with data from two Naval Air Reserve units.

Model and Data

It is assumed that the individual faces an array of alternative choices (in the present context, remain in the Reserves or leave) and that the individual will select the alternative that results in the greatest satisfaction (in economic terms, individuals are assumed to maximize utility). Since it is unlikely that individuals have perfect information, it is also assumed that individuals acquire and use information efficiently.

The reservist has access to a large array of information from his experiences that he can use to determine if Reserve membership provides the state of greatest satisfaction. Potential influences on his decision may include information from physical, economic, social, political, and psychological aspects of life. Researchers tend to focus attention only on aspects drawn from their own discipline, however. Since the reservist chooses in a context devoid of disciplinary boundaries, we argue that models of his choice should be similarly blind to these artificial lines.

Economic models of occupational choice and of turnover emphasize that individuals seek to maximize their utility, not their income. Thus, these models recognize that workers consider both the pecuniary (including wages and benefits) and nonpecuniary (e.g., working conditions) aspects of their jobs. These models predict that compensating wage differentials will be associated with various job characteristics. This implies that to model retention requires measuring a large array of pecuniary and nonpecuniary job characteristics, which is difficult. In the model developed here, therefore, an indirect approach is used: it is hypothesized that measures of job satisfaction capture the individual's evaluation of the pecuniary and nonpecuniary characteristics of his job -- individuals who are more satisfied are more likely to stay. In addition, net pay from the Naval Reserves is included in the model as a direct measure of the pecuniary aspects of the job. Net income from other sources (including a civilian job, working spouse, and pensions) is also included. Perceptions of labor market opportunities is included because it is hypothesized that individuals who perceive favorable market opportunities are less likely to stay.

Sociologists and social psychologists have examined the importance of integration (i.e., participation in social relations) and have argued that individuals who are better integrated into the organization are more likely to stay. In our model, integration is hypothesized to influence

turnover by affecting satisfaction, which then affects the decision to stay or leave. Similarly, we hypothesize that the affect of normative beliefs and motivations to comply with the desires of relevant others influences turnover through satisfaction.

Psychologists argue that the best predictor of a person's future behavior is what he has done in the past. Thus, tenure (length of service) is included in the model. Tenure is a complex variable, however. Tenure not only reflects stability of membership, it also reflects the accumulation of human capital, some of which is specific to the organization. Tenure also captures deferred aspects of compensation, such as pensions, which are usually based on income and length of service. Since individuals can qualify for retirement benefits only after a period of service, it is further hypothesized that the affect of tenure on propensity to remain in the Reserves will be nonlinear, with propensity to remain reaching a maximum (other things being equal) as pension eligibility is reached.

A final construct domain is that of citizen obligations: the role of feelings of patriotism and concern for the security of the political state on retention. We hypothesize that citizen obligations, sense of patriotism, and identification with the military influence retention through their affect on satisfaction with the military.

The sample consists of members present at drill in two Naval Air Reserve Anti-Submarine Warfare (ASW) units. The analysis is restricted to 154 male Selective Action Reservists (SARs). Since no differences were observed between the two ASW units on the variables used, the two units are combined in the analysis. A full range of NECs were represented. All of the measures used in the analysis were collected in written surveys administered on base during drill time in summer 1981.

Results: Intentions to Remain

Four variables were designed to measure intentions to remain in the Naval Reserves: attitudes toward reenlistment, the likelihood of looking for a civilian job when the current enlistment expires, the frequency of thinking about leaving the Naval Reserves, and the likelihood of reenlistment. Maximum likelihood factor analysis was used to construct a single common factor from the four indicators of intentions to remain. The results of formal hypothesis tests using the factor analysis results are consistent with the four variables being indicators of a single latent variable: intentions to remain. This is the dependent variable for the analyses reported.

The results of the model of intentions to remain in the Naval Reserves are reported below. The estimated model accounts for 54.45 percent of the variance in intentions to remain.

The statistically significant results may be summarized as follows. Increases in education are associated on average with increased intentions to remain in the Naval Reserves, other things held constant.

Intentions to Remain in the Naval Reserves

Variable	Coefficient	Std. Error
Constant	-3.9344 ***	0.7505
Education (years)	0.0430 *	0.0260
Tenure (years)	0.0783 ***	0.0213
Tenure squared	-0.0023 ***	0.0006
Net Navy pay	-0.0006	0.0010
Net income from other sources	0.0001	0.0001
Other income missing (=1 if yes, =0 otherwise)	0.0246	0.2464
Perceptions of market opportunities	0.0488	0.1069
Overall satisfaction (Faces Scale)	0.5055 ***	0.1267
Interaction of market opp. and overall satis.	-0.0135	0.0193
Pay satisfaction (JDI pay and benefits scale)	0.0046	0.0081
Work satisfaction (JDI work satis. scale)	0.0166 **	0.0064
Supervision satisfaction (JDI supervision scale)	-0.0079	0.0052
Officer rank (=1 if yes, =0 otherwise)	0.0024	0.3072

F = 13.43 ***; R-SQUARED = 0.5445; * p < .10; ** p < .05; *** p < .01

Increases in tenure are associated with increases in intentions to remain, but at a decreasing rate. The estimated coefficients on tenure and tenure squared can be used to calculate that intentions to remain reach a maximum at 17.25 years of Navy experience. Given the length of service requirements to the Navy pension system, these results are plausible.

As expected, general satisfaction is positively related to intentions to remain. Also as expected, satisfaction with work, which captures the nonpecuniary aspects of the job, is positively related to intentions to remain.

Interestingly, Navy pay, net income from other sources, perceptions that a civilian job could be found that uses the skills that the individual has, officer rank, and the interaction of general satisfaction with market perceptions were all not statistically significant.

These results suggest that individuals, in deciding whether to remain in the Naval Reserves, take into consideration a broad range of things and do not simply focus on the Reserves as a source of income as the sole reason for being in the Reserves.

In order to identify better the reasons for staying or leaving the Naval Reserves, the survey asked respondents to consider a list of statements (e.g., "You have a good retirement program"). For each statement, the respondents were asked for two responses: to state whether they thought the statement was true or false, and whether the statement would cause them to stay in the Reserves, leave the Reserves, or not influence their decision. While detailed results are not presented in order to conserve space, several factors emerge as strong reasons for staying (in the sense that over seventy percent of those who felt the

statement was true also felt it was a reason for staying).

One factor that emerges as a strong reason for staying has to do with the nonpecuniary aspects of the job, including feelings of patriotism ("You have a job in which you can take pride"; "Serving your country"; "You have an interesting Reserve job"; "You get a feeling from your job that you have done something worthwhile"; "You have work that offers a challenge"; "You're doing work that is important for the country"). This confirms the conclusion that the nonpecuniary aspects of the job are important.

A second factor that emerges as a strong reason for staying is the retirement program ("You will receive retirement benefits"; "You have a good retirement program"). This confirms the conclusion that one pecuniary benefit that appears to exert an influence on the decision to stay is the availability of a pension. It is important to recall that the effect was nonlinear, with the "pull" exerted by the pension program reaching a maximum as pension eligibility is reached.

A possible reason for the statistical insignificance of the pay and income variables emerges from an examination of the reasons for staying or leaving responses. Responses to questions related to pay ("Your Reserve pay is low for the job you do in the Reserve"; "Your pay is more than could be earned on other jobs in this area"; "Compared to the time involved your pay in the Reserve is quite good") reveal that approximately half of the sample believe that their pay is low. Within this subgroup who believe that their pay is low, only approximately half (one-quarter of the overall sample) believe that that is a reason for leaving while the other half of the subgroup believe that it is not a factor. Within the subgroup who believe that their pay is not low, again only approximately half believe that this is a reason for staying while the other half of the subgroup believe that it is not a factor. Thus, pay seems to be an important factor for some individuals, but not everyone is in the Reserves only because of the cash it provides.

Conclusions

The results are consistent with the hypothesis that individuals consider both pecuniary and nonpecuniary aspects (including feelings of patriotism) of Naval Reserve life in deciding whether to stay or leave. This suggests that policy-makers have a wide variety of policy tools to influence retention.

One pecuniary aspect of the Reserves that appears to influence favorably the decision to remain is the availability of a Navy pension. This finding is not surprising given that pension eligibility requires a period of service. We recommend that any modifications to the pension system be made only after a careful review of the affect of those modifications on retention.

ATTRITION OF NONPRIOR-SERVICE RESERVISTS IN THE
ARMY NATIONAL GUARD AND ARMY RESERVE

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The Army Reserve and Army National Guard annually enlist approximately 70,000 individuals who have had no prior military experience. These nonprior-service enlistees receive full-time training to qualify them for a military occupational specialty (MOS). The return on this investment occurs as individuals serve their enlisted term (generally six years). The high rates of separation prior to the completion of the full term substantially reduces this return. The analysis of the FY80 cohort in a previous report (Grissmer and Kirby, 1985) showed separation rates during the first two years of 30.6 percent for the Army National Guard and 39.5 percent for the Army Reserve. These estimates, when extrapolated to the full six-year term under plausible assumptions, imply that only four in ten nonprior service Army Guardsmen and one in four Army Reservists will complete their contractual term of service. These high levels of separation caused much concern among military manpower planners, and triggered policies aimed at increasing the quality of nonprior service enlistments as a means of reducing attrition. These policies included increasing the number of recruiters, offering enlistment bonus payments and education grants, and targeting recruit quotas towards higher quality recruits defined as high school graduates and those in mental Category I-III.

The efforts to improve quality were quite successful, reinforced by the high rates of unemployment and poor youth job prospects that characterized the FY80-FY82 time period. The percentage of enlistees with high school diplomas increased from 68.2 percent to 71.2 percent in the Army National Guard and from 53.3 percent to 71.7 percent in the Army Reserve.

It is clear that to achieve the cost savings and greater unit readiness mentioned above requires that attrition actually decline as enlistment quality increases. Reality failed to keep pace with expectations and attrition rates actually rose for the FY1981-FY1982 cohorts for both the Army Reserve and Army National Guard. Attrition levels over the first two years rose from 39.5 percent in FY1980 to 46.7 percent in FY1982 for the Reserve, while the Guard attrition levels rose from 30.6 percent to 35.1 percent. Higher enlistment quality not only did not reduce attrition, but attrition actually increased significantly in the high quality cohorts.

Table 1 presents the two year attrition rates for the Guard and Reserve FY80-FY82 enlistment cohorts, disaggregated both by timing and the estimation of losses. The latter is particularly important when examining attrition from a total force perspective: transfers to the

Table 1
TWO-YEAR ATTRITION RATES OF ARMY NATIONAL GUARD AND ARMY RESERVE
FY1980-82 NONPRIOR-SERVICE COHORTS, BY TIMING AND DESTINATION OF LOSS
(In percentages)

Destination of Loss	Timing of Loss					
	FY80		FY81		FY82	
	Pretraining, training	Post- training	Total	Pretraining, training	Post- training	Total
ARMY NATIONAL GUARD						
Civilian Life/IRR	17.8	7.6	25.4	22.9	8.2	31.1
Selected Reserves	0.3	0.8	1.1	0.3	0.7	1.0
Active Force	0.7	3.4	4.1	0.6	2.4	3.0
Total	18.8	11.8	30.6	23.8	11.3	35.1
ARMY RESERVE						
Civilian Life/IRR	7.4	20.9	28.3	11.1	22.1	33.2
Selected Reserves	0.7	2.9	3.6	1.1	2.5	3.6
Active Force	0.8	6.8	7.6	1.7	5.3	7.0
Total	8.9	30.6	39.5	13.9	29.9	43.8
				12.9	33.8	46.7

active force or another Reserve component would not be classified as losses by total force planners. Several interesting facts emerge from the table: (a) the Army Reserve has a considerably higher overall two-year attrition rate than the Guard, (b) the timing of losses is strikingly dissimilar across the services, (c) both components exhibit an increase in civilian losses across the cohorts, and (d) much of this increase is attributable to an increase in civilian training attrition (from 17.8 percent to 24.1 percent for the Guard and from 7.4 percent to 11.4 percent for the Army Reserve).

A theory of attrition needs to take into account the motivations of both the individual and the component. We can explain early attrition as the consequence of rational decisionmaking in which belated information regarding the experience attributes of either the reserve job or the reservist is reevaluated and/or changes in the actual decisionmaking environment lead to separation.

For the individual, the regimentation and physical demands of military life, and employer/family conflicts among others count as experience attributes of reserve participation: characteristics about which the individual has little prior information and learns only through actual experience. We also show that for young persons who comprise the major share of nonprior service enlistment cohorts, this period is likely to be fraught with changes: in marital status, in employment, in residential location, some of which are obviously related to local economic conditions. Some or all of these factors are then likely to lead to voluntary separation.

The Army's discharge decision is likely to be influenced both by new information received during training regarding the productivity of the recruit and by factors external to the reservist such as local economic conditions and institutional constraints. The costs of separating the recruit are likely to be lower (a) during training, and (b) during periods of high unemployment (which makes replacement easier). Congressionally mandated end-strength levels also may introduce less than optimal attrition policies: for instance, despite high quality, the attrition rate may be high because of the impact of these strength caps.

This paper presents excerpts from a forthcoming report (Grissmer and Kirby, forthcoming) that analyzes the changing patterns of attrition among the FY80-FY82 enlistment cohorts using multivariate logit models and survival function techniques that enable us to allow for the effects of individual characteristics, service policies and local unemployment rates. These models were estimated separately for males and females (both the theory and our earlier research had suggested that the motivations and behaviors were likely to differ by sex) as well as for different time periods (training, posttraining till end of the second year, and a combined model covering the two-year period). We include only losses to civilian life on the Individual Ready Reserve (IRR) in this report; the earlier report analyzed losses to other destinations.

We find that attrition differs markedly by sex: the estimated two-year attrition probability for a female enlistee, 18-20 years old, single, white, high school graduate and Category III is between 0.44-0.48 in the Guard and 0.35-0.45 in the Reserve for the three cohorts. For a male enlistee, who is identical in every other respect, the attrition probability is considerably lower: between 0.18-0.27 in the Guard and 0.18-0.35 in the Reserve. Our theory pointed to several factors that would lead to higher attrition among women: earlier marriage, childbearing, spousal conflict, migration, and job environmental factors.

Attrition varies significantly with both educational attainment and with mental aptitude (as measured by the Armed Forces Qualifying Test). Estimated attrition probabilities are between one-third to one-half higher among high school nongraduates. Statistically significant and almost as large differences are evident among the different mental categories: for example, for the FY81 Guard cohort, Category IV enlistees had a probability of attrition of 0.34 compared to 0.15 for Category I enlistees. The pattern holds true across time, across the components, and for men and women.

The effects of other variables are generally smaller and not quite as consistent. For men, we find lower attrition among nonblacks, younger men, and single. The pattern is quite different for women, with lower attrition among blacks and older women (21 years and older).

The changing patterns of attrition across the cohorts and the anomalous finding that higher quality cohorts experienced higher attrition lead us to believe that it is important to model both the component policy, the effect of local unemployment, and the effect of end-strength and budget considerations. We are currently using survival-function techniques to sort out some of these factors and their effect on attrition.

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CASE STUDIES OF SEVEN ARMY NATIONAL GUARD UNITS ATTENDING
THE NATIONAL TRAINING CENTER

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Background

In 1983, the first Army National Guard round-out unit attended the National Training Center with its Active Affiliate. This first unit, a Georgia Guard armored battalion, experienced a 15% loss in strength within six months of returning from NTC. Concern was expressed by the Commander, Ft Stewart (the home of the Active Affiliate), the Vice Chief of Staff of the Army, and the Deputy Chief of Staff for Personnel, that this loss was in some way related to the NTC experience.

Since that first Georgia Guard unit, six other Guard round-out battalions have attended NTC. Although unit strength figures in these Guard units decline after NTC, none appear to have experienced the magnitude of loss that affected the first Guard unit. The differences in loss may potentially be attributed to differential organizational policies, unit personnel policies, local economic conditions, employer problems, and family issues. Many of the issues and problems are specific to the individual units and their surrounding locale. This paper summarizes some of the issues surrounding National Guard unit participation in the NTC.

Methodology

Focus group interviews were conducted with each of the seven National Guard round-out units that attended NTC. These interviews were conducted within a year of each unit's participation at NTC. Small group (4 to 9 persons) interviews were conducted separately for Unit Officers, NCOs, and in the later units (Alabama, North Carolina, and Louisiana) Junior Enlisted. Each interview lasted approximately two hours and was conducted during the unit's scheduled weekend drill. The following table lists the seven National Guard units, their Active Affiliates, and their NTC rotation dates.

Guard (State)	Active Affiliate	NTC Rotation
Georgia	Stewart	9-22 Sept 83
Minnesota	Riley	19 Apr - 8 May 84
Georgia	Stewart	3-22 Oct 84
Georgia	Stewart	18 Mar - 6 Apr 85
Alabama	Polk	1-22 June 85
North Carolina	Carson	26 Jun - 15 Jul 85
Louisiana	Polk	11-31 Aug 85

Topics covered in the interviews included: events leading from notification through train-up through NTC to the time of the interview, compensation and pay issues, family issues, readiness and retention, and general training problems. As can be anticipated, some issues were more salient to certain groups, e.g., pay issues to unemployed guardsmen, or training issues to NCOs and Officers, etc.

Training Characteristics of a Guard NTC Rotation

Preparation for and participation at NTC required some changes to the "normal" Guard environment. The characteristics unique to NTC participation can be classified into three categories: training environment, increased training time, and specific personnel policies. Following NTC, the units went back to a more "normal" environment, so that the following were not in evidence at the time of the interviews.

Training environment. Train-up for NTC was characterized by intensive weekend drilling with their Active Affiliate. In many cases, this training occurred on the active installation (Ft Stewart, Ft Polk, etc) with equipment with which the Guard had been unfamiliar. Training on the active installation sometimes meant an additional transportation time to and from training. For example, for the first Georgia unit, drills at Ft Stewart required a 10 hour drive in each direction. Normally, weekend drilling would be accomplished at the local Armory or local training site with little or no Active Affiliate participation.

