

# Enabling Officer Accession Cuts While Limiting Laterals

Albert B. Monroe IV • Donald J. Cymrot



4825 Mark Center Drive • Alexandria, Virginia 22311-1850

## Report Documentation Page

*Form Approved*  
*OMB No. 0704-0188*

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE <b>JUL 2004</b>	2. REPORT TYPE	3. DATES COVERED <b>00-00-2004 to 00-00-2004</b>			
4. TITLE AND SUBTITLE <b>Enabling Officer Accession Cuts While Limiting Laterals</b>		5a. CONTRACT NUMBER			
		5b. GRANT NUMBER			
		5c. PROGRAM ELEMENT NUMBER			
6. AUTHOR(S)		5d. PROJECT NUMBER			
		5e. TASK NUMBER			
		5f. WORK UNIT NUMBER			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>CNA Analysis &amp; Solutions, Center for Naval Analyses ,4825 Mark Center Drive, Alexandria, VA, 22311</b>		8. PERFORMING ORGANIZATION REPORT NUMBER			
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)			
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)			
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>	<b>Same as Report (SAR)</b>	<b>58</b>	

Approved for distribution:

July 2004

A handwritten signature in black ink that reads "Henry S. Griffis". The signature is written in a cursive style with a large initial 'H' and 'G'.

Henry S. Griffis, Director  
Workforce, Education and Training Team  
Resource Analysis Division

This document represents the best opinion of CNA at the time of issue.  
It does not necessarily represent the opinion of the Department of the Navy.

Approved for Public Release; Distribution Unlimited. Specific authority: N00014-00-D-0700.  
For copies of this document call: CNA Document Control and Distribution Section at 703-824-2123.

# Contents

<b>Executive summary</b> . . . . .	1
Background. . . . .	1
Objectives. . . . .	1
Analysis . . . . .	2
Findings. . . . .	3
Implications and recommendations . . . . .	3
<b>The lateral transfer question</b> . . . . .	5
How should the Navy build RL and Staff communities? . . . . .	5
Facts about lateral transfers . . . . .	6
Recent history. . . . .	6
Basic information about lateral outs. . . . .	6
Basic information about lateral-ins. . . . .	9
Focus on the relationship between SWO accessions and the overall state of RL/Staff communities . . . . .	12
<b>Describing and modeling the choices faced by the Navy</b> . . . . .	15
The flow of officers between communities . . . . .	15
How the Navy determines accessions . . . . .	16
SWO accessions . . . . .	16
RL/Staff accessions . . . . .	18
Measures of effectiveness . . . . .	19
Cost . . . . .	19
Productivity . . . . .	19
Initial assumptions . . . . .	21
Historical data. . . . .	21
Assumptions. . . . .	22
Reducing SWO accessions saves money and decreases warfare experience . . . . .	22
Cost savings . . . . .	22
Fewer laterals and fewer warfare qualified RL/Staff officers. . . . .	23
Less RL/Staff endstrength at YOS 9 . . . . .	24

Results of cutting SWO accessions. . . . .	25
Changes in the civilian economy and the SWO pyramid. .	25
The civilian economy . . . . .	25
More female SWOs . . . . .	26
The SWO pyramid . . . . .	28
<b>What it all means. . . . .</b>	<b>29</b>
Comparing costs to productivity. . . . .	29
RL issues . . . . .	29
Limitations and areas for future study . . . . .	30
Increasing the SWO retention bonus . . . . .	30
Retention bonus for the RL/Staff communities . . .	30
Forcing Aviation and Submarine training attrites to warfare qualify before lateraling to RL/Staff communities. . . . .	31
<b>Appendix A: Constructing the model. . . . .</b>	<b>33</b>
Data sources and quality . . . . .	33
Personnel numbers. . . . .	33
SWO community . . . . .	33
RL/Staff communities . . . . .	35
Costs . . . . .	36
<b>Appendix B: Warfare qualification regression results. . . . .</b>	<b>37</b>
Data description and regression methodology . . . . .	37
Regression results . . . . .	40
Summary of regressions . . . . .	40
Individual regression results . . . . .	40
<b>References . . . . .</b>	<b>47</b>
<b>List of figures . . . . .</b>	<b>49</b>
<b>List of tables . . . . .</b>	<b>51</b>

# Executive summary

## Background

The Navy officer personnel system includes the option for officers to transfer from one community to another during the course of a career. These lateral transfers often flow from the unrestricted line (URL) to the restricted line (RL) and some selected staff communities within the first 5 or 6 years of service. The two types of lateral transfers are training attrites and warfare-qualified officers. Training attrites fail to meet qualification standards within a warfare community and must either transfer to another community or leave the Navy. Warfare-qualified officers can remain in their URL communities, but the Navy allows some to transfer. Some fully qualified officers are allowed to lateral transfer to provide some RL/Staff officers with broader experience in dealing with warfare officers. The focus of this study is on these warfare-qualified lateral transfers.

On one hand, to accommodate the flow of lateral transfers, the URL communities may access and train more officers than necessary to meet their own requirements. On the other hand, anticipating lateral transfers from the URL, the RL and selected staff communities may underaccess to their true requirement. This approach results in excess junior officers in training in some URL communities, and these excesses reduce the quality of training and overall readiness. In addition, this approach may increase the total number of officers in the Navy and thereby increase personnel costs. In the current fiscal environment, reducing personnel costs may be particularly important because the Navy needs money to recapitalize the fleet.

## Objectives

This study, sponsored by the Deputy Chief of Naval Operations, Manpower and Personnel (N1), examines the tradeoffs between the advantages and disadvantages of maintaining the status quo. We will

show that, although officers from all the major URL communities lateral transfer, most warfare-qualified officers are from the Surface Warfare Officer (SWO) community. Warfare qualification is important because the data show that it enhances upward mobility of RL and Staff officers. Thus, our analysis will focus on lateral transfer from SWO and will answer two closely intertwined questions:

1. Should the Navy build RL and Staff communities mostly with direct accessions or lateral transfers?
2. Should the Navy therefore reduce SWO accessions?

## Analysis

To examine the implications of lateral transfers from the SWO into the RL and Staff communities, we build a simulation to model the flows of officers through O-3. Among SWOs, the main driver of the model is to ensure the retention of a sufficient inventory to fill all Department Head billets on ships. Because the RL and Staff communities do not have career paths that are as well defined, this part of the model is driven by the number of billets at 9 years of service (YOS 9).

To explore the implications of change in lateral change policy, we analyze three scenarios: (1) the status quo with 780 SWO accessions, (2) minimum accessions with 620 accessions to fill O-1 sea billets, and (3) the intermediate case of 700 accessions. To assess each scenario, we develop a number of measures of effectiveness, including:

- Total personnel cost (of implied levels of endstrength)
- Inventories at key career milestones (i.e., SWO Department Heads and RL/Staff at YOS 9)
- Average years of experience, in SWO and with RL/Staff communities (where more experience implies higher productivity)
- Inventory relative to Officer Programmed Authorization (OPA) for O-1 SWOs (where excesses reduce the effectiveness of training)
- Percentage of the RL/Staff inventory with warfare qualification (where qualification enhances productivity).