Increased training time. The train-up was characterized by additional training/drill requirements. In addition to the required one weekend drill per month, there were additional weekend drills, and longer drills (MUTA 5's and 6's) for all Guard. For NCOs and Officers, there were also supplemental planning and leadership training during the week for no pay. On top of all of this preparatory training, NTC itself requires an extra week of annual training time - three weeks as opposed to the usual two-week AT. With all of these training requirements, it is no wonder that many NCOs and Officers reported not seeing their families on weekends for months at a time.

Personnel policies. In order to maximize train-up experiences for NTC, Guard units have found it necessary to implement certain personnel policies for the duration of train-up and NTC. The intent of these policies is to stabilize personnel in leadership and job positions for most effective training. In the first Georgia unit, this was translated into not allowing any Guard from leaving the unit (either transferring to another unit or leaving the Guard) until after NTC. Some of the later units, learning from the experiences of the first unit, had a more flexible personnel policy. They allowed reasonable attrition (for cause) to occur and replaced these separatees with fillers from other in-state or out-of-state Guard units for the NTC exercises.

NTC Can be a Catalyst For Permanently Increased Readiness

The train-up for NTC and the NTC experience were seen by all participants as the "best training", the "most realistic training", the "most challenging training" around. Units reported being in their most ready

posture after NTC even after sustaining strength losses. There was a certain pride about surviving NTC and winning and losing battles together with their Active Affiliate. All of this may have the effect of increasing pressure from both the Guard and the Active Affiliate for continued quality training. This would be especially true for those Guard units with close bonding with their Active Affiliate. Close working relationships had increased both the Guard's and Active Affiliate's respect for each other.

The total NTC experience can also be seen as a catalyst for increased readiness through improved personnel retention and selection. During the train-up, less productive and/or physically deficient NCOs and Officers were selectively "pruned" from the units. This was partly self-selection out of the unit by Guardsmen, themselves, and partly, the commander's decision for selectively retaining high performing and committed personnel. One unit, using information gleaned from their NTC experience, has developed criteria for more selectively screening applicants for motivation and commitment.

In addition to selection of highly motivated personnel, NTC training itself increases Guard readiness. The knowledge of skills required and the experience of combat and combat training will stay with the unit personnel. There is an unanticipated readiness benefit from NTC: vicarious learning. Through increased communication, units in- and out-of-state are learning the lessons of NTC without going through a rotation. Fillers have played an important part in communicating NTC lessons learned. Fillers have taken the NTC experience into their home units and disseminated the information as "war stories". The lessons of the modern battlefield are effectively brought back anecdotally. These units have improved their drills to more accurately reflect the battlefields of today.

Potential Issues Associated with Guard NTC Participation

Issues associated with the Guard NTC participation we discuss here center around three areas: (1) recruiting, (2) retention, and (3) training and readiness. Some of the recruiting issues have been addressed above. NTC may help establish criteria for recruit selection and recruiting advertising. In the short term, the "macho" image of NTC training may help recruiting efforts by offering adventure, travel (to California), patriotism (against Soviet strategy), and escape from the mundane.

Retention issues center around four factors: employer relations, family time, local economic conditions, and NTC scheduling. Most employer problems are at the first line supervisor level. Any additional training that has a negative impact on the 40 hour work week or on work team performance will worsen Guard-employer relations. Additional training that takes weekend, or worse, vacation time from the family will aggravate any family problems. Unfortunately, military leave does not cover a three-week annual training period; so consequently, many Guardsmen must use their annual leave to cover the additional training and NTC. Local economic conditions present a two-edged sword. If the local economy is stagnant (i.e., high unemployment), the additional drills and training times provide an excellent source of alternate income to unemployed Guardsmen. If, however, one is employed on a full time basis, the additional Guard requirements are more likely to cause employer conflicts and possible dismissal, as additional training is seen as disruptive to the other workers and to productivity. Finally, the timing of NTC may be problematic. The Minnesota unit went to

NTC in April. This was probably the worst time for them to attend NTC because many of the Guard were farmers and April was planting season.

Finally, training and readiness pose potential issues. It is not clear how long readiness in a unit can be maintained following NTC. How often, then, should units be recycled through NTC to optimize retention of skills? For whom is NTC training most effective? There seems to be a consensus among the units that yearly NTC is too much; every 3 - 4 years is optimal. Yet, historical attrition data would indicate that there would probably be a greater than 50% turnover rate in that time. In early deployable units, this level of readiness may not be acceptable. Complicating the readiness issue, NTC training seems to be more of a learning experience for NCOs and Officers than for the Junior Enlisted. NCOs and Officers reported seeing the "big picture", learning the importance of continuous field maintenance, use of sleep-wake cycles, delegation of responsibilities, and training in logistics and navigation as positive aspects of NTC training. The Junior Enlisted seemed to be less involved and to gain less from the experience.

Analytical Limitations

Caution should be exercised before drawing conclusions from this case study. (1) These units are not representative of Guard units: All were Mechanized Infantry or Armor units; and all but one are from the Southeast. (2) This has been a retrospective case study, which relies exclusively on the individual and collective memories of the unit. (3) There are unique sets of factors connected to each unit. The composition of the units vary from primarily textile workers to primarily farmers and students, etc. However, this case study does indicate avenues of future research.

Where Do We Go From Here?

The next logical step would be to develop a comprehensive case study of matched Guard units either undergoing NTC train-up or new equipment training. Both would entail additional training and drills, which would facilitate teasing out the unique problems of NTC. This comprehensive case study should include not just Officers, NCOs, and Jr. Enlisted, but also employers, families, the Active Affiliate, and Guard who have attrited. By surveying or interviewing all groups, one could get a more complete and accurate picture of the impact of train-up and NTC.

This case study should start at the point the Guard unit is notified about their NTC rotation. This would provide a longitudinal, prospective case study which would offer more opportunities for unbiased perceptions. The opportunities for this research will grow as the number of Guard units scheduled to attend NTC grow, and Congress perceives the Reserves and Guard as a less costly alternative to the Active Component.

USS NEW JERSEY: UTILIZATION AND ASSIGNMENT OF SELECT RESERVISTS

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Introduction

The recommissioning and deployment of USS NEW JERSEY in 1983-84 presented the Navy with a unique opportunity to evaluate the use of both Fleet Reserve and Select Reserve personnel in real world, operational, and contingency environments.

Under the direction of the Chief of Naval Operations (OP-01B7, Assistant for MPT Research, Development, and Studies), this study was conducted to capture the lessons learned and make recommendations for future assignment, utilization and/or training of reserve personnel. The following specific areas were examined:

- a. Skill deficiencies of Select and Fleet Reservists in ratings and NECs.
- b. Identification of orientation, skill maintenance, or new equipment training requirements for reservists assigned to active duty.
- c. Assignment and utilization of reserve personnel aboard ship during periods of active duty service.
- d. Impact of reservists on morale, good order, discipline, and leadership.
- e. Integration of reserve personnel with ship's company.

Approach

The study of reservists participating in the USS NEW JERSEY crew relief program was conducted as a field study, using interviews and a survey as the principal means of gathering data. It was targeted to three distinct populations: supervisors and members of the ship's active duty crew who observed reservists' performance or provided service or support to the reservists while assigned to USS NEW JERSEY; Select Reservists (SELRES) participating in the crew relief program; and the Fleet Reservists serving long tours as a part of USS NEW JERSEY's recommissioning.

Findings and Conclusions

USS NEW JERSEY presented some unique problems in a variety of areas and challenged the ship's officers and crew to be innovative in their resolution. The logistics required to support 65 arriving and departing reservists and 108 departing and arriving regular crew members on the same day were labor intensive. These manpower movements, while USS NEW JERSEY was on-station in a hostile fire zone, allowed the Navy to test its rotation/replacement procedures under near-combat conditions and were judged

to be highly effective. The logistics effort was also viewed as having provided valuable training to components of the Naval Air Reserve Force.

While both the crew and reservists felt the crew relief program was highly successful, any conclusions resulting from this study should be viewed with caution. The participants in the crew relief program were volunteers; this study could not show what motivational effect volunteering had on the reservists' job performance. In both the interviews and the survey questionnaire, only the respondents' recollections of the situation could be obtained.

Select Reservists. Some 344 reservists volunteered to go aboard USS NEW JERSEY while on-station in a hostile fire zone for periods of 3 weeks for the purpose of relieving regular crew members to return home for 3-week periods of leave. The ship continued to perform its mission without major incident or loss of combat capability.

The lessons learned from the USS NEW JERSEY crew relief program are many. The report discusses those most pertinent to the training, assignment, and utilization of reserve personnel. The results of the study suggest that improvements in three areas may be key factors in the successful use of reserve personnel in contingency mobilizations. These areas are: (1) improving the documentation of skill qualification in PQS, Damage Control, and Watch Standing; (2) providing easier access to appropriate training materials; and (3) more effectively managing key records (service jacket, medical and dental) for reserve personnel. The general consensus of members of USS NEW JERSEY's crew and the reservists themselves was that the crew relief program was a resounding success.

Fleet Reservists. This study also examined the use of reserve personnel to provide critical skills and expertise on old systems being brought back into the inventory through the recommissioning of USS NEW JERSEY. An extremely small number of these reservists were available to provide information. The use of reservists to provide specialized knowledge or expertise on older systems and equipment could not be determined in this study. The consensus, however, is that in this instance, supervisory interview data indicated that the utilization of reservists was highly successful.

The lessons learned from the commissioning group of reservists are: (1) not all reservists had experience unique to older systems aboard USS NEW JERSEY; (2) initial technical skill proficiency was rated as lower than that of active duty counterparts; and (3) extensive use of skills was made in maintenance, operating equipment, and training. The integration of this group of reservists with the regular active duty crew was so successful that their presence was for all practical purposes unnoticed by their supervisors.

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NAVAL RESERVE TRAINING ASSESSMENT
AND FEEDBACK PROGRAMS

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The Chief of Naval Operations has directed that a complete assessment of Navy Training be conducted to ensure all valid training requirements are included. He further approved the Navy Training Strategy that sent a signal to the Fleet about his commitment to training excellence.

The Navy Training Strategy establishes policy and assigns responsibility for implementing Navy training programs. The strategy applies to both active and reserve forces and focuses on ten major objectives.

The first objective of the strategy specifically addresses training assessment, frequently a splinter effort, accomplished independently, and in varying degrees, by a number of organizations. The objective further states that a cohesive evaluation of our training to support the Navy's ability to perform its mission is required. Naval Reserve Training is included, as it compliments the total force structure.

The second training strategy objective directs the establishment of an effective evaluation and feedback system for quality control of training.

The third training strategy objective directs the assessment of the training base of the Naval Reserve and its ability to meet requirements.

These objectives form the basis for the Naval Reserve Training Assessment Program.

Responsibility. Total Force Training Assessment requires support throughout the Navy training establishment, from the Deputy Chief of Naval Operations (Manpower, Personnel and Training (OP-01)), through program sponsors, resource sponsors, Chief of Naval Education and Training (CNET) and his functionals. The following play major roles in the assessment of Naval Reserve training:

Deputy Chief of Naval Operations (Manpower, Personnel and Training (OP-01)). Is the Navy's senior trainer. Is charged by Navy training strategy to evaluate training assessment

systems and provide overall training guidance on a continuing basis. He is also responsible to report the status of training to the CNO semi-annually (usually each May and November). Lastly he will assess training implementation of new systems to determine if necessary resources are programmed to coincide with fleet introduction.

The Chief of Naval Education and Training (CNET). Is responsible for assessing CNET school house training for effectiveness and reporting his findings semi-annually to the CNO. He also assists the Commander, Naval Reserve Force (COMNAVRESFOR) in development of a training feedback system that will be incorporated into the fleet training assessment program (FLETAP). This initiative will provide the direct link between fleet evaluation and Reserve training.

The Director of Naval Reserve (DIRNAVRES) (OP-09R). Has the responsibility for providing continuous assessment of Naval Reserve training and providing status of that training to OP-01 semi-annually. In addition, OP-09R is tasked to review Selected Reserve (SELRES) tasking for achievability and develop new training concepts to meet requirements. Both assessments and the review of taskings are key to supporting significant program growth by 1991 and the overall improvement of training readiness.

Commander, Naval Reserve Force (COMNAVRESFOR). Has been tasked to manage a training feedback system (FLETAP) that will identify training problems, determine corrective action, track corrective action and provide a methodology for field input.

Finally, COMNAVRESFOR will assist OP-09R with training assessment on an ongoing basis.

Training Management System. The goal of the Training Management System (TMS) is to accomplish the CNO's ten major training objectives as outlined in the training strategy.

OP-01 has been tasked to manage the TMS. In order to meet this responsibility, a thorough assessment of existing efforts is required. OP-01 will continue to track Program Objective Memorandum (POM), budget and execution impacting upon the total force training effort. The Training Resources Panel (TRP) will coordinate and track major training issues of significant resource impact.

The four elements of the training management system include:

- o POM Process that provides for the systematic promulgation of total Navy resource requirements. OP-01 and the TRP play key roles in this process.
- o Acquisition Process that is key to procurement of defense systems.
- o NTP/CTP Process that identifies all manpower personnel and training requirements associated with development of new and existing systems.
- o Assessment/Feedback Process that provides for corrective action of training deficiencies.

Naval Reserve Assessment and Feedback. OP-09R has become a full player in the training assessment and feedback process. The Director of Naval Reserve has instituted the OP-09R Training Assessment Program that supports two major goals; (1) Clarifies the current status of training (evaluates the training base), (2) Validates training effectiveness.

Seven major subject areas were reviewed during the initial assessment of reserve training:

- Training requirements identification methodology via Reserve Billet Training Plans (RBTP's) and the use of the Navy Training Planning process in support of Reserve programs.
- Current training concepts such as Weekend Away Training (WET), Active Duty for Training (ACDUTRA) at the gaining command or active school house, and modularized courses such as FC-1111 "C" schools to determine effectiveness and support of the individual qualification process.
- The effectiveness of current training facility design to support specific training concepts and projected growth.
- The status of current training aids and devices inventory and its support of specific requirements.

- The adequacy of training support at the local center and in support of Weekend Away Training (WETS) at larger Reserve sites such as Great Lakes, IL, Houston, TX and Philadelphia, PA.
- The adequacy of training budgets and POM.
- And finally, a review of new initiatives for consistent execution nationwide.

Naval Reserve Training Assessment Team Methodology. The OP-09R Training Assessment Team employed the basic assessment methodology used by the OP-01 team. Field visits provided the bulk of information in the initial assessment program through visits to four (4) Readiness Commands, seventeen (17) Reserve Centers and various other Reserve and fleet activities. These visits were non-attributive and were made to gather necessary information on status of current programs. Additional staff visits to COMNAVRESFOR and COMNAVRESFOR Headquarters provided specific information on the status of new program initiatives, resource availability and readiness status of specific programs and units such as the NRF program. In addition, the team reviewed various studies, inspection guides, survey results and reports from outside governmental agencies.

Highlights of the initial Naval Reserve Assessment Visits. When the initial assessment visits were complete in May of 1985, the Director of Naval Reserve received an initial brief on the status of the Surface Training Program. Highlights from that briefing included:

- Development of a life cycle document that structures training policy and concepts nationwide. This was accomplished with the recent publication of COMNAVRESFORINST 3502.1
- Formalization of a Train-the-Trainer program that puts the "Training" back into TAR. Four levels of courses for both active and Selected Reserve (SELRES) personnel are being prepared.
- Reduce unit tasking to free up drill time for the accomplishment of required training. This issue was further highlighted by the SECNAV Policy board which directed that unit tasking be reduced by 30% by 1 OCT 1985.

- Improve billet stability....it is difficult to train to a "moving target".
- Open Active School Houses on drill weekends to support Reserve technical training requirements.
- Develop a training program and concept that will respond to significant program growth.
- Develop a scheduling process that will be the key to effective program execution.
- Fully incorporate the Reserve in the NTP process to better identify required training resources.
- Gain resources through the POM Process and active support (CNET, Fleet and Type Commanders).
- Specific issues have been addressed in medical, SAM Program, Reserve program, inspection guides, facility planning and the use of vans and portable training kits in support of inland training programs.

Conclusion. Naval Reserve Training Assessment has provided the foundation for a major overhaul of the Surface Reserve Training Program. As we proceed through the four (4) phases of development, training assessment and feedback will provide the corrective action recommendations necessary to ensure timely execution.

Assessment and feedback information formed the basis for the overall strategy that enabled OP-09R to identify resource requirements in Fiscal Years 84 and 85 Baseline Area Appraisals. It further provided the needed information for determining an effective execution strategy and will provide the long term corrective action recommendations needed to fully implement the Surface Reserve Training Program.

SKILL TRAINING IN THE RESERVE COMPONENTS

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Our military forces rely on the Reserve Components for immediate support in any future war. The magnitude of this dependence is heaviest in the Army but is significant in all the Military Services. Reservists in Selected Reserve units need to acquire and maintain the same level of proficiency as their counterparts in the Active Forces. There will be no time to correct for peacetime training deficiencies after mobilization begins.

For the last 5 years, the Logistics Management Institute (LMI) has been analyzing technical skill training for the Office of the Assistant Secretary of Defense (Reserve Affairs). We examined the current strategies and methods used by the Services to train reservists. We found that, with minor modifications, all Services are training Reserve Component personnel with a training system built to train Active Component personnel.

The prevalent training pattern in the Active Forces consists of:

- Short initial entry skill training in military schools.
- Heavy emphasis on the job training and experience in units to bring personnel from apprentice level to skilled journeyman.
- Advanced skill training in military schools.

The Active Force training model does not work very well in the Reserve Component environment. Reserve Component training is on the whole less effective than in the Active Forces because:

- Compared to their Active Force counterparts, reservists have much less time available for training.
- Most reserve units do not have a peacetime mission that enables them to practice their wartime jobs.
- Reserve units are often located far from training facilities, workshops, and the equipment needed for effective on-the-job training.
- Reserve units are usually located far from the active units they will join or support in wartime.
- Most reservists are unable to take time off from their jobs to attend military schools for advanced training or to be retrained when they transfer to new occupations within the Reserve Component structure.