## Findings

We find that a cut in SWO accessions from 780 to 620:

- Saves \$91 million in personnel costs because it reduces the end-strength across the SWO and RL/Staff communities and has little impact on overall seniority
- Reduces the number of warfare-qualified officers in RL/Staff communities by 448, a decline of about 4 percentage points
- Has little impact on the overall seniority of the officer corps, but does increase SWO seniority and reduces RL/Staff seniority
- Causes the number of laterals from Surface to RL/Staff communities to fall by 35 percent, causing an increase of 47 RL/Staff direct accessions.

We tested the robustness of the results by examining possible declines in underlying retention rates, due to either a strengthening economy or a decrease in retention from shifting gender mix, and a change in the billet structure that increases Department Head requirements without increasing O-1 requirements. In neither case did we find a large enough change in the results to change the relative magnitude of the cost savings.

## Implications and recommendations

Our analysis suggests that the Navy faces a tradeoff in reducing SWO accessions from 780 to 620. Such a reduction will reduce endstrength at a saving of about \$90 million per year, but it will also reduce the average experience level and percentage of warfare-qualified officers in the RL and Staff corps. In examining this tradeoff, we calculated that a warfare-qualified officer in the RL and Staff corps would have to be worth about \$200,000 more than a non-warfare-qualified officer in the same billet for the SWO accession cut and consequent restrictions on laterals to become cost-effective. Given that the total cost of such billets is considerably below this level, maintaining the status quo is likely to be a costly approach.



# The lateral transfer question

This section discusses the issues and provides background information for the analysis.

## How should the Navy build RL and Staff communities?

Currently, Restricted Line (RL) and some Staff communities (Civil Engineering and Supply) access officers through a mix of direct accessions and lateral transfers. The use of lateral transfers in RL and Staff communities provides warfighting experience in these support communities. The option to lateral transfer may also help keep high-quality officers in the Navy. Some officers would not stay in the Navy if not for the ability to change officer communities. These officers may prefer to specialize in a technical area rather than remain on the command track and may want to serve less time at sea. Thus, the option to lateral transfer may increase overall Navy retention, and improve job satisfaction and performance.

The need for lateral transfers could justify accessing more SWOs than needed to fill junior officer (JO) billets. Carrying extra officers is expensive, however, and may hurt the effectiveness of training of SWO junior officers by reducing watchstanding, diluting mentoring, and slowing qualification. Also, because of technical change, policy changes, and budgetary considerations, over time the Navy is allocating fewer officers to fill JO slots on ships (i.e., O-1/O-2 OPA is falling). The declining billet base implies that the status quo will result in increasing JO overages.

This study is about whether the Navy should maintain the status quo in its SWO accession and lateral transfer policies.

## **Facts about lateral transfers**

This section presents information about lateral transfers over recent history. Its purpose is to make the case for focusing on SWO lateral transfers to a generic RL/Staff community.

### **Recent history**

Over the past 15 years, about 350 officers per year transferred from the URL to an RL or Staff community. Even though officer strength fell by 35 percent over this period, there is no clear downward trend in the annual numbers of lateral transfers. About 90 percent of these transfers come from either the Surface Warfare or Aviation communities, but the transfers from these two communities are quite different. Most Aviation transfers are training attrites (i.e., necessary), but most SWO transfers are warfare qualified (discretionary). These different profiles suggest the possibility of different policy responses. Since the focus of this study is on warfare-qualified lateral transfers, our analysis concentrates on SWO transfers.

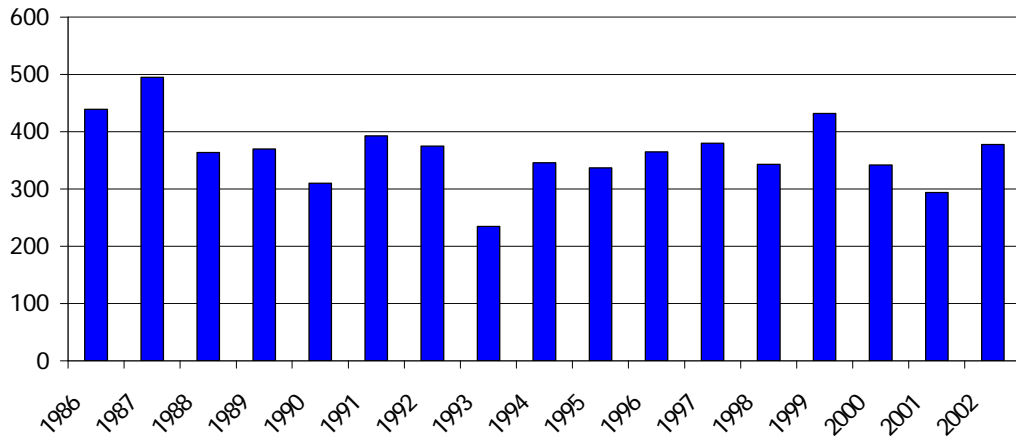
Lateral transfers play a different role in different RL and staff communities. Nearly all engineering duty officers, whether in surface or aviation, are lateral transfers. Lateral transfers also play a major role in the public affairs and oceanography communities. They play a lesser role in the Supply and Civil Engineering Corps (CEC) and such RL communities as Intelligence and Cryptology. Nonetheless, lateral transfers are dispersed widely in RL and Staff communities, so we do not call out any single community in our analysis.

### **Basic information about lateral outs**

Between FY86 and FY02, an average of 365 officers left the main URL communities (Surface, Aviation, Submarine) to become part of RL and Staff communities (figure 1). This varies from 235 in FY 93 to 495 in FY87.

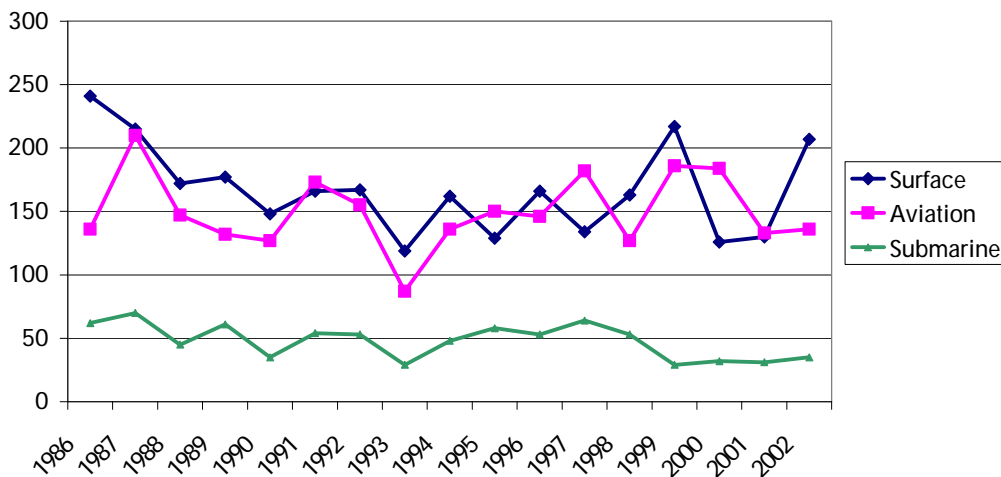
The number of laterals is more or less constant over time, even though the URL has decreased by about 35 percent since FY90.