We recommend the adoption of the following basic policies to improve training in the Reserve Components.

1. Adopt accession, retention, and assignment policies that reduce the training burden of Reserve Component Units.

- Recruit fewer non-prior-service accessions and instead recruit as many prior-service personnel as possible who are qualified to fill unit vacancies.
- Prior-service people who are recruited but who are not qualified to fill their assigned job should be required to complete the qualifying school training upon enlistment.
- Make a determined effort to recruit people who are employed in civilian jobs that are occupationally similar to jobs in the reserve unit.
- Retain a higher proportion of unit members who are qualified at the journeyman and master level.

The Navy and Air Force have traditionally followed these policies; the Army and Marine Corps have not. We recognize that there are costs associated with these policies. Personnel costs will increase if the personnel profile of the Reserve Component units shifts to a more experienced and higher graded force. The cost of enlistment and reenlistment bonuses will also increase. There will be a reduction in the funds required for entry-level training.

2. Adopt training approaches which accommodate the unique training environment.

- Lengthen initial skills training for members of the Guard and Reserve. Non-prior-service personnel who enlist in the Guard and Reserve attend the same initial skill training courses given to Active Force recruits. The courses for reservists should prepare them to perform in their occupational specialty without supervision. At the present time, initial skill training produces apprentices. Reservists should be trained to the journeyman level because Reserve Component units are often unable to provide adequate on-the-job training.
- Provide increased regional training opportunities. There is a need for an expanded network of fully-equipped and staffed training sites to which Reserve Component units can travel periodically for weekend training.
- Use more private sector training. Reservists are usually unable to attend military courses that teach advanced skills. They simply cannot take the time off from their jobs. This training can be provided by contracts with private sector training institutions that are close to where the reservists live and work. These courses can be designed to fit the training needs of reservists and be scheduled during IDT periods.
- Increase full-time manning in positions requiring technical, hard-to-train skills. The judicious use of full-time manning in Reserve Component units can improve measurably the overall training of those units. Full-time personnel can attack

mid-career technical courses while on full duty status. They have the skills and experience to provide effective on-the-job training to unit members during unit training assemblies. The Air Force leads in the use of full-time personnel.

- Consider Reserve Component jobs when developing training programs.

Reserve Component units often operate and maintain equipment that is different (usually older) than the equipment found in Active Force units. Military school courses often ignore equipment that is no longer used in Active Force units. The training given to reservists in military schools should prepare them for their unique jobs.

- Design training devices and simulators to meet Guard and Reserve needs.

The development and design of training devices is based on the requirements of Active Force units and schools. Active Force units may not need training devices or simulators because they train on the equipment available in the unit. Identical Reserve Component units may need training devices because they do not have access to this real equipment. Furthermore, training devices designed for the Active Forces tend to be too large and expensive for small, dispersed Reserve Component units.

INDIVIDUAL READY RESERVES RETRAINING NEEDS AND OPTIONS

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OVERVIEW

This paper summarizes the considerations for developing an effective training program for members of the Individual Ready Reserve (IRR). The research was done in 1985 for the Assistant Secretary of Defense (Reserve Affairs). The research results are documented in draft form in Individual Ready Reserve Skill Retention and Retraining Options, WD-2890-RA, February 1986.

Background

One of the nation's mobilization assets is the Individual Ready Reserves (IRR). The majority are individuals who have completed their active duty contract, but still have time remaining in their military service obligation. In addition, a small percent reenlist in the IRR after the end of the military service obligation. The IRR do not belong to or train with units, but rather represent a pool of pretrained individuals that can be called to active duty during national emergencies. Currently, the services depend on the IRR at mobilization to immediately fill vacancies in existing units and perhaps later to act as casualty replacements. Readiness at mobilization of the U.S. armed forces depends on the IRR maintaining their skills in peacetime.

The Congress, OSD, and the services, concerned over readiness and mobilization issues, have recently focused their attention on IRR skill retention for several reasons. First, the services provide only small allocations of training funds to the IRR; thus, the IRR receive little training to maintain their skills for mobilization. Second, in an effort to increase the number of IRR available at mobilization the Congress extended the military service obligation from six to eight years. This extension exacerbated IRR skill retention uncertainty because, in the future, some IRR may not have practiced their military skills for more than four years prior to mobilization.

In 1985 OSD requested in the Defense Guidance that the services determine IRR skill retention and institute any necessary retraining programs. Concurrently OSD asked Rand to study the issue of IRR retraining needs and possible retraining options.

Our research addressed the questions of whether the IRR maintain their skills without systematic practice and what kind of retraining program would increase their skill retention. Specifically the research tasks were to: 1) review the literature and current programs to determine if IRR skill retention can be predicted, 2) to specify the likely predictors of IRR skill retention, 3) to identify the information needed to support retraining program decisions, and 4) to develop

recommendations for estimating IRR retraining needs and design of a retraining program.

The IRR include about 450,000 officers and enlisted. In the past the services focused their limited IRR management on officers. The enlisted personnel, who account for over 85 percent of the IRR, received little attention; thus, the research focused on enlisted skill retention problems. We also focused heavily on the Army and Marine Corps programs. The Army and Marines depend more heavily on them for mobilization and have ongoing programs to actively manage the IRR. Finally, many issues surround the IRR training program including ability to contact IRR members at mobilization, show rates for exercises and mobilization, and usefulness of annual musters. This research concentrated on a subset of issues--predicting enlisted skill retention and developing retraining options.

We initially reviewed both academic and military literature on skill retention to determine the extent of knowledge in the field that applied to the IRR. We also collected information on characteristics of the IRR, their current and proposed training programs, and IRR training experiences. We accomplished this through review of the literature, interviews with relevant personnel at the services' personnel centers, review of after-action-reports for IRR training, and review of internal services documents.

Results

From our research we conclude that the decision of whether or not to train an IRR member must consider the role that the IRR member will play in a mobilization and whether another asset is available to fill that role. Tradeoffs must be made between time and effectiveness gained at mobilization and the costs and ability to effectively retrain now. These tradeoffs are properly made with knowledge of IRR skill deterioration, retraining options, option costs, and IRR retraining motivation.

We found from the literature review that, although the research on skill retention provides many interesting concepts and facts, few are directly applicable to the IRR. The studies reviewed did not test the IRR and the subjects tested had characteristics quite different from the IRR. In particular, the retention interval in the tests was short, less than a year, while we expect the IRR to be required to retain skills over periods up to six years.

Some broad conclusions can be drawn from the literature. Certain skills are more easily retained than others. In general, the retention of procedural tasks, the sequencing of tasks, and the ability to perform a task in a required period of time decay rather quickly. Continuous motor skills, performance accuracy, and tasks supported with aides decay less rapidly. An individual's score on a performance test after the last training opportunity is the best predictor of an individual's skill retention.

Retraining requirements should vary across and within occupational areas, and the tasks to be retrained must be closely tied to predictions of skill retention and time and resources available at mobilization. Several options exist:

- o Do not retrain if the skill is maintained.
- o Retrain periodically now if the skill is needed immediately at mobilization.
- o Retrain at mobilization if time is available then.
- o Rely on another asset if the skill is not maintainable in the IRR.
- o Combinations of the above.

More specific information on the IRR can be easily obtained by the use of controlled experiments and surveys. We recommend that the services begin testing IRR members after each training opportunity attended and upon transfer from the Active. This information should become a part of the member's service record. The IRR may also be tested after each muster and asked to give details of their civilian experiences. This information will provide a baseline for determining IRR skill decay. More controlled experiments can be done on targeted skill areas to determine specific skill retention and the most effective retraining options. We explore these research recommendations in more detail in the draft document.

Like skill retention, our research shows that the services know very little about relevant costs of possible IRR retraining options or whether or not individuals will choose to attend training. Without this information, IRR retraining decisions will run the risk of being very cost ineffective and possibly irrelevant for the target population. In the text we suggest ways in which this lack of information can be quickly remedied. Especially important will be the use of better collection mechanisms.

The services also know very little about the motivation of IRR members to retrain--only 5 percent of the enlisted now voluntarily train. Further information on motivations, responses to incentives, and responses to the training program is needed to set up a program that will ensure the participation rates desired. To collect the information needed we suggest a series of surveys questioning IRR members on background, employment, employer's attitude toward training, training satisfaction, monetary incentives, etc. These surveys could be easily administered during annual IRR musters.

All of the above mentioned information requirements, when satisfied, could be used to set up a well structured IRR retraining program and a smooth mobilization call-up. A well-run program may increase participation in voluntary training and raise the confidence of IRR managers in the show rates of well trained personnel at mobilization.

IRR AVAILABILITY: A MATTER OF MOTIVATION

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In its 1982 report to the President the Military Manpower Task Force called the Individual Ready Reserve (IRR) the most important source of trained, individual military manpower.¹ Of all the pretrained individual manpower categories, i.e., Individual Mobilization Augmentees (IMA), the Inactive National Guard, the Standby Reserve, and retired military personnel, IRR members are among the best trained and most readily available for mobilization during a national emergency--available, that is, in terms of legal obligation to report for active duty.² But just how "available" are the almost one-half million members of the IRR in terms of whether they would or could fulfill that legal obligation?³ The answer is apparently not intuitively obvious, since the availability of the IRR is probably not scientifically verifiable (short of a full mobilization) and, many believe, may not even be statistically predictable to any significant degree.⁴

This state of affairs does not mean that a discussion of IRR availability would be a waste of time or that the pursuit of an IRR yield index would be meaningless. On the contrary, such endeavors are essential to any analysis of the viability of the Reserve components as partners in the total force. Indeed, to ignore yield rates is to assume, by default, rates of 100 percent. What the state of uncertainty regarding IRR availability does mean, however, is that an examination of the issues must include a key ingredient that many defense scholars, theorists, and practitioners ignore on the basis of insubstantiality. That ingredient is "motivation"--motivation both on the part of the Military Services to provide resources to manage their IRR elements and on the part of the individual IRR members to respond positively to a call to arms. Before addressing the issue of motivation directly, it would be useful to review past and relatively current initiatives with regard to IRR yield rates.

A 1974 DOD study used what was termed a "nominal show rate" of 70 percent for the IRR, which reflected an approximation based largely on experiences with limited mobilizations in 1961 and 1968.⁵ Because of congressional criticism and DOD concern, the Army studied the issue of yield rates in 1979 and concluded there was no scientifically supportable procedure for developing a single show rate for any Reserve manpower pool and, therefore, recommended that the use of such rates as management predictors of deployable and employable manpower be discontinued.⁶ A

subsequent Army study, however, included a procedure for determining a mobilization yield rate for the Army IRR based on actual data and is summarized in table 1.⁷

TABLE 1
ARMY IRR MOBILIZATION LOSS FACTORS AND RATES

FACTOR	Percent Loss Rates
Underage for Mobilization (War Zone)	0.42
Fulltime College Students	3.71
In Hospital	1.28
Pregnant	0.02
Temporary Hardship--Single with Dependents	2.76
Approved Discharge--Married with 4+ Dependents	4.63
Incorrect Addresses/Nonlocatable	7.46
Mobilization Yield Rate (Adjusted for Multiple Factors)	81.64

A 1986 study prepared by MAXIMUS, Inc. for the Reserve Components Medical Council resulted in a yield rate computation model that we believe holds great promise in this area.⁸ It is called the Wartime Accessibility of Medical Personnel Upon Mobilization (WAMPUM). Although somewhat questionable, particularly with regard to its dependence on the DELPHI method of determining some of the factors and their weights in calculating the availability of Reservists, including IRR members, for mobilization, WAMPUM makes some allowances for differences among the Services and at least recognizes varying factor values for different career fields, changing mobilization scenarios, and various mobilization periods. Table 2 summarizes the model's nonaccessibility factors and their basic values or weights.

TABLE 2
WAMPUM NON-ACCESSIBILITY FACTORS

FACTOR	WEIGHT
Sole Parent	Max at 5%
Dependency	Max at 5%
Training	Up to 25%
Age	20%-95% for Ages 60-70
Pregnancy	5.5%-.62% for Females Ages 18-44
Hospitalization	.15%-.6% for Ages 17--over 64
Non-Locatable	3% (USAF IRR) to 8% (Navy IRR)
Failure to Report	3%

Based on these and other studies, DOD five-year fiscal guidance to the Military Services with regard to Reserve manpower issues has taken several forms over the years, the most recent of which have been rather

amorphic as shown in table 3.

TABLE 3

DOD IRR YIELD RATE GUIDANCE

<u>Fiscal Years</u>	<u>GUIDANCE</u>
1980-1984	70% by M+180 for each fiscal year
1981-1985	80%, 85%, 90% for FY81, FY83, FY85 respectively
1982-1986	90% by the end of FY85
1983-1987	Improve yield rates
1984-1988	90% cumulative, time-phased rate
1985 on	No mention of rate/show rate

The absence of specific DOD guidance in recent years concerning yield rates does not, in our view, indicate a lessening in the perceived importance of the IRR within the total force. Rather, it is likely a reflection of the realization within OSD--one we believe that has long existed within each of the Military Services--that yield rates cannot be mandated across the board without an appreciation of the structure, history, mission and other peculiarities of each of the Services. These other "peculiarities" can, to a large extent, be reflected in institutional motivation with regard to the IRR, and, indeed, the entire Reserve program. This is reflected in the Navy, for example, through its increasing appreciation of the IRR as a useful tool in resolving certain mobilization manpower issues. After analyzing the structure of its own operational environment, the Navy has concluded that an 80 percent IRR yield factor is currently the "best guestimate" for mobilization planning purposes. Surely such an estimate has much more utility than earlier guidance promulgated from OSD across the Services.

Institutional motivation manifests itself in many ways that indicate the degree of seriousness a Service attaches to its management of Reserve manpower assets. More often than not the driving consideration is the peacetime perception of how vital those assets are in getting the mission accomplished during wartime. If the IRR is not viewed as a particularly viable force for getting the wartime mission done, then it simply will not be managed effectively, reflecting low institutional motivation in this area. In turn, the availability of IRR members for recall to active duty would be marginal at best.

There is a wide variety of initiatives that the Services can do to both enhance the mission effectiveness of the IRR and to stimulate the motivation of its members to report for active duty when called. One of the most important, in our view, is to give serious consideration of removing artificial barriers to the mobilization of certain IRR members, e.g., fulltime college students, married members with four or more dependents, etc. Further, intuitively it would seem obvious that anything that impresses upon a person the fact that he or she is a member of a Reserve military program would only help instill within that person a sense of obligation and commitment. Yet until relatively recently not

all of the Military Services issued Reserve ID cards to IRR members. Notwithstanding the fact that this omission violated DOD regulation, it would seem that it was also contrary to common management sense. Certainly it indicated strongly a lack of Service motivation with regard to the IRR.

Other omissions of equal import still abound in varying degrees among the Services. For example, skills management and selective refresher training for IRR members need much improvement. Do we believe people will actually make themselves available for mobilization even though they believe they are inadequately prepared to perform military tasks? Why would we want them to be available? In fact, some programs already exist to provide some sort of refresher training to IRR members. The Army provides such training to about five percent of its IRR force each year. The Navy has a Training and Analysis Group studying ways to implement an IRR training program in FY 1988.

We must also reduce the uncertainties of the individual IRR member's probable mobilization assignment. While the peacetime preassignment of any appreciable number of IRR members to wartime mobilization positions may or may not be as useful as it seems to be for the military retiree pool, this should not form a basis for unimaginativeness in the management of the IRR. And what about the care of dependents during a mobilization? We simply do not believe that the almost one-half million members of the IRR are comfortable with and appropriately knowledgeable about the welfare of their loved ones upon mobilization.

One of the biggest problems in the Reserve availability issue has long been the maintenance of accurate data on each Reservist--data such as addresses, skills, physical condition, etc. The MAXIMUS study mentioned earlier found that, within the Reserve Component Common Personnel Data System, over 59,000 records showed no marital status, more than 22,500 records had no dependent data, over 1,100 records lacked dates of birth, and one specialty from one Service appeared to be in error in over 2,500 instances. How can we expect IRR members to be available when we do not have accurate records on them? Perhaps a potential solution to the improvement of data quality, and to increasing IRR yields as well, is to decentralize the management of the IRR to local Reserve Centers with the aid of computer technology. Once decentralized, personnel data would be captured, maintained, and reported at the local level.

In the final analysis an individual's propensity for reporting as ordered for active duty will be directly and positively related to his or her expectations, experiences, and perceptions prior to being so ordered. And while it may be true that some of his or her motivation will be affected either positively or negatively by the nature of the crisis precipitating the mobilization, this aspect of the equation is too nebulous to address in any constructive way. (It should be noted that the OSD-directed IRR muster in FY 1987 will have no relevance to this issue either.) Individuals must be made aware of their responsibility to respond to a mobilization order and the necessity to make at least minimal advance preparations to assist themselves and their families

in the mobilization process. Only creative, innovative management of the IRR on the part of each of the Services can provide such awareness. A sense of comradeship and belonging, even at a very basic level, is at least as important to Reservists as it is to their active force counterparts.

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SKILL DETERIORATION AND RETRAINING NEEDS OF THE INDIVIDUAL READY RESERVE (IRR)

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Introduction

Acting under the FY86-90 Defense Guidance (DG), the Deputy Chief of Naval Operations (DCNO) for Manpower, Personnel, and Training (MPT) initiated a program to assess technical skills of Navy Individual Ready Reservists (IRR). Participation of the Naval Training Systems Center (NAVTRASYSCEN) was requested. Specifically, NAVTRASYSCEN (Code 10) was requested to study and analyze the deterioration of Navy skills acquired on active duty during time spent in the IRR. In accordance with the DG, analysis of skill deterioration was to determine retraining needs of the Navy IRR to maintain the minimum proficiency required to support mobilization.