Figure 1. Lateral transfer from the URL to RL from FY86 to FY02



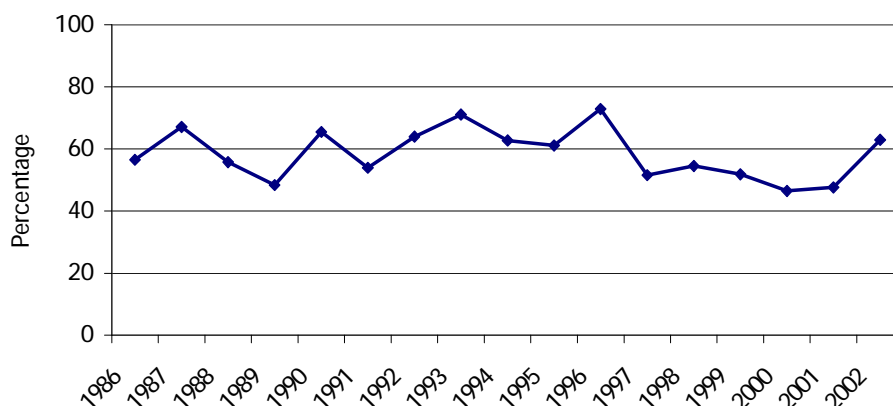
The Aviation and Surface communities dominate the URL. They represent about 82 percent of all URL officers. Most URL lateral transfers are from these communities (see figure 2). Even though there are more Aviation than Surface Warfare Officers, the number of laterals from each community is nearly the same. Only about one-eighth of the total number of laterals come from the Submarine community.

Figure 2. Percentage of lateral transfers by warfare community



A major advantage of lateral transfers from the URL is that they bring their warfighting experience. However, some lateral transfers were never able to complete warfare training successfully, in which case they are not really bringing this crucial experience with them. Figure 3 shows that more than half the laterals from the URL are warfare qualified. The fraction of laterals that are warfare qualified has remained relatively stable over time at around 60 percent.

Figure 3. Percentage of URL laterals with warfare qualification (FY86 to FY02)



The percentage of lateral transfers who are warfare qualified is quite different across the three warfare communities (figure 4). In the Surface community, well over 70 percent of laterals bring a warfare qualification with them, while that figure is only about 30 percent in the Aviation community (most transfers are flight attrites). Submarines are the intermediate case with qualification rates of over 40 percent (mixture of attrites and post Department Head).

Figure 5 shows that most warfare-qualified laterals are from Surface. At the start of FY03 in RL and selected Staff (Supply and CEC) communities, about 65 percent of all warfare-qualified laterals were from Surface, while about 25 percent were from Aviation and 10 percent from Submarine.

Figure 4. Percentage of warfare qualified by community

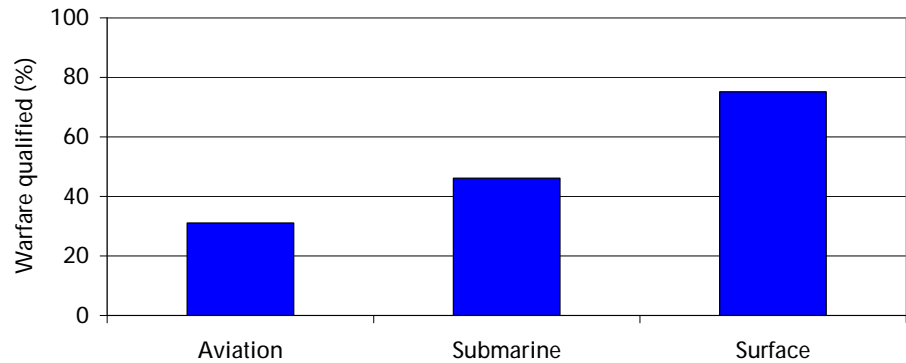
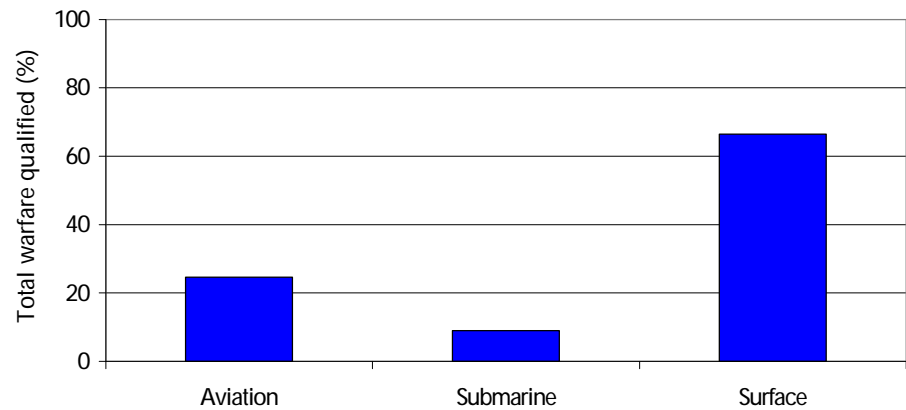


Figure 5. Proportion of warfare-qualified laterals by community



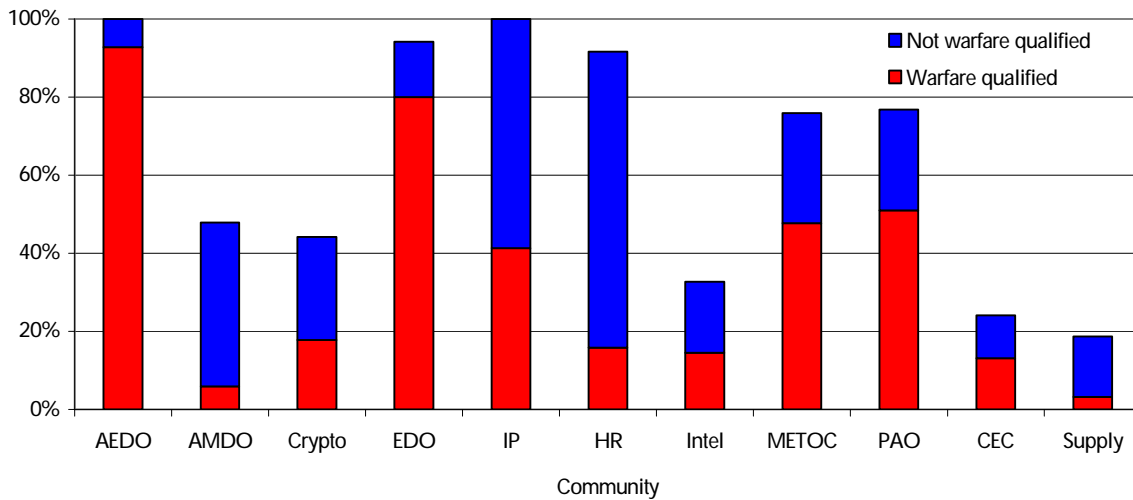
## Basic information about lateral-ins

### Characteristics

The percentage lateral and percentage warfare qualified in RL and Staff communities vary widely between RL and Staff communities (figure 6). At the start of FY03, about 60 percent of current RL officers and 20 percent of officers in the Civil Engineering and Supply (Staff) communities were laterals. There is huge variation in the fraction among communities in both the percentage of laterals and percentage warfare qualified. The fraction lateral ranges from

100 percent (Aviation Engineering and Information Professional) to close to 20 percent (Civil Engineering and Supply). In between are communities with around 40 percent laterals (Aviation Maintenance, Cryptology, and Naval Intelligence) and communities with about 75 percent laterals (Oceanography and Public Affairs).