Approach

Skill deterioration and retraining needs were assessed for 16 critical ratings. These were considered critical based on the criterion of projected personnel shortfalls for mobilization. Questionnaires were used to obtain job performance information (tasks performed and proficiency associated with their performance). Data were obtained from both IRR personnel and from E-4s currently on active duty in the ratings. Proficiency was defined in terms of the degree of supervision needed to perform job tasks. Information concerning current civilian employment was also obtained from the IRRs.

IRR respondents estimated their proficiency on rating job tasks at their End of Active Obligated Service (EAOS) and at the present time (NOW). Differences between EAOS proficiency and NOW proficiency provided the measures of skill deterioration. Active duty personnel working at the E-4 level of their rating estimated their current proficiency on rating job tasks. The E-4 level was selected to provide a working definition for the DG concept of "minimum proficiency to support mobilization." Thus, differences between the current proficiency level of the active duty E-4s and the IRR rating groups provided the basis for determining if training was needed to bring the IRRs to an acceptable proficiency level before mobilization.

Specific findings about skill deterioration and IRR retraining needs, for the 16 individual ratings studied, are presented in Hall et al. (1986). The report identifies IRR refresher and maintenance training likely to be needed to support mobilization, and the specific job tasks of each rating that training should emphasize. Skill upgrade training needs are also discussed for each rating. The remainder of this present paper presents general findings and conclusions that pertain to the overall group of ratings studied.

Findings and Conclusions

General findings and conclusions are given for three areas: Data base, skill deterioration, and IRR training needs.

Data Base

Several study findings indicated that the Navy IRR data files may be incomplete or inaccurate in a number of areas. These deficiencies can lead to incorrect estimates of the IRR manpower that can be mobilized. Problems apparently exist in both file content areas and in the procedures used to maintain currency of the files. Specific findings supporting this conclusion were:

- . Approximately 30 percent of the mailing addresses listed for IRRs in the six Cryptologic Technician (CT) ratings were incorrect (range 28 to 40 percent).
- . Approximately 10 percent of the addresses for the other 10 ratings were incorrect (range 6 to 15 percent).
- . Based on questionnaires returned, an estimated 5 percent of IRRs who did not return questionnaires may not be in the viable manpower pool because they have, for example, reenlisted, passed their 60th birthday, received final discharges, died.
- . In a number of ratings (notably the CT group), far fewer names of IRRs completing Military Service Obligations (MSO) were listed than would be expected considering service separation rates.
- . Many IRRs (61 percent) in the ratings studied had already completed their MSO of 2 years. If individual agreements with these personnel are not on file, they are beyond the zone of involuntary recall for mobilization.
- . "Last Release from Active Duty" information needed to purge files and issue discharges was not contained in the IRR data files for approximately 7 percent of the names in the samples drawn.

Skill Deterioration

As measured by differences in proficiency reported for EAOS and current proficiency, skills acquired on active duty do deteriorate during IRR membership. Considerably less deterioration occurred for those IRRs who, after EAOS, worked in civilian jobs related to their Navy ratings. The skill deterioration that occurs does not appear to be a major, general problem insofar as dictating needs for comprehensive retraining of IRRs to support mobilization. For most of the ratings, the current proficiency levels of IRRs compared favorably with the proficiency levels reported by individuals who are currently on active duty. Thus, the typical IRR should be able to perform most job tasks of his rating at mobilization after brief familiarization such as would be provided by direct, corrective supervision. However, skill deterioration effects were sufficient in five ratings to indicate some formal IRR retraining needs.

IRR Training Needs

Retraining needs for IRRs in two ratings could not be determined because of small sample sizes. Formal retraining and maintenance training for all IRRs in three ratings and for those IRRs in two other ratings who are not currently working in a civilian job related to their rating may be necessary to support mobilization. A specialized curriculum emphasizing selected rating job tasks appears desirable. Skill upgrade training should be considered for all IRR personnel who have been off active duty for greater than 3 years because of probable changes to equipment, procedures, and materials used in job performance. For all other IRRs in the ratings studied, retraining and maintenance training prior to mobilization appear to be unnecessary. Familiarization training at recall consisting of supervised practice may suffice.

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AN ACTIVE-RESERVE MIX DECISION PROCESS

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We have developed and tested an improved decision process to demonstrate that such a process could be formulated and could be of practical use. To a large extent, the improved process is based on existing Service concepts and ideas.

The basic approach involves (1) selecting and refining the definitions of the key decision factors and (2) standardizing the application of these factors within a decision logic. A primary objective was to design a simple, straightforward process that could readily be used as a management tool both in making decisions and in explaining the supporting rationale. Another objective was to standardize the process to yield consistent results across Department of Defense (DoD), while at the same time, providing enough flexibility to accommodate the unique aspects of each Military Department and Total Force Component. The decision process should assist all management levels of DoD—Office of the Secretary of Defense, Office of the Joint Chiefs of Staff, and the Military Departments—by organizing and displaying the information needed to make informed force-mix decisions in the context of requirements for military capability and available resources. It is not designed to provide the answer automatically; it is intended to help identify the key issues, force into the open critical differences of informed opinion and provide for explicit consideration of the uncertainties and risks inherent in assigning a unit to either the Active or the Reserve Component. All objectives, we believe, have been satisfied in the proposed process.

To test the applicability of the new process and illustrate its use, we conducted 15 force-mix case studies covering a wide spectrum of force-structuring issues. The case studies helped identify procedural and data problems encountered within each Service and mission area. More importantly, the case studies demonstrated both the feasibility and the value of the standardized, improved decision process. We found that the checklist of decision factors covered relevant issues in all cases, and could be tailored when necessary to accommodate the unique aspects of individual Services and components. In addition, the case studies illustrated the importance and utility of properly specifying and linking mission requirements and associated costs when comparing active and reserve unit alternatives.

The improved process consists of:

- a minimum set of standard force-mix decision factors that apply to all mix decisions
- a basic decision logic to guide the application of the factors to achieve the required military capability in the most efficient manner.

Decision Factors

The set of decision factors is intended to encompass all relevant issues to be examined prior to deciding the component in which a particular unit should be placed. Standardization of the factors provides consistency to the discussions about force mix.

Table 1 is a checklist of the factors that were found to be a minimum and complete set. That is, in the course of the 15 case studies, no decision issue fell outside the list, and each factor on the list was found to be necessary at least once. The factors fall into two major categories – constraints and tradeoffs.

TABLE 1
FORCE-MIX DECISION FACTORS

I. CONSTRAINTS	II. TRADEOFFS
Forward Deployed Forces Legislation Contingency Capability Without Involuntary Reserve Call-up	Mission Characteristics - Wartime Mission - Deployment Time - Peacetime Workload and Alert Status Unit Characteristics - Equipment - Facilities - Manning - Training - Operating Tempo Resources - Costs - Manpower Risk/Uncertainty

Constraining factors require units to be placed in either the Active or Reserve Component without regard to cost. Generally, they are either explicitly or implicitly established by authorities outside DoD and are not subject to DoD changes without specific authorization. Therefore, they are treated as fixed bounds during the force-mix deliberations within the programming/budgeting process.

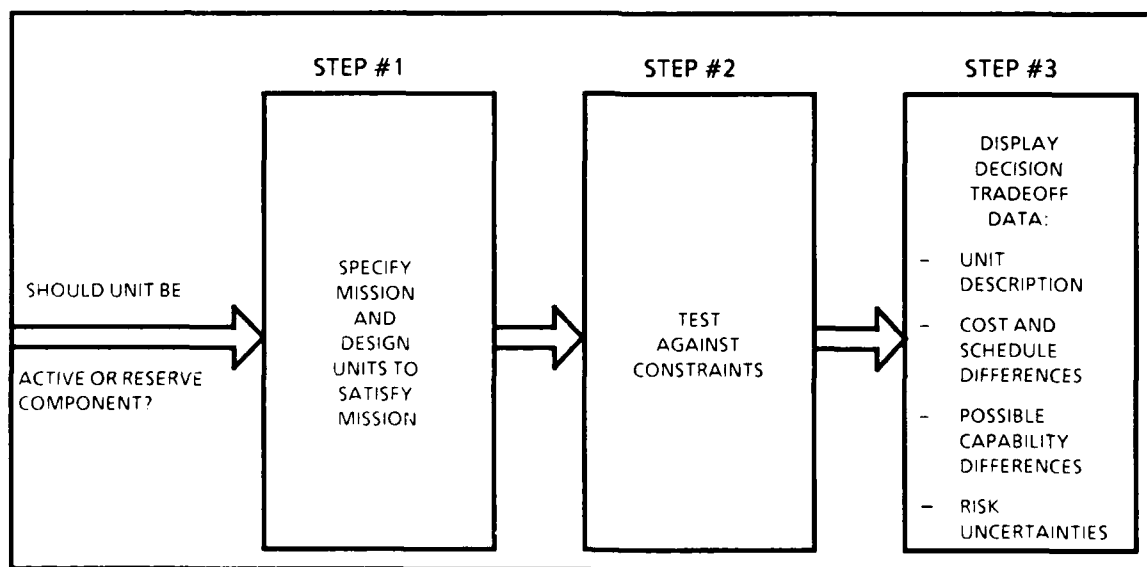
The remaining factors include those force-mix considerations that can be adjusted or "tradeoff" with resources, either manpower or dollars, during the programming and budgeting process. In general, the traded-off factors cover unit design or operational characteristics that are controlled within DoD, and all of which respond to the application

of resources. They are the technical foundation for force-mix decisions based on military capability versus resources. The "mission characteristics" and "unit characteristics" categories cover the requirements for and determinants of unit capability respectively: they define a unit mission requirement and translate it into unit physical and operating specifications. The "resources" category translates the unit specifications into a dollar and manpower resource stream over time, and is thus related to all other tradeoff factors. These three categories of factors are linked together, and if any one is adjusted, it will normally change both of the others. The final category, "risk and uncertainty," allows explicit consideration of important uncertainties (or differences of opinion) concerning the estimated military capability and resource estimates for a particular military unit. To the extent these uncertainties can be translated into potential impacts on mission performance, a sensitivity or risk analysis is available for consideration in the decision. The ultimate purpose of analyzing each of these factors is to document and make visible the important differences in capability, costs and risks associated with organizing a unit in either the Active Component or the Reserve Component.

Decision Logic

A set of criteria or decision factors is not enough. In order to apply the factors in a logical way, we also developed an organized procedure for their use. An overview of the decision logic is shown in Figure 1. Both the order of the procedural steps and the steps themselves are important to the process.

FIGURE 1
OUTLINE OF DECISION LOGIC PROCEDURES



The primary objective of the initial step is to define the specific wartime and peacetime missions the active or reserve unit in question will be required to perform. The wartime mission definition will include a description of the planned employment tasks and schedules that have been, or will likely be, assigned to the unit in war/contingency scenarios. Employment schedule information is necessary because when a unit is to be used is as important as how a unit is to be used, when considering force-mix decisions. For newly programmed units entering the force structure, war plan deployment information may not be available and will have to be estimated. Nevertheless, this information is of critical importance, since comparisons of Active and Reserve Component units are of limited value in the absence of actual or implied employment schedules. A unit's peacetime, continuous tempo of operations will be determined by its peacetime mission, its level of alert and the unit's required level of training proficiency. Mission statements must be complete enough to allow alternative active and reserve units to be specified in terms of manpower, equipment, facilities, training, and operating tempo.

The second step in the decision process is to test the unit alternatives against the constraining factors. This test determines whether peacetime forward deployment, legislation or contingency capability directs the decision to either the Active or Reserve Components without further consideration of cost or other tradeoff factors.

For those cases which are not determined by the constraints, the final step of the logic develops, organizes and displays the relevant information for deciding whether to select the active or the reserve unit alternatives. This information summarizes and contrasts the important differences in capability, cost and the level of risk associated with each alternative.

The sequence of steps in the proposed decision logic is an essential part of that logic. To reorder the steps, or to eliminate any of them, could lead to an incomplete or less-than-logical basis for a decision. Even though only rough estimates and incomplete information may be available in some cases for use in the real world of annual program and budget development, all key factors can and should be addressed before a decision is made.

As a final note, we found that existing or "normally" equipped and manned units are often used as reference points in comparisons of active and reserve units. This is done whether or not the units have been tailored to specific mission needs, or funded adequately to carry out their assigned missions. In these cases, comparing the cost differences between active and reserve alternatives for force-mix decision purposes is of little value at best - at worst, it can be misleading. We believe the most appropriate comparison logic involves first, fixing mission requirements; next, designing active and reserve unit alternatives which can achieve that capability as closely as possible; and only then, comparing their resource implications.

COMPARING THE ACTIVE/RESERVE FORCE MIX ACROSS COUNTRIES

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In recent years, one of the most popular ways among Congressmen to cut the defense budget has been to shift missions and personnel from the active forces to the reserves. These shifts were given additional impetus in 1983. At that time, Senator John Warner's office published figures on the ratio of active to reserve forces in NATO, the Warsaw Pact, and the other European countries [1]. The U.S. ratio of active to reserves was much higher (and by implication much more expensive) than that of other nations. The entire Warsaw Pact and all the other NATO countries but one had lower active/reserve ratios; all but two had more reservists than active-duty personnel. In contrast, the ratio for the U.S. was 2.35 people on active duty for every reservist. (For comparison, the Soviets have about three-quarters of an active-duty person per reservist.)

These numbers gave rise to several questions. First, were the comparisons legitimate: were reserves defined sufficiently similarly across countries that meaningful comparisons could be made? Second, what did naval active/reserve force mixes look like? Were they consistent with the overall pattern?

Surprisingly, the information necessary for active/reserve naval force comparisons is not readily available in published sources. To remedy this information gap, in 1983 we sent a questionnaire to naval attaches in the Washington embassies of the world's 20 largest navies. The information we gathered from this questionnaire, as well as published data to update the numbers to 1985 [2-5], is the basis of this paper.

Table 1 reports the numbers of active-duty and reserve personnel for the eight largest forces in Warner's sample and the two countries with the highest and lowest ratios. The first set of numbers are those reported by Senator Warner. They cover personnel in all branches of the armed forces in 1982. The original source of these numbers was a summary table in [6]. The second set of numbers cover naval personnel only. They are based on the same definitions of reserves as those used in [6], and in fact are taken from [3] (an update of [6]), with additional information from [4].

Ignoring strategic differences across countries, which would suggest different levels of appropriate active/reserve mixes, the numbers do suggest that the U.S. Navy is at one end of the spectrum. Upon closer examination, however, the U.S. Naval force mix turns out to be closer to that of other countries. A brief comparison of the numbers for the U.S. (ratio of 5.27) and Spain (ratio of .20) will illustrate. For the United States, the numbers are those of the Selected Reserve: the paid, drilling reservists. In contrast, the numbers for Spain refer essentially to all naval veterans under the age of 38. And since Spain has a system of conscription, with 18 months of active duty followed by compulsory reserve affiliation, the number of reservists is of course high.

TABLE 1

ACTIVE/RESERVE PERSONNEL COMPARISONS

Country	Warner's figures Military personnel, 1982 (thousands)			Naval personnel, 1985 (thousands)		
	Active	Reserve	Ratio	Active	Reserve	Ratio
USSR	3,705	5,000	.74	460	460	1.00
U.S.	2,117	900	2.35	569	108	5.27
Turkey	569	836	.68	46	70	.68
FRG	495	750	.66	36	25	1.44
France	493	457	1.08	68	50	1.36
Italy	370	799	.46	44	221	.20
Spain	347	1,085	.32	57	285	.20
UK	328	282	1.16	71	30	2.37
Canada	83	21	3.89	14	3	4.67
Norway	42	243	.17	8	25	.32

Except for the United Kingdom, our information on the reserve structures of the other countries was not complete enough to warrant detailed examination. A U.S./UK comparison is, however, instructive. The United States and Britain have the largest free world navies; moreover, both procure personnel by voluntary methods. Since September 1982, the British have used an "Open Engagement" system with new Royal Navy recruits signing up for 22 years (until retirement). If they leave the Navy before their 22 years are up, they are liable for 3 years service with the Royal Fleet Reserve (RFR). Only some of them, however, (currently 24,800), are actually selected for the RFR. They do not drill regularly but they are readily available for mobilization.

In addition to the RFR, Britain has a Royal Naval Reserve (RNR) in which entrance is voluntary. Initial obligations are 5 years for males and 3 years for females; these periods are renewable by 5 and 3 years, respectively, up to the age of 50. There are currently 5,600 of these paid, drilling reservists, the great majority of whom do not have prior military service. The number in table 1 combines the RNR and the RFR.

We have clear definitions of the two components of the British Naval Reserves, and thus the ratio of active to reserve naval personnel in Britain is quite straightforward. Our best guess about which U.S. Naval reservists are comparable to the British naval reserve is the total of the Fleet Reserve (59,000), the Individual Ready Reserve (70,000) and the Selected Reserve (114,000); adding these components revises downward the naval active/reserve ratio for the U.S. to 2.40, a number quite close to the British ratio of 2.33.

If we're trying to measure a country's relative commitment to its reserve forces, it might also make sense to look at the equipment it has in reserve; the obvious piece of equipment for a naval force is the ship. When one looks at ships, the problem of definition becomes even more complicated. We were able to find no satisfactory source of comparative data on ships in reserve. Jane's Fighting Ships, the preeminent source, does not distinguish between ships in mothballs and ships manned largely by reservists, the two primary categories of reserve ships; moreover, the data in Jane's are incomplete. Finally, comparing reserve ships, like comparing manpower, is complicated by the numerous variations in the way different countries think of, organize, and administer their resources.

Once again, a comparison of the U.S. and UK systems illustrates the problem. In the U.S., the National Defense Reserve Fleet (NDRF) comprises former Navy and Military Sealift Command (MSC) ships and inactive merchant ships owned by the government and maintained in "wet storage." The NDRF is administered and maintained by the Maritime Administration. Its ships are capable of being mobilized within 6 months. The most modern and capable units of the NDRF are known as the Ready Reserve Force. They are kept in a higher state of readiness and can be operating within 5 to 20 days.