Figure 6. Fraction lateral transfer in RL/Staff communities (O-1 to O-6)



Similarly, the percentage warfare qualified in RL and Staff communities varies widely. Almost all Aviation Engineers, and 80 percent of Engineering officers, are warfare qualified. Forty to 50 percent of officers in the Information Professional, Oceanography, and Public Affairs communities are warfare qualified. Less than 20 percent of officers in the Aviation Maintenance, Cryptology, Intelligence, Civil Engineering, Human Resources, and Supply communities are warfare qualified, although the percentage is almost 20 in Cryptology, Human Resources, and Intelligence. Also, many entrants into the Aviation Maintenance and Cryptology communities are prior enlisted who had enlisted warfare qualifications.

All RL and two Staff communities (Supply and Civil Engineering Corps (CEC)) receive significant numbers of lateral transfers, but no community dominates the receipt of laterals from the URL. Supply

currently receives more laterals than any other community, with about 70 per year. Engineering is next, with about 60 per year, and after that is Naval Intelligence with about 40 laterals per year. Civil Engineering, Aeronautical Engineering, and Cryptology receive about 30 laterals per year, while Aviation Maintenance and Oceanography receive about 25 laterals per year. Public Affairs receives about 15 laterals per year. Other Staff communities (e.g., Judge Advocate General and Medical) occasionally receive laterals, but not enough to make a significant difference in either the management of laterals in general or the management of their particular communities.

Communities with relatively small percentages of laterals and warfare-qualified laterals, such as Supply, Intelligence, and Civil Engineering, can receive the same number of laterals as communities with larger fractions of laterals because Supply, Intelligence, and Civil Engineering are larger than any other RL communities. Currently, Supply has about 2,750 officers, while Intelligence has about 1,400 officers and Civil Engineering has about 1,300 officers. This is in contrast to other RL communities, which have a total of 200 to 800 officers in each community.

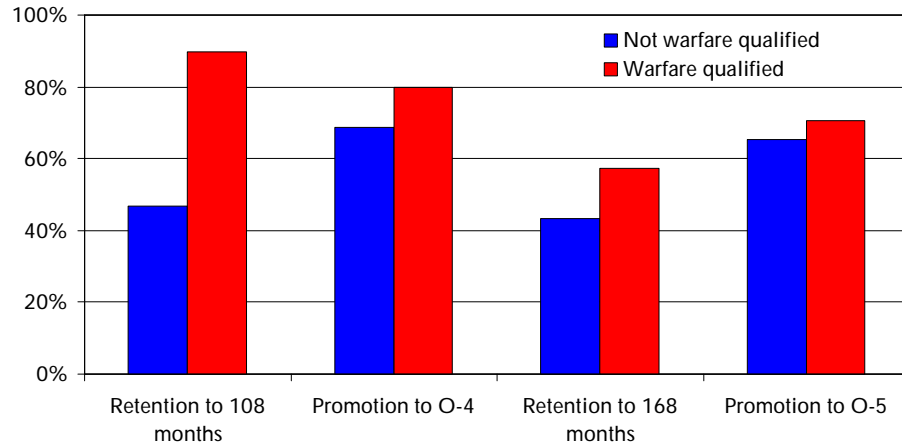
From here forward, the term “RL/Staff” will refer to the entire RL plus the two Staff communities—Supply and Civil Engineering—that receive significant numbers of laterals.

### **Warfare experience and performance**

Warfare qualification in RL/Staff communities is important because RL/Staff communities support the URL; therefore, URL experience is thought to increase RL/Staff productivity in some communities. Reflecting either real differences in productivity or preferences by promotion boards, warfare-qualified laterals retain longer and advance farther than other RL/Staff officers and therefore are critical in filling RL/Staff control paygrades (figure 7). Warfare-qualified laterals enter with more experience, so it is not surprising that they have higher retention. However, even after taking into account the retention differences, warfare-qualified laterals are promoted more often to (especially) O-4 and O-5. Over 90 percent of warfare-qualified laterals survive to 108 months, compared with less than 50 percent of non-warfare-qualified laterals. Of those that make it to 108 months,

about 80 percent of warfare-qualified laterals promote to O-4, compared with less than 70 percent of non-warfare-qualified laterals. Warfare-qualified laterals are also more likely than non-warfare-qualified laterals to survive to 168 months and promote to O-5 contingent on reaching 168 months. Appendix B describes a more complete analysis in which we adjusted these raw data for other characteristics, such as race, fiscal year, marital status, accession source, grades, and college quality. Overall results are unaffected by including these controls.

Figure 7. Warfare-qualified RL/Staff officers stay longer and promote farther



## Focus on the relationship between SWO accessions and the overall state of RL/Staff communities

Since laterals are spread across the RL/Staff communities and no community dominates the receipt of laterals, it makes sense to study the overall flow of laterals into RL/Staff communities. Also, since most laterals (and most warfare-qualified laterals) come from the Surface Community, we focus on the overall flow from the Surface community to RL/Staff communities. This is because the Navy has little discretion over lateral transfers that are training attrites. They must either leave the Navy or transfer to another community. Warfare-qualified laterals, however, can leave the Navy, stay in the home

community, or move to another community, so the Navy has some control of the flows of warfare-qualified laterals to RL/Staff communities.

This approach is bolstered by the high training costs of Submarine and Aviation officers. Submarine and Aviation officers cost hundreds of thousands of dollars to train, as opposed to SWOs, most of whose training is on the ship. These high training costs make it economical to keep Submarine and Aviation officers in their communities as long as possible, allowing them to lateral only to fill specific RL/Staff positions, such as Aeronautical Engineering and submarine-related Engineering positions.

The point is that there are few Submarine laterals and, even though there are many Aviation laterals, most of those are training attrites. With Aviation attrites, the Navy can either force them out of the Navy or have them lateral to other communities (or force them to SWO qualify, which will be discussed later). However, most SWO laterals are fully qualified to continue on the SWO career path. Some of those qualified SWOs might leave the Navy if not allowed to lateral; therefore, the lateral option can be viewed as an incentive to retain some officers in the Navy if not SWO.

Once we accept that the number of laterals from the Submarine and Aviation communities is determined by conditions within those communities and very specific needs in a few RL/Staff communities, it makes sense to take the number and composition of laterals from the Aviation and Submarine communities as given and to concentrate on the effects that changes in Surface community management would have on the overall health and cost of RL/Staff communities. In other words, the main questions we study in the rest of the paper are the following:

- What effect does reducing SWO accessions have on RL/Staff communities that receive laterals, as well as the SWO community itself?
- How should SWO accessions be determined?



# Describing and modeling the choices faced by the Navy

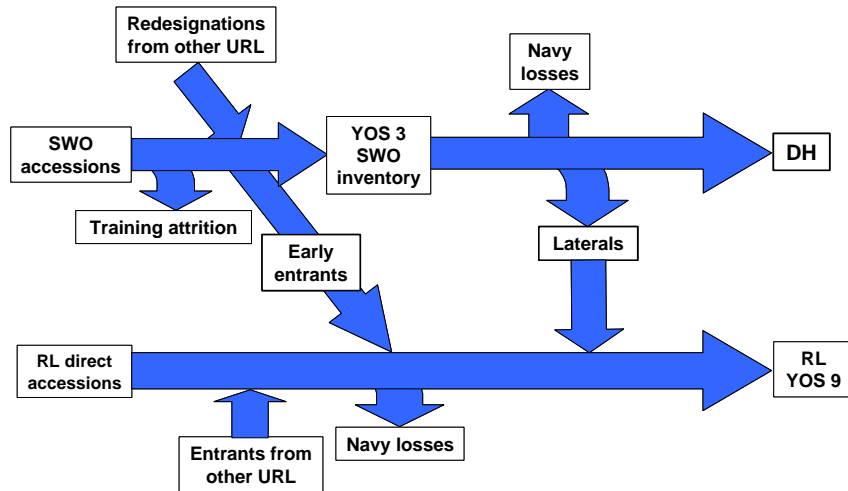
To analyze the implications of limiting warfare-qualified lateral transfers, we built a simulation model. The purpose of this model is to track the officer corps in the SWO and RL/Staff communities from accession through 9 years of service.

## The flow of officers between communities

Figure 8 diagrams the SWO to RL/Staff personnel flow model. The top half of the model shows the movement from SWO accessions to SWO Department Heads. The Navy accesses SWOs through the normal channels: the Naval Academy, Naval Reserve Officer Training Corps (NROTC), Officer Candidate School, and through the enlisted ranks. In the first 2 years of service, a few officers leave the Navy, while many more enter the SWO community as training attrites (redesignations) from other communities. SWOs with options (Engineering, Oceanography, or Information Professional) can leave the SWO community as soon as they become warfare qualified. Other SWOs who wish to lateral to RL/Staff communities must wait a few years and go in front of a lateral board. Some SWOs are allowed to lateral to RL/Staff communities, and others leave the military. Those that remain into YOS 9 become Department Heads and fill critical control grade billets. The Navy needs 275 new SWO Department Heads every year to meet requirements.

The bottom half of figure 8 shows the flow of officers in RL communities and Staff communities that take significant numbers of laterals. RL/Staff communities get direct accessions from Officer Candidate School and the enlisted ranks. Officers from the Naval Academy or NROTC are required to start their careers in the URL, but can start in RL or Staff communities if they receive health or other exemptions.

Figure 8. SWO to RL/Staff personnel flow model



Officers enter RL/Staff communities from the URL early in their careers as options, or later in their careers as laterals. There is almost no flow between RL/Staff communities or from RL/Staff communities to the URL. RL/Staff officers who survive until YOS 9 are then available to fill RL/Staff control grade billets.

## How the Navy determines accessions

### SWO accessions

Navy planners choose the number of SWO accessions to balance across several goals. First, the number must at least equal the requirement to fill O-1 billets plus account for attrition. (Actually, the more correct term here is the Officer Programmed Authorization, or OPA.) Second, the number must provide sufficient inventory to advance in a career to reach the career milestone of Department Head at sea based on projected retention. SWO Department Head tours occur while the officer is a lieutenant after most officers have fulfilled their minimum service requirement. Consequently, the number of accessions needs to anticipate losses from the Navy and lateral transfers to other officer communities. Recently, in a typical year group, a little under one half of SWO accessions continued in the

Navy at least until YOS 9, but only about a third continued in the SWO community. So, depending on the relative requirements for O-1s and Department Heads and the number of lateral transfers to the RL/Staff Communities, the Department Head requirement can be the binding constraint that establishes the SWO accession number. In recent years, the Navy has started paying a SWO retention bonus as a way to influence the continuation rate and the required number of accessions.

The point of this discussion is that the Navy does have some options in setting SWO accessions. To examine alternatives, our analysis includes three possible scenarios that represent the range of options open to the Navy.

**780: Status quo**

Based on the Navy's current planning factors, status quo SWO accessions are 780 per year. The Navy then uses a \$50,000 SWO retention bonus to retain 275 Department Heads at YOS 9. This implies 34 percent retention from YOS 3 (there are 30 net laterals in before YOS 3) and is plausible given current and historical trends.

**620: Access to SWO Nov 03 O-1 Officer Programmed Authorization**

The Navy currently needs to access 620 SWOs every year to meet its O-1 OPA (as of November 2003). This represents a decrease over past years. Last year's O-1 OPA required 650 SWO accessions per year. Since the O-1 OPA is much greater than the number of Department Heads, the Navy could increase the SWO retention bonus, retain 275 Department Heads, and have officers available to lateral into RL/Staff communities.

**700: Moderate accession cut**

Accessing 700 (halfway between 780 and 620) is an option if the Navy decides to cut SWO accessions, but decides that the increases in bonuses and the decrease in warfare experience in RL/Staff communities are not worth the money saved by the large decrease in junior officers implied by cutting SWO accessions to 620.

## **RL/Staff accessions**

In this study, we assume that the binding constraint for RL/Staff is that the total endstrength of RL/Staff officers remains constant in all scenarios. This is in sharp contrast to our assumptions for the SWO community, where we assume that the binding constraint is that the SWO community produces 275 YOS 9 Department Heads every year. We make these assumptions because the SWO community has clear sea requirements, and shore requirements are added for training and to maintain a healthy sea-shore rotation. In contrast, most RL/Staff billets are shore billets, and are therefore not tied to platforms. This makes it easier to adjust experience requirements for any particular RL/Staff billet.

The overall RL/Staff billet structure is unattainable; if we combine SWO billets with all RL/Staff communities that receive significant numbers of SWO laterals, there are 1,981 O-1 billets, 1,689 O-2 billets, 5,373 O-3 billets, and 4,078 O-4 billets. The increase from O-1 to O-3 occurs because officers typically spend 2 years each as O-1s and O-2s and 6 years as O-3s. The billet structure assumes 69 percent overall Navy retention to O-4, which appears unexecutable, even though some officers enter the SWO, RL, and Staff communities from the Aviation and Submarine communities (generally as O-1s and O-2s). Current overall retention for these communities to YOS 9 is 50 percent, and historical overall retention is lower (between 40 and 50 percent), especially for SWOs. Therefore, we regard both increased RL/Staff experience and more warfare-qualified officers in the RL as benefits, but we assume that the overall size of the RL/Staff remains the same in all scenarios. We also assume that the total number of billets in RL/Staff communities is correct, but the billet paygrade distribution does not have to stay fixed.

Once we assume that the combined number of RL/Staff officers remains the same in all scenarios, the number of RL/Staff direct accessions is set by the total number of RL/Staff billets, the number of SWO accessions, the number of SWOs allowed/wishing to lateral, RL/Staff retention rates, and the size of SWO retention bonuses.

## Measures of effectiveness

The value of the inventory profile implied by each scenario to the Navy will depend on the total officer personnel cost and productivity. We'll compare the measures of productivity to dollar savings in different scenarios to determine how many SWOs the Navy should access each year.