Then there is the Navy Inactive Fleet, made up of former active Navy vessels. As of April 1986, some 30 ships and 40 craft were being held as mobilization assets. Others were designated for cannibalization, and still others were pending disposal. The ships that could be reactivated include carriers, cruisers, destroyers, amphibious ships, and auxiliaries. The Navy Inactive Fleet is controlled by the Naval Sea Systems Command.

Finally, there are the "active" reserve ships, the Naval Reserve Force, those ships that are manned by crews made up primarily of reservists, both TARs and Selected Reserves. They are under the regular Navy command structure and are scheduled in the same way as active forces. The NRF now comprises 1 destroyer, 11 frigates, 18 minesweepers, 2 amphibious ships, 4 fleet tugs, 2 salvage ships, and 9 craft of opportunity. An ambitious expansion and modernization of the NRF is underway.

The British, on the other hand, do not maintain much of a force in mothballs. They tend to sell or scrap their older vessels. Detailed information on their holdings was not available. The Royal Navy Reserve operates about 11 minesweepers and 10 coastal training craft. Additionally there is a small Royal Naval Auxiliary Service (RNXS) which operates 15 small craft. Like the U.S. NRF, the RNR is modernizing its mine countermeasures force, so these numbers are dynamic.

About the only conclusion that can be drawn from this incomplete information is that the U.S. has a fairly substantial ship force in reserve. To gain a more complete understanding of assets in reserve would require a study of other resources that are designated for mobilization, such as the Coast Guard and U.S. flag merchant ships. Then it would be necessary to compare these with USN and MSC active ships to obtain some

kind of active/reserve ratio. And to compare the U.S. with other countries would require going through the same process for each of them, but with substantially more data problems. For a really complete analysis, consideration would also have to be taken of the relative capabilities and availability of the resources, a far from trivial undertaking.

In summary, comparing active/reserve force mixes among the U.S. and other countries is difficult. First there is a paucity of information. Second, even when information is relatively complete, as it is for Britain and the United States, dissimilar organizational structures run the risk of an "apples to oranges" comparison. It appears at first that the U.S. Navy has a richer mix of active to reserves than do other countries, at least in regard to personnel. However, this finding may be caused by definitional problems: other countries classify broader categories of individuals as reservists than does the United States. In fact, our closer look at the Royal Navy, the second largest all-volunteer force, suggests that the British active/reserve force mix is roughly comparable to that of the United States.

To do more meaningful comparisons across countries involves a larger collection of information and an appreciation of the strategic, geographic, historical, and political factors that influence a country's active/reserve force mix. Without a regard for the country-specific context, as well as the purely definitional differences, valid comparisons cannot be made.

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ACTIVE/RESERVE COSTS OF NAVY UNITS

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INTRODUCTION

Annual operating and support cost differences between active and reserve Navy units can be explained by focusing on the number and nature of their assets and activities. These boil down to personnel, equipment, and operating tempo. In general, both active and reserve units contain the same number of people. However, the mix of full-time and part-time people is quite different, providing one element to their inherent cost differences. Full-time people in reserve units are active duty USN personnel. Full-time people in reserve units are Training and Administration of Reserve (TAR) USNR personnel. The costs of full-time personnel are similar. Part-time people in both active and reserve units are of the Selected Reserve, and, for the most part, have had prior service experience. Because of their prior affiliation and experience, the cost to acquire and train Selected Reservists is considerably less than for full-timers.

Equipment type, quality, and quantity is generally the same for active and reserve units. Although reserve units have previously received the equipment castoffs of their active counterparts, current planning gives the reserves equal treatment. However, it may be some time before this equal treatment is achieved throughout the reserve forces. Some differences exist in the inventories of aircraft maintained for training of active and reserve units, but we will ignore that here.

Because of higher proportions of part-time people in reserve units, and restrictions on their deployment time, reserve units cannot achieve the same levels of activity as their active counterparts. This lower operating tempo translates into lower operating cost.

RELATIVE MANPOWER COSTS

Part-time reservists generally work one weekend per month plus two weeks active duty training. This constitutes 10 percent of the time put in by full-timers. However, because part-timers are essentially paid double-time for their weekend participation, they get 16 percent of full-time pay and allowances. Support, which includes medical and welfare activities, base operations, and replacement training, has increased for selected reservists as a result of the Sea Air Mariner (SAM) programs for both officer and enlisted personnel. The larger cohort of non-prior service entrants into the reserves increases the costs for acquisition and training. This affects officers to a larger degree than enlisted men and results in a total cost per reserve officer almost twice that of pay and allowances alone.

The full-time/part-time mix of people can vary considerably, but in general, ship systems require a higher proportion of full-timers than aircraft systems.

OPERATING TEMPO

Lack of full-time crews results in reserve units generally experiencing half the activity rates of their active counterparts. This means that reserve units consume less fuel and suffer fewer activity rate-related failures. It also means they are less available to perform peacetime missions or to participate in fleet exercises.

ANNUAL O&S COSTS

By looking at the comparative annual O&S costs of typical Navy active and reserve units, we can get an appreciation for the kind of cost savings that result from reserve substitutions for active units. Because the reserve P-3 squadron contains a larger percentage of part-time people (75 percent) than do the frigates (55-60 percent), and because aircraft O&M costs are more activity related, the reserve P-3 squadron costs considerably less than its active counterpart compared with the reserve frigates. Ship costs reflect some offsetting costs to the savings associated with part-time people on board reserve ships. The lack of necessary full-time people to perform organizational maintenance creates a need to transfer ship's force maintenance to an intermediate facility. The added people at the intermediate facility are chargeable to the reserve ship.

OTHER ACTIVE/RESERVE COST ISSUES

Annual O&S costs of active and reserve units can be thought of as the tip of the iceberg. The costs associated with site and force related issues could dwarf any savings resulting from a transfer to reserve status. The costs of constructing and modifying bases and facilities to accommodate the new reserve initiatives could be enormous relative to O&S costs. This is of particular importance when considering that efficient basing of active units favors concentrating forces, while dispersed basing is favored for reserves to encourage broad participation from local communities. Similarly, where communities cannot provide sufficient reserve manpower, other alternatives are available. Affiliation incentives or transportation options can be resorted to, both of which can have high initial as well as recurring cost implications.

The dispersed basing of reserve units also has implications on force support activities. Intermediate maintenance activities, inventory control points, supply, medical and welfare activities may need additional facilities or place greater demand on transportation assets. The prepositioning of war reserves as well as the mix of equipment and ordnance may need to be altered to accommodate a higher concentration of reserve forces. The peacetime commitments normally carried out by

active forces (e.g., presence, tracking, political, exercises) would be effected by shifting forces to the reserves. The remaining active forces would face higher activity rates if they were to meet the same level of peacetime commitment, offsetting some of the cost savings of such transfers.

In short, the decisions involving active/reserve tradeoff issues require far greater understanding than mere savings associated with annually recurring unit related costs. More effort must go into understanding site and force related cost issues.

COST ANALYSIS OF SELECTED UNITS IN THE
MARINE CORPS ACTIVE AND RESERVE COMPONENTS

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This study analyses several issues involved in changing the current structure of the total force for the U.S. Marine Corps [1]. It develops a methodology for estimating annual operating costs of similar units in active and reserve components and applied the model to two cases--infantry battalions and CH-46E squadrons. The analysis includes estimates of the start-up costs incident to the transfer of units or missions from the active Marine Corps to the Selected Marine Corps Reserve (SMCR).

The study combines published cost factors and budget data to estimate operating and support (O&S) costs for the two case studies. Cost elements estimated are personnel,¹ including base operating support, equipment operations and maintenance; and ammunition training allowances. The analysis concludes that annual O&S costs for a reserve infantry battalion are approximately 35 percent of the cost for a similarly manned and equipped battalion in the active force. For an SMCR CH-46E squadron the comparable fraction is 74 percent. The estimated costs for FY 1983 are shown in table I.

TABLE I
ANNUAL OPERATING AND SUPPORT COSTS
(Millions of FY 1983 dollars)

	<u>Active</u>	<u>SMCR</u>
Infantry battalion	16.9	5.9
CH-46E squadron	10.1	7.5

In studying start-up costs three different scenarios were investigated:

- o Scenario 1--deactivation of an active unit and transfer of its mission to an existing reserve force
- o Scenario 2--deactivation of an active unit and simultaneous start-up of a new SMCR unit

¹Retirement costs are excluded because of the unreliability of the estimates. Excluding retirement costs does not substantially change the results.

- o Scenario 3--start-up of an SMCR unit and deactivation of an active unit after 3 years.

The start-up costs included in the analysis were construction of facilities, entry-level training, travel, transportation and procurement of equipment, and post-entry-level training. The total start-up cost for each scenario is given in table II.

TABLE II

START-UP COSTS
(Millions of FY 1983 dollars)

	<u>Scenario 1</u>	<u>Scenarios 2 and 3</u>
Infantry battalion	4.1	18.2
CH-46E squadron	3.0	8.3

The estimates of the annual operating costs and start-up expenses are combined to give a total expenditure cost during the period of time in which the prospective force mix change would take place. This time period is assumed to be 3 years and includes the completed transfers described in the three start-up scenarios. In addition, it is assumed that it takes 1 year to deactivate an active unit. The resulting estimates are shown in table III.

TABLE III

COMPARISON OF TOTAL 3-YEAR EXPENDITURES
(Millions of FY 1983 dollars)

	<u>Start-up costs</u>	<u>Additional reserve unit</u>	<u>Active unit</u>	<u>Total</u>
Infantry Battalion				
Status quo	0	0	50.6	50.6
Scenario 1	4.1	0	16.9	21.0
Scenario 2	18.2	17.7	16.9	52.8
Scenario 3	18.2	17.7	50.6	86.5
CH-46E Squadron				
Status quo	0	0	30.3	30.3
Scenario 1	3.0	0	10.1	13.1
Scenario 2	8.3	22.6	10.1	41.1
Scenario 3	8.3	22.6	30.3	61.2

The expenditures for each of the three scenarios show marked differences. The first scenario, because it involves a decrease in

total end-strength, is the cheapest option. The first scenario results in a savings over the status quo in the initial 3 years. The other two options do not provide any new reduction in spending until at least the fourth year. Table IV shows the first years of reduced total expenditure for the three scenarios considered.

TABLE IV
FIRST YEAR OF REDUCED TOTAL EXPENDITURE

	<u>Scenario 1</u>	<u>Scenario 2</u>	<u>Scenario 3</u>
Infantry Battalion	2	4	7
CH-46E Squadron	2	7	14

The general cost analysis presented here can easily be applied to other Marine Corps units. Other units that have been examined with similar cost reduction results include maintenance battalions, landing support battalions, and CH-53 squadrons.

It must be stressed that these cost comparisons do not assume that active and reserve forces are equally capable or that the proposed scenarios will result in the same level of readiness. In fact, the cost of each proposed change in the force structure is inversely related to its effect on military capability. The least-cost option, for example, leaves a mission uncovered for about 2 years, or however long it takes a reserve unit to attain wartime readiness. The other two scenarios studied, while less drastic in their impact, reduce the ability of the Marine Corps to respond to contingencies, if for no other reason than that a force that was immediately available must now go through the mobilization process.

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RESERVE FORCE COST RESEARCH

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OVERVIEW

This paper summarizes the cost research of the Reserve Forces that has been conducted by The Rand Corporation in the last few years. It describes the analysis of the annual recurring operating and support costs of comparable units in the Active and Reserve force structures and the analysis of the non-recurring costs associated with unit changes in the Reserve Forces.

Annual Unit Operating and Support Costs

In fiscal year 1983, the then newly created Office of the Assistant Secretary of Defense for Reserve Affairs (OASD/RA) asked Rand to analyze the annual recurring unit costs of Reserve Force units in all three of the military services. The objectives of this research were to develop methods to provide cost inputs to policy decisions and to understand and quantify those factors that contribute to the difference in annual costs of similar Active and Reserve Force units. The analysis included the development of annual operating and support (O&S) cost estimates for a number of case study units in the Army, Navy, and Air Force. The results of this research are documented in a pair of Rand reports (1, 2).

The cost estimates include the average, recurring costs of unit personnel, equipment operations, and peacetime base support. They do not include fixed, force-wide, or sunk costs such as force administration costs, unit conversion costs, or the fixed base operating support, depot maintenance, or training school costs. Also, any costs, such as training expenditures, incurred by the Active force for prior-service personnel recruited by the Reserve Forces are not included in the cost estimates of the Reserve Force units. The cost estimates, therefore, represent the steady state annual costs associated with having an incremental unit in the force structure stationed at an existing installation. Personnel-related costs are based on the current force structure and the flow of personnel into, out of, and between the Active and Reserve components.

Figure 1 shows the results of the analysis of the annual costs of 16 aircraft C-130E units in the Active Air Force and in the Air National Guard. Figure 2 shows the cost estimates for a mechanized infantry battalion in the Active Army and the Army National Guard. These units are representative of the overall results of the case studies and show the wide variance in cost differentials between Active and Reserve Force units for capital intensive units (C-130E) and labor intensive units (infantry battalion).

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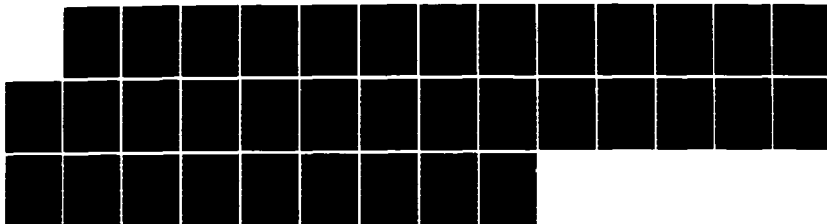
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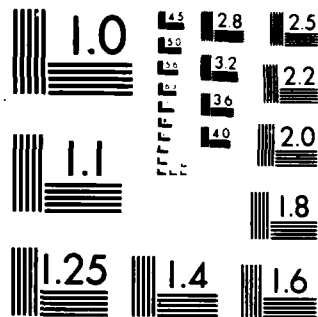
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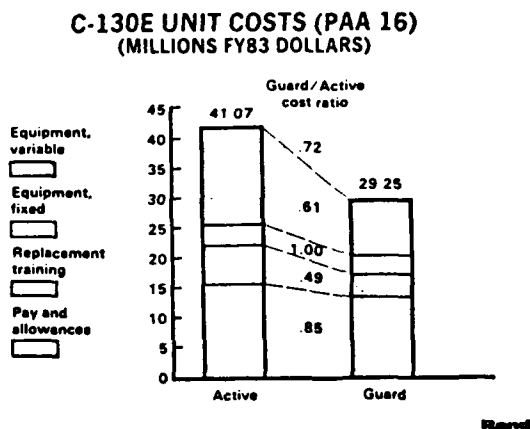


Fig. 1

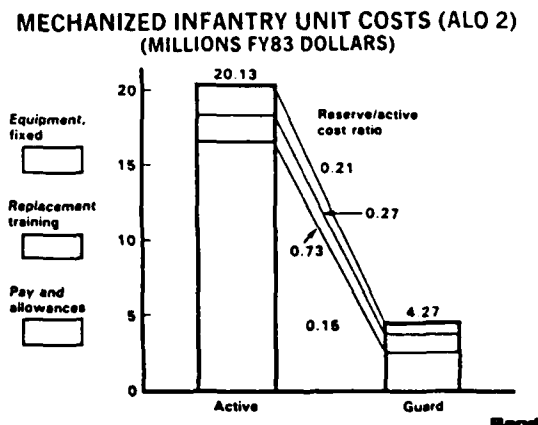


Fig. 2

Figure 1 shows that the Air National Guard C-130E unit has annual O&S costs equal to approximately 72 percent of the similar Active unit. The ANG personnel-related costs are 75 percent of the Active unit personnel costs and the ANG equipment-related costs are 67 percent of the Active's equipment-related costs.

Most of the fixed costs per aircraft and the variable costs per flying hour were assumed to be equal for the Active and ANG units. The only difference in equipment cost factors is a lower POL cost per flying hour for ANG aircraft. Although this factor contributes to the lower ANG equipment-related costs, the fewer programmed flying hours in peacetime (462 flying hours per aircraft per year for the ANG C-130Es versus 720 for the Active aircraft) is the main reason that the ANG's equipment related costs are lower than those of the Active unit.

Typically, the main savings for Reserve units as compared to Active units is assumed to be in the personnel area since Reserves are a part-time force in peacetime. However, the results for the C-130E case study show that the personnel pay and allowances for the ANG unit are not that different from those of the Active unit. The high ANG unit personnel cost is mainly due to the full-time members of the ANG unit--for example, 239 of the 625 unit personnel are full-time Air Technicians (ATs). These ATs receive both their civilian and military reservist

wages. Most of these full-time personnel are in maintenance and provide the continuous maintenance support required for peacetime aircraft operations.

Figure 2 shows that the National Guard mechanized infantry battalion has annual O&S costs equal to approximately 21 percent of an Active unit. This ratio was generally the same across all the units investigated in the Army.

The elements of annual cost are presented in a manner similar to the C-130E costs with the exception of the representation of equipment related costs. Because we had no equipment activity levels or cost factors for Army units, fixed and variable equipment costs could not be separated. The equipment costs displayed in Figure 2 are based on data collected from Active Army units at Fort Hood and units of the Texas National Guard. Similar data were collected for Active units at Fort Stewart and from the Georgia National Guard.

The mechanized infantry case study shows a very different picture from the C-130E case study. First, for Army units, equipment-related costs are a small part of total unit costs. Therefore, the uncertainty surrounding the unit equipment cost estimates should not greatly influence the total unit cost estimates. The second main difference between the mechanized infantry and the C-130E case studies is the low personnel-related costs of the Army National Guard unit compared to the Active. Both the Active and National Guard units have the same numbers of personnel (as specified in the unit TO&E). The National Guard unit, however, is truly a part-time force in peacetime, having relatively few full-time personnel assigned (19 out of 874). The low number of full-time personnel results in a ratio of Guard to Active personnel costs of 15 percent, reflecting the fact that part-time Reserve component personnel drill about 15 percent of the year.