### Cost

The relative costs of these scenarios will be expressed by the combined yearly SWO/RL/Staff YOS 1-9 personnel cost. These costs include estimates or current values of base pay, allowances, retirement accrual, other pays, benefits, training costs, and bonuses. Costs were taken from Navy Visibility and Management of Operating and Support Costs (Navy VAMOSC), where available, and other costs were taken from the Cost of Manpower Estimating Tool (COMET) or were estimated from past studies. Details are included in appendix A. One possible limitation is that these costs do not separate out the cost of retraining a SWO in an RL or Staff community. To the extent that these costs are significant and undercounted, it would further argue for limiting the number of lateral transfers.

### Productivity

Since the Navy produces an intangible product that cannot be traded (national defense), there is no direct value of productivity that can be compared to the estimated cost of all scenarios. However, there are a couple of indicators that can later be compared with the cost differences between scenarios:

- Average experience of RL/Staff officers
- Percentage of RL/Staff officers with warfare qualification
- Inventories to fill key billets (SWO YOS 9 Department Head (DH) = 275; RL YOS 9 = 419)
- Number of excess SWO junior officers (O-1/O-2) relative to Nov 2003 OPA.

Here's why each of these is an indicator of productivity.

### **Average experience of RL/Staff officers**

The average experience of RL/Staff officers is important for productivity because productivity typically increases for workers in all professions, especially in the early parts of a worker's career [1]. We can assume that this is true for naval officers as well. Therefore, a more senior RL/Staff officer corps is likely to be more productive than a more junior force. Average experience is a proxy for productivity.

### **Percentage of RL/Staff officers with warfare qualification**

RL/Staff communities exist to serve the warfighter and perform duties that URL warfighters don't have either the time or expertise to do. Therefore, we assume that warfare qualification is advantageous to RL/Staff officers in performing their current tasks. We support this assumption with the data showing that warfare-qualified officers in RL/Staff communities have higher promotion rates than non-warfare-qualified officers in those communities. Warfare experience is more important in some communities than others, but it has some importance in all RL/Staff communities that take laterals. The productivity benefits of warfare experience are over and above the cost benefits coming from higher retention.

### **Inventories to fill key billets (SWO YOS 9 DH = 275; RL/Staff YOS 9 = 419)**

A key measure of productivity is whether the Navy has enough officers to fill control grade (O-4 and above) billets. The Surface community needs to produce 275 YOS 9 officers every year to fill Department Head and above billets. RL/Staff communities have no such requirement, but need a large number of YOS 9 officers to produce enough (and enough high-quality) officers for control grade billets. Our status quo inventory is 419 YOS 9 RL/Staff officers, and all other scenarios are compared with the status quo. If the Navy has fewer RL/Staff officers at YOS 9, it needs to leave billets gapped (leading to losses in productivity), promote earlier, or be less selective in promotion, leading to losses in productivity from less seniority or skill.

### **Number of excess SWOs (relative to current OPA)**

In this study, we assume that the value of SWO training to junior officers starts to decline as the number of junior officers assigned to ships

exceeds the OPA. The argument in favor of this assumption is that individual training gets crowded out when the number of trainees gets too high. Each junior officer will have fewer opportunities to perform training tasks, such as serve as Officer of the Deck or perform watchstanding within their assigned department. Furthermore, because the number of more senior officers does not increase when the number of junior officers exceeds the OPA, the amount and quality of mentoring are also likely to decline. Within our analysis, we have not been able to monetize the value of this factor, but rather allow the policy-makers to make their own judgment on its value.

## **Initial assumptions**

Modeling the future of the Navy under different levels of SWO accessions requires the use of many assumptions, some of which are based on historical data, and others on informed conjecture.

### **Historical data**

Historical data are based on current data projections, or 5-year averages. The historical data used in this model are as follows:

- SWO retention from YOS 3 to YOS 9 is assumed—by the Navy—to be 34 percent at current SWO retention bonus levels (\$50,000 total, \$10,000 per year for 5 years).
- RL/Staff retention to YOS 9 is the same as the average over the last 5 fiscal years.
- Laterals into Surface Warfare and into RL/Staff communities from the Aviation and Submarine communities remain constant over time at current levels (5-year average).
- The status quo number of laterals from SWO into RL/Staff communities also remains constant at current levels (5-year average). The number of laterals changes in other scenarios.
- Real personnel costs remain unchanged from current levels and differ by paygrade. They also are different for SWO and RL/Staff communities. RL/Staff costs are a weighted average

of all RL/Staff communities that take significant numbers of laterals.

## **Assumptions**

Some assumptions about SWO and total Navy retention and strength were used to complete the model. These assumptions follow:

- Total RL/Staff endstrength remains the same in all scenarios. This seems reasonable because the total number of RL/Staff officers is currently within 100 of the total number of billets. It also makes it easier to compare different scenarios.
- The SWO community can make use of increased bonuses to produce the 275 YOS 9 DH requirement. The Navy now assumes that it takes a total of \$5,000 total bonus per officer to purchase 1 percentage point of retention [2].
- Increases in SWO retention are split evenly between those who would have left the Navy and those who would have lateraled into RL/Staff communities. This assumption is reasonable because some officers would like to lateral to other communities, but leave the Navy because they are not allowed to lateral. This means that fewer SWO accessions implies fewer laterals from Surface into RL/Staff communities. Direct accessions into RL/Staff then increase when SWO accessions decrease to maintain constant RL/Staff endstrength.

## **Reducing SWO accessions saves money and decreases warfare experience**

### **Cost savings**

The status quo (780 SWO accessions per year) is projected to lead to a total SWO/RL/Civil Engineering/Supply (hereafter referred to as total) YOS 1-9 endstrength of 10,028 officers (table 1). Reducing SWO accessions to 700 reduces total endstrength by about 375 officers, and reducing SWO accessions to 620 reduces total endstrength by about 750 officers. Since average YOS is mostly unaffected, overall costs are reduced.

Reducing SWO accessions to 700 officers reduces costs by \$46 million, while reducing SWO accessions to 620 saves \$91 million (table 1). The necessary SWO retention bonus at 700 accessions would be \$67,500, and the SWO retention bonus would be \$90,000 at 620 accessions. This is much higher than the current \$50,000 bonus, but lower than current Submarine bonuses (\$110,000).

Table 1. Reducing SWO accessions saves money

Scenario	Net annual cost savings (\$M)	Implied SWO bonus (\$K)	Total strength YOS 1-9	Total cost of YOS 1-9 strength (\$M)	Average YOS
780	0	50.0	10,028	1,239	4.55
700	46	67.5	9,647	1,198	4.58
620	91	90.0	9,259	1,159	4.60

The average SWO 1-9 YOS increases from 4.24 to 4.38, and the average RL 1-9 YOS decreases from 4.94 to 4.83. Cutting SWO accessions from 780 to 620 decreases the ratio of SWO O-1/O-2 officers divided by Nov 03 SWO O-1/O-2 OPA from 1.41 to 1.14, signifying a huge decrease in the number of excess SWO junior officers (JOs).

### **Fewer laterals and fewer warfare qualified RL/Staff officers**

Cutting SWO accessions means that there are fewer SWOs to lateral into RL/Staff communities. Cutting SWO accessions from 780 to 620 cuts laterals by about 35 percent, and direct accessions increase by 47 to maintain constant endstrength in RL/Staff communities (table 2).

The decrease in the number of laterals and the increase in direct accessions reduce the number of warfare-qualified officers in RL/Staff communities. In the status quo scenario, 13 percent of RL/Staff officers in YOS 1-9 are warfare qualified, but this falls to 9.2 percent when SWO accessions are cut to 620. Likewise, the percentage warfare qualified at RL/Staff YOS 9 falls from 24.9 to 18.8 percent, meaning that there are fewer warfare-qualified officers to fill RL/Staff control grade billets. Overall, there will be about 450 fewer RL/Staff warfare-qualified officers if the Navy cuts accessions from 780 to 620.

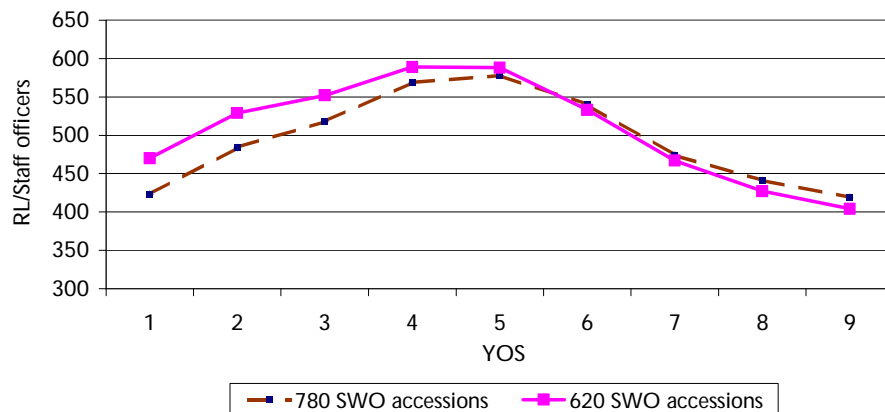
Table 2. Cutting SWO accessions increases direct accessions and decreases laterals

Scenario	Annual direct accessions to RL/Staff	Annual lateral transfers from SWO
780	397	158
700	421	130
620	444	102

### Less RL/Staff endstrength at YOS 9

Figure 9 shows the effect that reducing SWO accessions has on RL/Staff manning at YOS 9. The diagram shows that cutting SWO accessions suggests an overall decrease in seniority in RL/Staff communities. However, decreasing SWO accessions from 780 to 620 implies only a 4-percent reduction in RL/Staff YOS 9 endstrength (419 to 404). To fulfill RL/Staff requirements, the Navy would either have fewer officers in control grade billets, would have to reduce its selectivity in choosing such officers, or would have to promote officers earlier in their careers. However, the small decrease in RL YOS 9 officers suggests only slight changes.

Figure 9. Effect of reducing SWO accessions on RL/Staff manning at YOS 9



## Results of cutting SWO accessions

Cutting SWO accessions has the following benefits and drawbacks:

- Advantages
  - Cuts endstrength
  - Reduces cost
  - Reduces excess of SWO JOs over OPA on sea duty
- Disadvantages
  - Reduces warfare experience in RL/Staff communities
  - Decreases average RL/Staff experience
  - Increases risk of RL/Staff control grade shortages.
  - Increases risk of DH shortage.

Can anything change the relative size of these advantages and disadvantages?

## Changes in the civilian economy and the SWO pyramid

As we look to the future, the billet structure and underlying forces working on the Navy's officer corps are likely to change from today. In this section, we examine whether changing some of the underlying assumptions of our simulation model will change the essential outcome of our analysis. We consider three possible changes: improvement in the civilian economy that could increase the cost of retaining officers, reductions in SWO retention rates due to more female SWOs (who have lower retention rates than male SWOs), and continuing technical improvements and policy changes (e.g., Goldwater-Nichols) that historically have decreased junior officer requirements relative to mid-grade and senior requirements.

### The civilian economy

As a means of capturing an improvement in the civilian economy, we posit an increase in the cost of retaining SWOs. Our current model assumes that it costs \$5,000 per person of bonus to purchase an extra

percentage point of retention. As an alternate rate assumption, we assume that the economy improves and the overall cost of bonuses increases by 50 percent (i.e., a \$7,500 bonus increase is required to increase the retention rate by 1 percentage point). Table 3 shows our estimate of the change. Extra bonuses would only cost between \$2 million and \$6 million, depending on the scenario, so the cost saving from reducing SWO accessions and lateral transfers would still be substantial.

Table 3. Changes resulting from an improvement in the economy

Scenario	Original cost savings (\$M)	Increasing bonus cost by 50% (\$M)
780	0	0
700	46	44
620	91	85

## More female SWOs

The second robustness check assumes that overall SWO retention decreases because more women are becoming SWOs. The scope of our study did not include re-analyzing SWO retention behavior; rather, it was designed to use the current SWO planning factors. Consequently, our study took as given the planning factors that were passed to us by the SWO community manager—namely, that a \$50,000 SWO retention bonus supports SWO retention of 34 percent and SWO accessions of 780, and that each \$5,000 increase in the SWO retention bonus will increase SWO retention by 1 percentage point. Because of the recent increase in the female share of SWO accessions, there is a risk associated with assuming that female SWO retention and female retention responsiveness to bonuses will equal the rates of male SWOs in the future. Therefore, we do a sensitivity analysis using retention measures for female SWOs that are lower than for male SWOs.

A recent re-examination of the data within the SWO community has led the SWO community manager to develop new planning factors—that a \$50,000 SWO retention bonus results in a 35.3-percent male

SWO retention rate and a 16.7-percent female SWO retention rate. Based on current accessions, the breakdown of SWOs reaching the retention point will be 75 percent male and 25 percent female. Historical data suggest that each \$5,000 increase in SWO retention bonus will increase male SWO retention by 1 percentage point. It is difficult, if not impossible, to know the effect of the SWO retention bonus on female retention because the cohorts that faced retention decisions before the introduction of the \$50,000 retention bonus entered the Navy before the 1994 reform of the combat exclusion rules. This is because there was an apparent drop in female SWO retention due to the removal of the combat exclusion rule, which canceled out the increase in female SWO retention coming from the SWO bonus.

Since female SWO retention (16.7 percent) is almost half of male SWO retention (35.3 percent), we assume that women are half as responsive to the SWO bonus as men. In other words, if male SWO retention increases one percentage point for each extra \$5,000 in bonus, we assume that female SWO retention will increase one-half a percentage point for each \$5,000.

If we assume that the male share will be 75 percent and the female share will be 25 percent, the overall retention rate will drop to 30.7 percent, *holding the SWO retention bonus constant at \$50,000*.

Further, if we assume that each additional \$5,000 of bonus yields a 1-percentage-point increase in male retention and an additional \$5,000 of bonus yields a 0.5-percentage-point increase in female retention, then each \$5,000 yields a 0.875-percentage-point increase in overall retention. So, an increase in the SWO retention bonus to \$69,000 (an extra \$19,000) is needed just to get back to a 34-percent retention rate. Then, an increase in the SWO retention bonus to \$115,000 (an additional \$46,000) is needed to get retention from 34 to 42 percent.