The qualitative results of the analysis can be summarized by addressing the Reserve unit personnel and equipment cost advantages evident in the case studies. If combat units are labor-intensive (personnel), and if there are few full-time personnel associated with Reserve units, then the annual O&S costs of Reserve units will tend to be significantly less than the annual costs of comparable Active units. For capital-intensive combat units, if the fixed portion of equipment costs is smaller than the variable portion and if the peacetime activity rates of the Reserve unit are lower than the activity rates of the Active unit, then the equipment-related annual costs of Reserve units will tend to be significantly less than those of Active units. Overall, the cost differences between similar Active and Reserve units varied greatly for the different types of units analyzed, suggesting that the cost analysis of force-mix decisions should be based on analysis at the unit level. The models and data bases developed by this research provide some of the tools necessary to estimate the annual costs of specific types of units.

Non-recurring Costs of Reserve Unit Changes

The analysis of annual recurring costs produced steady state cost estimates appropriate for a static force. The Reserve Forces, however, have been changing dramatically in recent years as new units have been activated asnd existing units have received either additional or new weapon systems. Changes to the force structure result in numerous costs including non-recurring costs and changes in the annual recurring costs of both the unit undergoing the change and, potentially, other units in the force structure.

To extend our analysis of Reserve unit costs to include the costs resulting from changes to the Reserve Force structure, we again performed a number of case studies of recent unit changes. The non-recurring cost estimates of these case study unit changes are displayed in Table 1. The costs in Table 1 are based on program and budget factors and are for individual unit decisions (versus the cost of changes that affect multiple units). They exclude any overhead or system-wide costs, any sunk costs, and any costs due to normal upgrade of facilities and equipment.

The results of the non-recurring cost analysis of Reserve Force unit changes suggest:

Table 1

NON-RECURRING COSTS FOR CASE STUDY UNITS (Millions of FY 85 Dollars)

Case Study	Non-Recurring Costs					Total
	Construction	Weapon Procurement	Suppt. Eq. Procurement	Personnel Acquisition	Personnel Training	
Naval Reserve Forces						
FF1052: San Francisco (2 ships)	29.7	0	2.0	2.0	6.7	40.4
New York (2 ships)	31.2	0	1.0	2.0	6.7	40.9
FFG7: Long Beach (6 ships)	11.2		0	3.0	10.0	24.2
Puget Sound (2 ships)	68.0		1.0	1.0	3.3	73.3
A-7E: Cecil (12 PAA)	0	0	.7	0.0	0.6	1.3
Atlanta (12 PAA)	0	0	9.8	0.0	0.6	10.4
New Orleans (12 PAA)	0	0	8.5	0.0	0.6	9.1
F-14: Oceana (24 PAA)	19.0	0	9.5	1.8	3.0	32.3
Dallas (24 PAA)	0	0	29.8	0.0	3.0	32.8
Air Reserve Forces						
F-16: Luke (24 PAA)	16.0	302.4	18.0	2.2	57.1	395.7
Kelly (24 PAA)	2.1	302.4	18.0	0.3	40.6	363.4
C-5: Kelly (16 PAA)	55.5	0	18.2	1.4	28.9	104.1
Stewart (8 PAA)	91.8	0	17.3	1.1	18.1	128.3
C-141: Andrews (8 PAA)	6.9	0	12.0	0.4	8.7	28.0
Jackson (8 PAA)	18.3	0	12.0	0.3	11.4	42.0

- o Construction costs usually far outweigh personnel-related costs.
- o The non-recurring costs associated with a transfer from the Active to the Reserve Forces can usually be offset by the potential savings in annual costs.
- o Changes that involve the transfer of equipment from the Active to the Reserve or that result in minor differences in the quantity and training requirements of the personnel usually have relatively minor non-recurring costs.
- o Costs can be reduced if bases and equipment can be shared and if an available pool of personnel, especially non-prior service personnel, are available in the basing area.

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RESERVE FORCES PERSONNEL DATA BASES:
CURRENT STATUS AND FUTURE PLANS

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Defense Manpower Data Center

The Defense Manpower Data Center (DMDC) serves as a central repository for historical automated personnel files from Department of Defense components. The Assistant Secretary of Defense (Force Management and Personnel) sponsors DMDC and is responsible for its tasking and direction.

Established in 1974 as a government activity, DMDC collects and maintains a large number of personnel files and provides data support to the Office of the Secretary of Defense, the Military Departments and others working in the area of DoD Manpower/Personnel issues. The files are maintained in ways which allow quick retrieval of data using standard software packages. In addition to doing large numbers of queries for the Defense community on personnel issues, DMDC uses its data resources to support a number of operational personnel programs as well. DMDC serves as DoD's central point for Debt Collection; it runs a fraudulent enlistment detection system; DMDC calculates the Overseas Housing Allowance and the Variable Housing Allowance; eligibility verification for the new GI Bill is done at DMDC.

DMDC holds a large number of automated data bases and views their collection and maintenance as a three dimensional problem.

1) Total Force Data Base. DMDC collects information on virtually all DoD employees: Active Duty Military; Reserve personnel; DoD Civilians and Military Retirees. Not only does this give us counts of each of the major subpopulations; but, using Social Security Numbers, we can track movement from one status to another.

2) Life Cycle Profile. DMDC receives records on DoD personnel at each important milestone in their career with DoD.

3) Permanent Historical Archive. All files are considered permanent records and will be kept indefinitely. Older files are also maintained so that time series analyses can be done using data which is analytically consistent.

In the area of Reserve personnel, DMDC holds a number of files of interest.

I. Reserve Components Common Personnel Data System (RCCPDS)

This data base was started as the official source of Reserve strength reporting data. On a monthly basis, an inventory (containing a record on each reservist showing his or her status as of the last day of the month) and a transaction file (showing gains and losses to the Selected Reserves) are submitted to DMDC. DoD Instruction 7730.54 gives the detailed data requirements and definitions, as well as the policy for reporting procedures. The files cover all officers and enlisted personnel assigned to: the ready reserve, the standby reserve and the retired reserve. Since FY85, all full time support has also been reported in RCCPDS.

Historical information on Reserves is available back to 1974. At that time, inventory files were submitted quarterly and no transaction files were submitted. Starting in FY78, monthly inventory and transaction files were submitted.

The RCCPDS system currently gives us approximately 50 data elements on each Reservist. These cover: identification (e.g. SSN, name); demographic characteristics (e.g. sex, education, race and ethnic); reserve information (e.g. training pay category, unit identification code); and service information (e.g. occupational specialty, Basic Active Service Date). The file is used extensively to provide strength accounting and management information to the Office of the Secretary of Defense. Using the file, DMDC produces a number of recurring reports, including a quarterly book of Official Guard/Reserve strengths, which provide management with a timely and accurate look at the changing makeup of the Reserves. In addition, RCCPDS is DMDC's single source for Reserve information in support of fraud and abuse reduction. DMDC uses RCCPDS, in combination with other computerized files, to check on benefit eligibility. DMDC is currently starting a project to add Reserve personnel records to the Defense Enrollment and Eligibility Reporting System (DEERS). This health care eligibility system, will have the Reserve records available as individuals come onto active duty, or in case of a Reserve call up.

II. Prior Service Military Available (PSMA)

This file identifies the group of recent veterans eligible to reenter military service. DMDC constructs the file by taking the records of all separations, screening out those with unsatisfactory service records, and adding in information on the former members' address at separation. This address information makes this file useful for a number of applications. The primary use of this file is to generate lists of individuals as leads

to both Active Duty and Reserve recruiters. These lists can be customized by geographic area (e.g. within 50 miles of a Reserve unit) or occupation. These files can also be used by other DoD and government components to locate individuals with scarce or highly technical skills. Finally, these files show a pool of pretrained manpower which could be drawn upon in the event of a mobilization.

III. Reserve Cohort Files

A cohort is any group who shares a set of common characteristics. DMDC builds a number of cohort files which would be of interest to those working Reserve personnel issues. The first, which we call the Reserve Attrition Cohort, is built by sequentially matching all Reserve gains for a given fiscal year against subsequent Reserve inventory and transaction files. This match will track the tenure and status of each Reserve gain in the Reserve forces and allow us to determine attrition rates. Finally, the file is matched against active duty and reserve inventory files on the anniversary of the gain date to look for cases of Reserve reentry and transfer from the Reserves to active duty.

The Reserve Career History cohort file is under development for a project by DoD's Training and Performance Data Center. This cohort again starts with all Reserve gains for a fiscal year, but this file looks backward in time to identify the career history of those gains. It looks for prior service patterns and the length and quality of active duty service.

IV. Other DMDC files. Other DMDC files of interest would include those submitted by the Veterans Administration on post-service and in-service use of educational benefits. DMDC receives testing and accession files containing information on Reservists from the Military Enlistment Processing Command. Personnel Security information is contained on the Defense Central Index of Investigations.

Taken as a group, the files available at DMDC form a valuable pool of information for the study of Reserve personnel. The files can track the dynamics of the Reserve forces as people change training pay categories and components. Using the active duty files, important information can be developed on the flows between the active and reserve components.

As we look toward the future, there are a number of initiatives which will affect the quality and type of Reserve personnel available in the future. In April 1984, the Deputy Assistant Secretary of Defense (Guard/Reserve Manpower) formed a steering group and working group to

assess and improve the quality of data submitted in the RCCPDS system. This group focused flag level attention on the problems of data quality and sought timely solutions. OSD, in addition, provided support during the POM and budget process for funding upgrades of Component reporting procedures and equipment. The working group conducted an in-depth review of each data element. Consistency across Component and accuracy were the major concerns of this review. The working group also coordinated a major expansion of the content of RCCPDS. The number of data elements was expanded from approximately 50 to approximately 100. New elements were added in four major program areas:

- 1) Language identification and proficiency. Data on the first and second language identification and proficiency were added to support a central data base on DoD linguists. Proficiency reporting is required in three areas: speaking, reading, listening.
- 2) New GI Bill. This program started in July 1985 to provide support to Reservists attending courses leading to a baccalaureate. There are almost 25,000 selected reservists currently receiving benefits. This program requires a number of items of information in order to confirm eligibility, and continuing satisfactory performance in the Selected Reserve.
- 3) Personnel Security. DoD has a heightened interest in knowing the numbers of individuals investigated for and holding security clearances.
- 4) Retirement. DoD needed additional information on each individuals' accumulation of points leading to eligibility for retirement. Date and point information will fill the needs of OSD for accurate ways to predict the future costs of the Reserve Retirement System.

The DoD Instruction containing the modified data requirements was signed in May of 1986, and data will start being reported with the October 1986 cycle.

January 1987, will mark the start of a large study of Reserve pay by the Sixth Quadrennial Review of Military Compensation. The Quadrennial Review intensively studies a portion of the military compensation picture and makes recommendations on changes in the pay system. This time Reserve pay and its integration with active duty pay will be the topic studied. In order to do a valid and defensible study data will be needed in two areas.

The first need will be for records of Reserve pay for individual Reservists. These records will need to show all the different types of pay and allowances separately, as well as providing detailed information on attendance at drills by drill type. DMDC is currently structuring a data call which will supply these needs. Since these records are not now kept centrally at the DoD level, the hope is that some historical information can be gathered at the same time.

Second, information on the employment picture in the Reservists full time job needs to be examined. For this, data from a comprehensive survey of selected reservists will be utilized. This survey is currently being administered to a random sample of 160,000 selected reservists and their spouses. The survey will focus on civilian employment and earnings of Guard and Reserve personnel and the spouse's knowledge of Guard/Reserve benefits and entitlement.

The survey administration began in March 1986 and will be completed shortly. The results of this survey will fill important gaps in our knowledge of the civilian environment that reservists operate in and provide insight into the spouse/family perceptions of service.

Taken as a whole, these new initiatives and data will result in a much more complete picture of the Reserve forces and the Reserve experience. OSD's intention is to raise the quality and completeness of Guard/Reserve data to a level that will support sophisticated analysis of alternative personnel policy and pay options. We are fairly far down the road which will lead us to that point.

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USING ANALYSIS TO DESIGN RESERVE POLICIES THAT SUPPORT NATIONAL STRATEGY

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All of the papers at this conference have been devoted to performing research to help design better policies for the reserve components, and this one is no exception. Its perspective, however, is a bit different. It is derived from work that is being done for OSD (Reserve Affairs), which is interested in better using analysis to insure that our policies for the reserve components serve the broad goals of national strategy.

Three conditions must hold for analysis to be able to improve reserve policies:

- Researchers must know what questions to ask. These are pretty well known.
- They must do research to develop answers to the questions. This is what most of the deliberations of this gathering have been about.
- The decision-making system must be set up to be interested in the questions and to use the answers. This is the focus of this paper.

In general terms, an effective decision-making system for developing policies for the reserve components is one that identifies places where reserve policies are not serving the needs of national strategy, asks for analysis of the problems, and modifies the inadequate policies based on the analysis. A more detailed depiction of a decision-making process that would tie reserve policies to national strategy is suggested in Figure 1.

For policies to be tied to strategic goals, they must be derived from strategic goals. These must then be translated into the military capability necessary to achieve the goals. Military capability can be described in terms of what forces are needed, where they are needed, and when they have to be there to execute the strategy. This doesn't imply planning for one scenario. A strategy can imply many scenarios that we want to be able to handle. The desired military capability must be adequate for each of the scenarios in a strategy.

The mix of active and reserve forces should be the most economical set of forces able to produce the desired military capability, given the planned capabilities and expected costs of both active and reserve units of the relevant kinds. Of course, the reserve components should be managed in a way that achieves the planned capabilities of reserve units. If it isn't we are kidding ourselves.

The framework in Figure 1 has three key elements. First, there has to be feedback. If we can't execute the strategy within the budget, we should change one or both. If we find that our reserve forces don't have the capability they are supposed to have, we should change our policies to achieve the planned capabilities, or make our planning reflect reality. A second, related, point is that we can't do all our planning with respect to one strategy. If that strategy proves unaffordable, we must be able to consider others. This requires at least a rough idea of

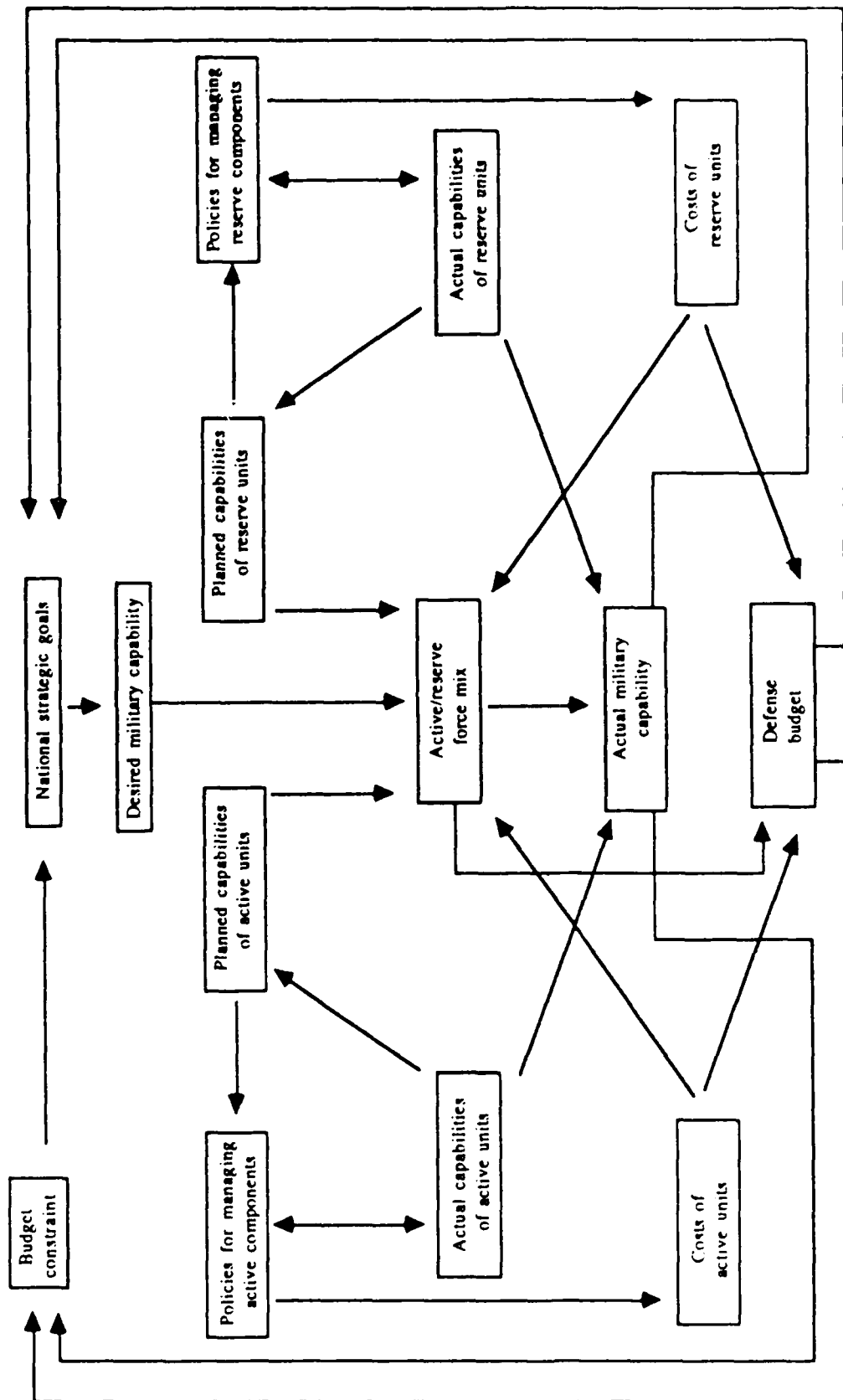


Figure 1. A FRAMEWORK FOR TYING RESERVE COMPONENT ISSUES TO NATIONAL STRATEGY

the forces needed to carry out alternative strategies. Finally, a strategy-based decision-making structure requires three kinds of analysis: analysis of what, where and when forces are needed to execute a strategy; analysis of the most economical active/reserve mix consistent with these desired forces; and analysis of how to make our forces (particularly our reserve forces) as capable as we plan for them to be.

How does today's decision-making structure compare to the idealized one just described? The Organization of the Joint Chiefs of Staff (OJCS) develops a "planning force" based on the requirements of national strategy embodied in the Defense Guidance (DG). The planning force has no real identification of the reserves. It assumes that all forces are where they are needed when they are needed. It is based on only one scenario and is unaffordable. This unaffordability assures that it has little impact on programming. Most important, there is no feedback among forces, goals and budgets. We change neither the strategy nor the budget, assuring continuing inconsistency.

Active/reserve force mix decisions are largely budget driven, not strategy driven. The services are responsible for the development of reserve management policies. They can tie policies to the achievement of broad goals as tightly or as loosely as they see fit. Both OJCS and the Office of the Secretary of Defense (OSD) review the services' programs. By-and-large this review consists of seeing how well the programs meet the mid-term objectives contained in the DG. Since the mid-term objectives pay very little attention to the reserves, reserve policies receive little scrutiny in the program reviews.

Figure 2 is a schematic version of the links between reserve component issues and national strategy in today's decision making system. It differs from the system in Figure 1 in three ways. There is no real link between desired military capability and anything in the programming system. The mix of active and reserve forces is not designed to be the most economical way to achieve any specified level of defense capability. Sometimes the services manage reserve forces with a close eye to whether units achieve their planned capability, but sometimes they don't.

Since reserve policies are largely service determined, they should be evaluated by service. None of the services really bases its active/reserve mix decisions on an analysis of the most economical way to perform a set of missions -- though the Air Force probably comes closest, but there are considerable differences among their approaches.

The Army seems to want to maintain as much active combat force structure as possible. This means that most support functions must be in the reserve components, which in turn means that almost any contemplated Army action requires using the reserve components. Despite this there are some very serious gaps between planned and actual capabilities. The readiness of medical units is a particular problem, and the unavailability of time to do enough unit training is also a cause for concern.

The on-going expansion of the Navy's Selected Reserve is a response to Congressional pressure enforced by limitations on active end-strength. The mix of active and reserve forces is determined incrementally, not on the basis of what mix can do the overall job most economically. The Navy is now paying close attention to making the reserves as capable as it believes they need to be.

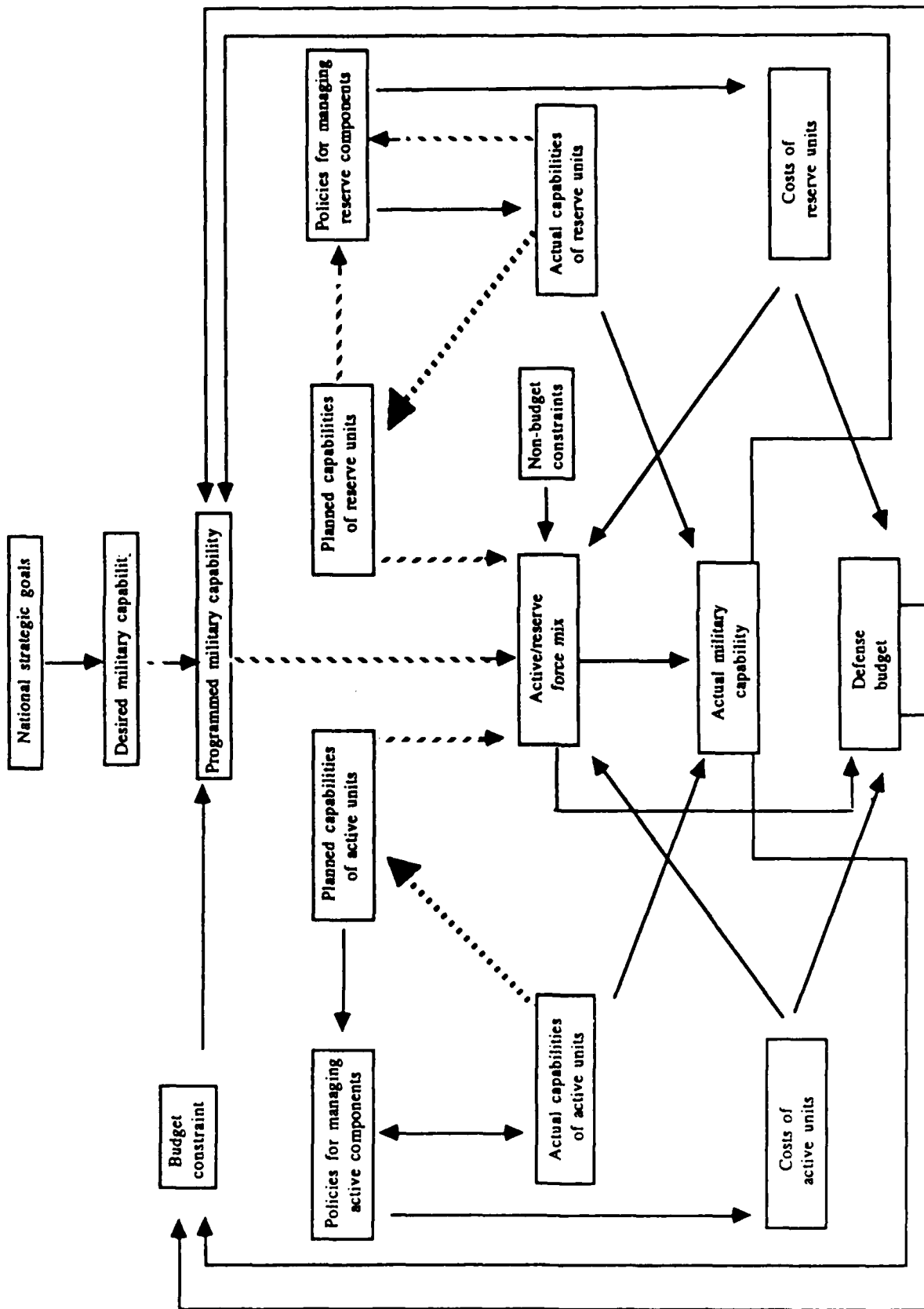


Figure 2. A SCHEMATIC VIEW OF THE LINKS BETWEEN RESERVE COMPONENT ISSUES AND NATIONAL STRATEGY

The Air Force is widely felt to have highly capable reserve forces. The Marine Corps has the same problem with available training time as the Army.

Since this is a conference on Naval Reserve Manpower, it is appropriate to review areas in which the Navy has had problems because it was not giving adequate attention to designing reserve manpower policies to efficiently achieve the planned level of capability:

- Medical and construction ratings account for about 40 percent of selected reserve requirements. There are still substantial personnel shortages in these ratings. The shortages are being addressed through non-prior service accession programs, but gaps are expected to persist until the early-to-mid 90s.
- Although the training readiness of reserve ships has improved, it is still difficult to provide reservists with the amount and kinds of training they need. The Navy has developed an impressive list of reserve training initiatives, but the area will require continuing attention.
- The case of requirements for low-paygrade selected reservists proves that having feedback in the system doesn't insure good policy. The SAM program was started to fill low-paygrade billets that traditional prior service accession programs couldn't fill. It took in 10,000 non-prior service reservists a year to fill low-paygrade billets in the Selected Reserve. This was done despite the fact that it would have been cheaper to fill the slots with higher paygrade prior service personnel, who also would have known their jobs better. Recently, the program has been scaled back and heavily oriented toward ratings with limited sources of prior service personnel, but asking for some analysis up front could have prevented a costly false start.

Not only is the Navy paying more attention to making its reserves effective than it used to, there are other signs that more of a strategic orientation will be taken throughout DOD. The National Security Council's direction to OJCS to develop an affordable planning force shows concern about the lack of feedback in the system. It is not clear, however, how the inevitable inconsistency between any affordable force and our currently stated strategy will be handled. Perhaps even more to the point, Congress may mandate development of an affordable strategy, which could force greater consistency between planning and programming. The recent push toward JCS reform seems likely to give OJCS more influence in the resource allocation process. In its role as a conduit for the views of field commanders, OJCS may well show increasing concern for the ability of reserve forces to execute their roles in war plans. In addition, the Navy has just instituted a study of strategic planning for the reserves. This includes constructing alternative active/reserve mixes and evaluating them in terms of their impact on execution of the Navy's Maritime Strategy.

This review leads to the following conclusions:

- The planning and programming systems are not well suited to analytically design reserve policies to serve national strategy. They often do not ask the right questions.
- Policies are not derived from strategic considerations.
- There is not enough feedback.
- There are some signs of improvement.
- Due to increased high-level attention, the Navy is not doing badly, though it still has some problems.
- The Army is the biggest potential problem.

It suggests four general areas where the decision-making process could use analysis better:

- Linking forces with strategies. That is, looking at alternative strategies and examining how much of what forces are needed where, with how much warning to execute each.
- Focusing on the most economical total forces that can execute the strategies.
- Specifying strategy-based management targets for all reserve units. The Army is doing this with its CAPSTONE program.
- Managing the reserve components to hit the targets.

Until steps like these are adopted, the ability of analysis to help reserve policies to support the needs of national strategy will remain hit-and-miss, as it has been in the past.

A PC-BASED RESERVE FORCES PROJECTION MODEL

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This paper describes the design of a personal computer based enlisted force projection model for the six Selected Reserve components. The model can be used to explore the size, costs, demographic composition, and experience mix of these forces under alternative policy and economic scenarios. As such it can be used to design and justify compensation, bonus and educational benefit programs; explore end strength changes; and explore various personnel policy options such as mandatory retirement. It is designed for policy making at the administrative level where overall benefits, incentive programs, and end strengths are planned.

Models built for these purposes have often failed to be used by policy-makers and analysts for reasons of accessibility, useful documentation, credible behavioral assumptions, and quick response. There had been a problem, for example, with adequately exploring behavioral assumptions. Often only simple assumptions were programmed into the model. A related problem was striking a proper balance in the level of aggregation within the model, thereby achieving enough detail without losing quick responsiveness. Further, portability was a problem when a model could be run by only one or two people on only a few computers. The hidden assumptions in such a closed system were naturally unsettling to the policy initiator as well as the modeler. In sum, an operations research model might well be inaccessible to the very policymaker who commissioned it.

The personal computer revolution offers partial solutions to some of the traditional problems. The design for a model can be keyed to policy orientation, and consequent widespread use and analytic flexibility. The policy initiator can clear a desktop space to park a standard PC; follow the menus to any focal point; interact with software like Lotus, Thinktank, and the Project Manager; retune the same model for several years; and read or create on-the-go notepad documentation. For analytic flexibility one can expand or collapse whatever levels of detail are desired, enter at any point of the modular model, and apply modern exploratory analyses.

The Rand Reserve Forces Model has four major modules which receive the historical data base, analyze input decisions to forecast the generating parameters, make the projections, and form reports (see Figure 1). Five general purpose routines or "macros" (Aggregate, Graph, Regress, Sensitivity, and Vacuum) can be plugged in as desired.

The first major module of the Reserve Forces Model houses historic data received from DMDC. It contains population count, continuation rate, and good accession tables for all six enlisted Selected Reserve components

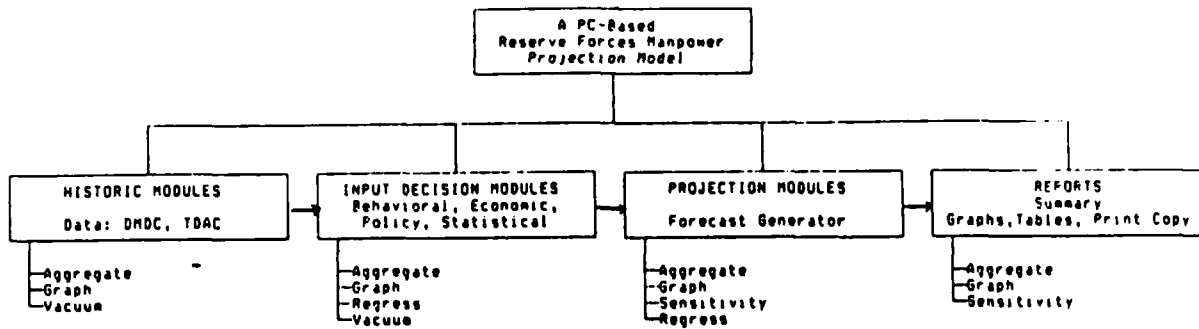


Figure 1. The Rand Reserve Forces Model

over fiscal years 1978 through 1985 with a maximum disaggregation of YOS by Race by Sex by PS Status by ETS Status by Mental Category and by Education Level. There is a companion historic cost module.

Next is the Input Decisions module. Here possible behavioral, statistical, econometric, and policy intervention decisions are explored with help from the general purpose routines. For example, the Vacuum

CONTINUATION RATES FOR AIR FORCE RESERVISTS

YOS	FY78	FY79	FY80	FY81	FY82	FY83	FY84	YOS EFFECT
<1	---	.	++	+++	++++	-	---	-
1	-	.	+++	++	.	---	---	---
2	++	++	---	---	---	---	+	---
3	.	+++	+++	---	---	---	---	---
4	.	---	---	++	---	---	+	---
5	-----	---	+	-	.	+++++	+++++	-----
6	-	---	---	---	+	+	+	---
7	-	-	---	-	+	.	+++	-----
8	++	-	---	.	.	.	++	---
9	+	.	-	.	.	.	.	.
10	+++	.	-	.	.	.	-	++
11	++	.	-	.	.	.	.	+++
12	.	.	.	-	.	.	.	++++
13	++	---	.	.	.	+	.	++++
14	+	.	-	.	.	.	.	+++++
15	.	-	.	.	.	+	.	+++++
16	.	.	.	+	.	.	.	+++++
17	.	-	.	+	.	+	-	+++++
18	.	+	-	.	.	.	---	+++++
19	+	.	+	-	.	.	.	+++++
20	.	+	.	.	.	+	---	++++
FY Effect	.	.	.	.	.	.	+	86.15%

Figure 2. A "vacuumed" table showing the overall average, marginal effects, and residual peculiarities

routine scans a table of residuals to draw an eye to peculiar items or patterns. We can then hypothesize whether such a peculiarity is caused by data problems, policy changes, or behavioral changes; and how to handle it in our forecast.

The second half of the Input Decision module is an easy to use data management program to prepare the input the projection modules. This input would include an aggregate of the 1985 inventory, forecasts of first quality and second choice accessions, as well as continuation rates, and cost elements. Accessions are split into two choices to allow for more flexibility in the accession rules. For instance, one rule might define first quality accessions to be men who are high school graduates and women who have prior service.

In the Inventory Projection module the user may make projections based on decisions made in the Input Decisions module. Projections can be made from one year at a time to fifteen years at a time. Any any point in the projection progress can be interrupted and changes may be made to allow for interactive decision making and sensitivity analysis.

The projected inventories may then be costed on the basis of baseline decisions made in the input decisions module or new decisions. Basic pay, accession training costs, allowances, bonuses, and retirement accrual are among the costing elements which can be included. Costs are produced on a per person basis and then applied to the projected inventories to produce total force manpower cost projections tied to the actual DoD budgets.

The final module is one used for reporting. It will include graphing, table, and text possibilities. For example, bars on the top in Figure 3 reflect on projection of the 1985 U.S. Naval Reserve population counts, to the year 2000. This projection assumes that a bonus existing in 1985 is continued. The negative bars at the bottom reflect a change to continuation rates which might result from dropping that bonus. A change of only ten percentage points at years of service four and five echos all the way through the system and results in a decrease of 9320 manyears per year by the year 2000. It will be easy to see, then, the results of management decisions such as bonus adjustments.

The modules are currently in the development stage. An extensive data base of Army and Air Force inventories has been prepared by DMDC. An initial version of Army component models should be available in the fall for tests. Some data questions for the Navy and Marine Corps models still exist. Finished models with complete documentation are approximately a year away.

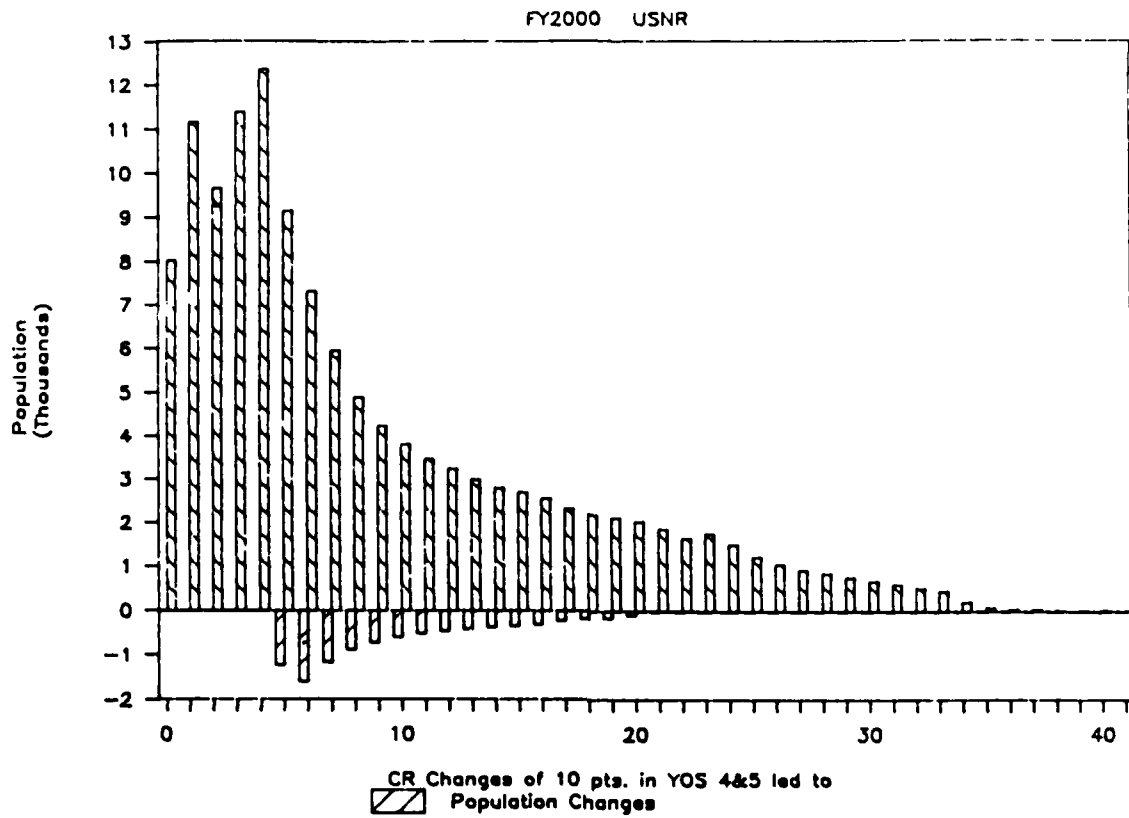


Figure 3. An example of projecting and sensitizing a reserve forces profile

SERVING IN THE RESERVE: AN EPHEMERAL ROLE

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Introduction

It is conventional social psychological wisdom that individuals occupy statuses in assorted social orders and social settings. That is, they occupy positions in those orders and settings, often arrayed hierarchically in terms of power and prestige. We are fathers, mothers, accountants, economists, priests, professors, admirals, and so on. Associated with each status we occupy are related behavioral expectations (Zurcher, 1983). Mothers are expected to nurture and not to abuse their children. Priests are expected to manifest spirituality and not decadence. We enact those role expectations with a certain degree of latitude. That is we put our own mark of individuality upon the enactments, sometimes more fully conforming to the expectations others have for us, sometimes creating innovative interpretations from the perspective of how we perceive ourselves as individuals. It is also conventional social psychological wisdom that individuals occupy multiple statuses in everyday life, indeed hundreds of them. Similarly, we are called upon to enact multiple roles. Sometimes the behavioral expectations conflict, sometimes they complement each other. The conflict can be problematic for us, and we need to find some way to resolve it.

Recently, social psychologists have been attending closely to how individuals assemble role repertoires. How do we by accident or by choice accumulate and balance multiple behavioral expectations for dealing with the routine of everyday life. The concept "ephemeral role" is an essential notion in understanding how we make those choices and how we effect that balance. An ephemeral role is a "temporary or ancillary position-related behavior pattern chosen by the enactor to satisfy individual needs incompletely satisfied by the more dominant or last roles he or she must regularly enact in everyday life positions" (Zurcher, 1968; 1970). Dominant roles include those associated with family and occupational statuses. Ephemeral roles include those associated with statuses involved in church participation, leisure activities, hobbies, volunteer work, participation in civic groups, membership in parent teacher associations, and other elected part-time endeavors (Zurcher, 1978).

Naval Reserve Participation As An Ephemeral Role

It is plausible to assume that Naval Reserve participation constitutes an ephemeral role. If it is, then what satisfactions does it provide individuals which are not well enough satisfied in the other roles within their repertoires? How does a reservist ephemeral role relate to the dominant roles associated with occupation and family? How does a reservist balance the satisfactions he or she obtains from enacting the military role? What if those satisfactions diminish or are considered inadequate? There has now accumulated a considerable body of literature addressing those questions (see, for example: Boykin, Merritt, and Smith, 1980a; 1980b; Zurcher, Patton, and Jacobsen, 1979; Zurcher and Wilson, 1981; Zurcher, Patton,

Jacobsen, and Navarraski, 1974). That research, summarized in the book, CITIZEN-SAILORS IN A CHANGING SOCIETY: POLICY ISSUES FOR MANNING THE UNITED STATES NAVAL RESERVE (Zurcher, Boykin, Merritt, 1986), has not been abstract social psychological theorizing, although theory has been advanced. Rather, the focus of the studies has been on the relation between ephemeral role satisfaction and enhancement of accomplishing the Naval Reserve mission, specifically regarding recruitment, readiness, and retention. Since the findings of those studies are presented in depth in the citations listed above, I will not make a full report here. Instead, I will offer a brief summary of some of the main findings primarily as a synthesizing device for further research and policy attention.

After a year of participant observation, I was able to identify key elements of satisfaction or dissatisfaction associated with the Naval Reserve ephemeral role and related elements in the reservists' role repertoires. Four scales were developed from the participant observation, each devised in the Likert summated scale format. The four were: The Naval Reserve Satisfaction Scale; The Active Duty Satisfaction Scale; The Active Duty For Training Satisfaction Scale; and The Civilian Occupation Satisfaction Scale. The scales were of varying lengths, but all had fourteen items in common. The reservist respondents were asked to indicate their degree of satisfaction (on Naval Reserve drill, on previous active duty, on active duty for training, and with civilian occupation) regarding: comradeship; responsibility; own authority; prestige; promotion; use of talents and abilities; sense of accomplishment; recognition for work; supervisors training, facilities/equipment; pay; fringe benefits; and the reserve role in general. Having those fourteen items in common across the four scales permitted calculation of the absolute and comparative balance of satisfactions within the repertoire. The scales, particularly the Naval Reserve Satisfaction Scale (NRSS) and the Civilian Occupation Satisfaction Scale (COSS) have now been used as part of questionnaires administered to over 10,000 Naval Reservists. The reliability and validity of the scales has been established as sound, the balance of satisfactions expressed by the respondents in the NRSS and COSS highly correlated with intention to remain in the Naval Reserve or to quit. Though representative samples of reservist respondents have been used, the findings are limited to the extent that they are based upon self-report and address attitudes rather than behavior. Boykin, Merritt, and Smith (1980b) have presented some evidence that low scores on the NRSS, along with a comparatively higher degree of satisfaction with civilian occupation, results not only in respondents' statements that they intend to quit the Naval Reserve but that they actually do quit. Later in this paper I will provide some further supporting evidence.

Among the findings of the studies was the clear indication that the highest reservist role related satisfactions were: comradeship, supervisors, recognition for work, prestige, and pay. Pay was found to be a necessary but not sufficient correlate of intention to continue affiliation, as several of the economists presenting papers at this conference further have verified. The lowest elements of reservist satisfaction were: sense of accomplishment, use of talents and abilities, facilities and equipment, responsibility, and training. In recent years Navy Reserve officials have accelerated attention to the elements of reservist dissatisfaction. Serious efforts have been

made to provide better more relevant training, more modern equipment, a fuller recognition of the detriments resulting from wasting the time, talents, and abilities of reservists, and communication procedures which inform reservists that their accomplishments definitely and importantly serve the "One Navy" mission. Those officials have become aware, as researchers consistently have argued, that the social psychological role-related satisfactions called for by reservists squarely relate to mobilization readiness. That such satisfactions need to be addressed and provided does not mean that the Naval Reserve must be converted into some kind of giant organizational encounter group. To the contrary, the reservists would resent mindless social psychological manipulations. They simply desire to have their best abilities employed and sharpened in service of preparedness for the mobilization tasks they would be called upon to perform.

General studies of the Naval Reserve consistently have shown that satisfaction with previous active duty is significantly correlated with Naval Reserve participation. The Naval Reserve role studies go beyond that finding. They suggest that reservists, as part of the process of developing a balance of satisfactions within a role repertoire, effectively combine some satisfactions remembered from active duty, some satisfactions associated with reserve drill, some satisfactions associated with active duty for training, and some satisfactions related to civilian occupation. The salient consideration is not the elements of satisfaction in any one component of the role repertoire, but the balance among those components. If, for example, all of the satisfactions favored previous experience with active duty, the reservist likely would attempt to go back to that status. If all the satisfactions favored civilian occupation, the reservist probably would quit the reserve. The best overall balance among the elements of satisfaction seems to be a distribution of satisfactions across previous active duty, Naval Reserve participation, and civilian occupation. For example, the reservist might favorably remember the intensity of responsibility while in active duty, might appreciate the purposive comradeship in the Naval Reserve, and might enjoy the fringe benefits in civilian occupation. There is no ideal balance of role satisfactions for reservists in general. Each individual has a somewhat different weighting of the importance of satisfaction items within his or her repertoire. But such a repertoire does exist for each and every reservist, and Navy officials must understand that the Naval Reservist role is one element within that social psychological network. The balance of satisfactions, the effective balance, is fragile. I repeat that the Navy cannot and should not be obliged to provide aimless role satisfactions to participating reservists, nor can Navy officials be expected to assess the idiosyncratic character of each participating reservist role repertoire. But the Navy can and should continue and indeed intensify its efforts to provide the mission and mobilization-related training, unit integrity, equipment, and employment of reservist personnel. If that is done, individual reservists will work out the balance of satisfactions in their own role repertoires. The result will be enhanced recruitment, readiness, and retention.

A Case Of Reservist Role Balance Disruption

The following is perhaps an isolated and limited illustration of reservist role balance disruption, but nonetheless might be instructive. Twenty-five members of a Navy medical reserve unit were mobilized for a twenty-one day active duty for training evolution with the United States Marines in a major field exercise. The unit was not assigned to the Fleet Marine Force for mobilization purposes. The members of the unit had become accustomed to laboratory and preventive medicine work. Because the unit was part of a larger study, data were available on member responses to the Naval Reserve Satisfaction Scale and the Civilian Occupation Satisfaction Scale. There was a wide variation among the members in the balance of those satisfactions, from an extreme leaning toward satisfaction with the reserve to an extreme leaning toward satisfaction with civilian occupation. The Marine field exercise was far different from what the unit members ordinarily experienced during drill or while on active duty for training. It challenged the balance of satisfactions they had represented between the Naval Reserve and civilian occupation. It was not a clinical, hospital, or laboratory setting. It involved functioning in the field under conditions of considerable stress and discomfort. The role-related outcome of the experience for the reservist participants briefly can be summarized. Those that were most oriented toward the military role thoroughly enjoyed the exercise. They became energetically and thoroughly involved in the activities. They identified their unit commanding officer as being a hero for having been instrumental in arranging their participation. Following the completion of the exercise, they thought about or actually undertook making efforts to go back on active duty. Those individuals who were most oriented toward the civilian role essentially "blew off" the experience. They attempted whenever possible to withdraw from the exercise activities. They identified the unit commanding officer as a fool for his part in the decision to force their presence. When the exercise was completed, they thought about or actually quit the Naval Reserve. Quite surprisingly, those reservists who were about equally oriented toward the military and civilian roles were the ones who most agonized about the experience and who most disliked it. The fully military oriented individuals were able to become wholly involved in the activities; the fully civilian oriented individuals were able to withdraw and not care. The reservists who had the closest balance of military and civilian orientation neither could wholly psychologically get involved nor would they withdraw not caring. They did the work with which they were tasked effectively, but they consistently raised questions about the inappropriateness of their involvement. They wanted to be Navy medical reservists but not in the Fleet Marine Force context. Their balance of role satisfactions between civilian occupation and reserve participation had not been arranged in that context. They identified the unit commanding officer as a villain for having essentially disrupted their role balance. When the exercise was completed, they thought about or actually effected transfer to another reserve unit so that such an occasion would not happen again.

Surely the mobilization of Navy medical reservists in time of national emergency would involve their assignment to stressful and unpleasant duties. But that is a different matter that we are now discussing. If called to

active duty for the purposes of defending the interests of the United States reservists, medical or otherwise, would invoke important value orientations and make the ephemeral role of the Naval Reserve a dominant role, temporarily or otherwise. The illustration and instruction of this case bears only on emphasizing the complexity of the role repertoire enacted by reservists in a peacetime milieu. It is precisely in such a milieu, however, that recruitment and retention of Naval Reservists (as an aside, particularly of medical reservists) should be considered. When it is necessary for mobilization training purposes to disrupt the role balance of the participants every effort ought be made to underscore the importance of the disruption in terms of the value orientation committed reservists share.

Conclusion

The studies of the role repertoires of Naval Reservists, though perhaps limited by restrictions of self-report, attitudinal orientation, and idiosyncratic case studies, demand close attention. At the very least, the findings ought alert responsible individuals that participation in the Naval Reserve is an ephemeral role, part of a role repertoire, and not a simple nor sovereign activity for individuals. More research ought be done about how the Naval Reserve role fits or does not fit with the dominant roles involved in the family, occupation, and with other ephemeral roles. A crucial emphasis clearly is the reserve participation today is voluntary, and that volunteerism bespeaks the arrangement of satisfactions in a role repertoire. These findings, or speculations if you prefer, are worth sharing with reserve center commanding officers, unit commanding officers, retention officers, and recruiters.

The role repertoire and role balance notions also relate to some broader considerations as outlined by Zurhcer, Boykin, and Merritt (1986). To what extent is the Naval Reservist a networker among civilian and military organizations? To what extent is he or she a constructive broker between the civilian and military communities? Can the reservist, particularly in the all volunteer military climate, be the primary civilianizer of the military and provide important messages to civilians regarding the importance of the military? Given his or her choice to balance satisfactions derived from both military and civilian participation, can the reservist serve yet another crucial function in a society dedicated to democracy?

Earlier in this conference, Paul Schumann, an economist, convincingly argued for multi-disciplinary and cross-theoretical research on Naval Reserve manpower issues, again specifically involving recruitment, readiness, and retention. I totally agreed with his argument. None of us alone, regardless of our expertise in our specific disciplines, can get the job effectively done. When we pursue manpower issues within the protection and insularity of our own disciplines, whether we are social psychologists, economists, sociologists, political scientists, or whatever, we tend to trivialize our data such that it might be read with interest by our professional colleagues but it is ineffective for sound policy. In addition to the conceptual integration across social science disciplines, we also need a multi-methodological approach to be effective. Econometric modeling, survey

designs, case studies, and qualitative small-group investigations together and in concert are needed. In particular, I urge the systematic small group participant observation studies among cohorts for whom survey research data already are available because they have been respondents to those surveys. The triangulation of the findings can be particularly powerful. Lastly, I urge Navy officials pointedly and insistently to call upon qualified Naval Reservists to conduct manpower-related research as all or part of their duties. There are remarkable pools of talent within the Naval Reserve to accomplish that task, not necessitating contracts, undue overhead, education about the organizational system, or concern about commitment. This is not to say that contracts ought be discouraged for salutary manpower studies in open competition among qualified civilian research groups. It is to say that qualified reservists themselves, and there are hundreds of them, can make important contributions to solving this difficult contemporary problem.

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APPENDIX A

Workshop on Reserve Manpower, Personnel, and Training Research

Naval Postgraduate School
Monterey, California

25-27 June
1986

AGENDA

Wednesday, June 25, Morning

Chair: Coffey, NPS
Recorder: Rowe, NPRDC

8:00 Registration, coffee

8:45 Welcome

Marshall, NPS
Coffey, NPS

THE NAVAL RESERVE IN CONTEXT

9:00 Naval Reserve: Historical perspective and
a view to the future

Megna, OPNAV

9:30 Total force integration

Patton, OPNAV

10:00 Coffee

PERSONNEL SUPPLY

10:30 Determinants of unit manning levels

Kirby, Rand

11:00 Estimating supply elasticity in reserve forces

McNaught, GAO

11:30 Local area considerations

Mehay, NPS

12:00 Lunch

Afternoon

Chair: Collyer, OCNR
Recorder: Enns, Abt Assoc.

1:30 Forecasting Naval Reserve enlisted end strength Fletcher, CNA

2:00 Geographic factors & prior-service enlistments Asch, Rand

PERSONNEL RETENTION

2:30 Socioeconomic status and turnover

Boykin, Citadel, &
Merritt, USN

3:00 Tea

3:30 Economic and psychological factors in retention of military personnel in Naval Air Reserve Schuman, Minnesota

4:00 Modelling survival rates of non-prior- Grissmer, Rand
service accessions (Army)

4:30 Open discussion: Personnel supply and retention issues

5:00 Adjourn

6:00 - 8:00 No-host reception in Terrace Room, Officers' Club
Cash bar; hors d'oeuvres

Thursday, 26 June, Morning

Chair: McNaught, GAO
Recorder: Carroll, OPNAV

TRAINING

8:30 Retention effects of increased training time Nogami, ARI

9:00 Skill retention: The USS New Jersey experience Zajkowski, TAED

9:30 Training assessment Sheffield, OPNAV

10:00 Coffee

10:30 Front end analysis of Naval Reserve research needs Van Matre, NPRDC

11:00 Reserve training strategies Simms, LMI

INDIVIDUAL READY RESERVE

11:30 IRR retraining needs and options Bodilly, Rand

12:00 IRR availability: A matter of motivation Wilson, USAF

12:30 Lunch

Afternoon

Chair: Goldich, CRS
Recorder: Singer, CBO

2:00 Skill deterioration and retraining needs of the IRR Hall, TAED

UTILIZATION

2:30 Force-mix analysis Simms, LMI

3:00 Naval Reserve forces throughout the world Domaby1, CNA

3:30 Tea

ACTIVE-RESERVE COSTING

4:00	Navy examples	Fletcher, CNA
4:20	Marine Corps examples	May, CNA
4:40	Army and Air Force examples	Schank, Rand
5:00	<u>Adjourn</u>	

Friday, 27 June, Morning

Chair: Sinaiko, SI
Recorder: Bryant, DTDAC

ACTIVE-RESERVE COSTING, continued

8:30	A method for estimating the costs of changes in the active/reserve balance	Gotz, Rand
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RESEARCH INFORMATION

9:00	DMDC files	Brandewie, DMDC
9:30	Analysis in support of policy planning and national strategy	Horowitz, IDA
10:00	<u>Coffee</u>	
10:30	A PC-based reserve projection model	Eisenman, Grissmer, and Kawata, Rand

PSYCHOLOGICAL AND SOCIAL ISSUES

11:00	Serving in the reserve: An ephemeral role	Zurcher, Texas
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OTHER SERVICES' RESEARCH ON RESERVES

11:30	Air Force R&D	Barr, Air Staff
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APPENDIX B

Workshop on Reserve Manpower, Personnel, and Training Research

Naval Postgraduate School
Monterey, California

25-27 June
1986

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