Thus, this sensitivity analysis would support dropping SWO accessions to 620, coupled with a \$115,000 SWO retention bonus. This would drop the net savings to \$90 million—still an excellent ROI for the Navy. Similarly, reducing SWO accessions to 700 would require a bonus of \$92,000, dropping the net savings to \$40 million (refer to table 4).

Table 4. Changes resulting from an increase in the number of female SWOs

Scenario	Original cost savings (\$M)	Increasing the number of female SWOs (\$M)
780	0	0
700	46	45
620	91	90

### The SWO pyramid

The third test for the robustness of the results examines an increase in the steepness of the SWO pyramid. Reference [3] argues that historical trends toward a steeper grade structure pyramid are likely to continue in the future. To examine the impact of this possibility within the context of our model, we assume that SWO Department Head requirements increase by 10 percent, from 275 to 303. Similar to the previous case, an increase in Department Head requirements would increase the cost of SWO retention—in this case, because of an increase in the required retention rate. Table 5 presents a summary of the impact.

Table 5. Changing SWO pyramid has little effect on cost savings

Scenario	Original cost savings (\$M)	Increasing SWO DH requirements 10% (\$M)
780	0	0
700	46	31
620	91	75

Although this change reduces the amount of saving from cutting SWO accessions, as in the case of an economic change, the magnitude of the change is insufficient to eliminate the cost saving.

## What it all means

The foregoing analysis suggests that cutting SWO accessions would reduce the total personnel costs of SWOs and RL/Staff officers through their first 9 years of service. The key question is whether the savings are garnered at the cost of something else to the Navy. As we discussed previously, the main impact of reducing lateral transfer is essentially to substitute less experienced non-warfare-qualified officers for more experienced warfare-qualified officers within the RL/Staff community. The average experience difference is about 1.3 months. Because we cannot measure the value of warfare qualification, we consider an indirect approach.

## Comparing costs to productivity

Cutting SWO accessions from 780 to 620 would save \$91 million, but result in 448 fewer warfare-qualified RL/Staff officers and a small increased risk of not adequately filling RL/Staff billets. Dividing the 448 into the \$91 million gives \$203,000. The value of the loss of warfare qualification plus the small loss in seniority would have to exceed this amount for the status quo to prevail in a cost-effectiveness calculation. Given that the cost of a junior officer billet is perhaps half that amount at most, it seems implausible that warfare qualification and seniority would be that valuable to the Navy. Furthermore, even if we account for the risk of increasing the cost of retaining a sufficient supply of SWOs, the balance would still seem to strongly favor the SWO accession cut.

## RL issues

A decrease in the number of RL/Staff YOS 9 officers could be dealt with in two ways:

- *Increased promotion rates to O-4 (and maybe O-5).* Any changes would have to be made within DOPMA limitations. Our analysis suggests that there is only a risk of a small shortage, which could be accommodated within DOPMA restrictions. Of course, increasing the promotion rate suggests that officers with less potential and fewer accomplishments will now get promoted.
- *RL bonuses.* RL bonuses would increase overall RL/Staff seniority and could be set to equalize the number of RL/Staff control grade officers in all scenarios. These bonuses would likely be inexpensive; a back-of-the-envelope calculation suggests that it would only take \$10 million to produce 419 RL/Staff YOS 9 officers (instead of 404) when SWO accessions are cut to 780 from 620.

## **Limitations and areas for future study**

This section discusses several limitations on the scope of the study that could affect implementation of a decision to reduce SWO accessions and subsequently reduce the number of lateral transfers to the RL/Staff communities.

### **Increasing the SWO retention bonus**

In the scenarios considered in this study, the cut in SWO accessions is counterbalanced by an increase in SWO retention bonus to ensure the continuation of a sufficient inventory of SWOs to reach the Department Head career milestone. We have shown that, in the case of a cut from 780 to 620 SWO accessions, the bonus needs to be increased from \$50,000 to \$90,000. Because the a SWO retention bonus is offered at about YOS 5, the authorization to increase the maximum bonus need not be secured simultaneously, but the bonus must be put in place before the officers whose behavior you want to affect reach their Minimum Service Requirement.

### **Retention bonus for the RL/Staff communities**

Our analysis suggests that reducing lateral transfers and simultaneously holding RL/Staff officer strength constant pose a risk of a small shortage of officers at YOS 9 and subsequently eligible for pro-

motion to O-4. The size of that risk would grow if RL/Staff O-4 and above billets grow relative to the size of the O-1 to O-3 billet base. One possible way of dealing with the risk of a shortage is to create a continuation bonus for the RL/Staff communities. Creating such a bonus is not a recommendation of this study, but it is an issue that deserves further study.

Several factors could influence the future need for a bonus. First, the reduction of lateral transfers implies that a greater portion of the RL/Staff communities will enter those communities without either having established a sufficiently high level of performance to warrant continuation and advancement or having made a decision (i.e., to lateral transfer) that suggests a continuing commitment to the Navy. Although we assume a lower continuation in our model for this population, it is certainly within the realm of possibility that actual continuation will be below our projected levels. Second, technological and policy changes could affect the RL/Staff communities in much the same way as it could affect the URL communities—that is, steepening the slope of the grade structure pyramid. Third, not all communities are heavy users of lateral transfers. Any RL/Staff bonuses implemented should probably be targeted only to communities in need. Finally, the Navy is in the process of reducing officer structure and endstrength. If billets are removed from the existing structure, it is likely to be several years before the inventory is realigned with the new structure. During this realignment process, chances are that the Navy will be carrying an excess inventory of RL/Staff officers. During this transition period, it seems unlikely that a new continuation bonus could be justified.

### **Forcing Aviation and Submarine training attrites to warfare qualify before lateraling to RL/Staff communities**

Currently, some Aviation and Submarine training attrites, especially those who entered the Navy through OCS, lateral directly to RL/Staff communities. These attrites spread themselves throughout the RL/Staff. The Navy is considering requiring Aviation and Submarine training attrites to qualify in the Surface community before lateraling to RL/Staff communities. This would greatly increase the fraction of warfare qualified in the RL/Staff, and, if anything, would strengthen

the case for the Navy to cut accessions from 780 to 620 for several reasons:

- Increasing lateral transfers into the SWO community would increase the number of excess SWO junior officers over Officer Programmed Authorization on ships unless SWO accessions are cut.
- If warfare-qualified ex-training attrite laterals have higher retention than direct accessions, fewer officers than before will need to enter the Navy to maintain RL/Staff control grade billets and selectivity, favoring cutting accessions.
- Getting Aviation and Submarine training attrites to warfare qualify does not change the cost benefits of decreasing SWO accessions because the number of laterals and direct accessions into RL/Staff communities remains unchanged for each scenario.

## Appendix A: Constructing the model

This appendix explains in detail how we constructed the SWO to RL/Staff flow model using an Excel spreadsheet, historical data (5-year averages from FY98-02), and assumptions about how both the Navy and individual officers will make decisions when the number of SWO accessions changes.

### Data sources and quality

Historical data were taken from CNA's officer database, which is provided by the Navy. Navy data may vary slightly from CNA data because of differences in the timing of changes in an individual's record within communities and at the level of the entire Navy. For example, an officer may lateral transfer in April, but the transfer may be recorded in August. Conversely, an officer may be granted a transfer in April and not leave the community until June. This may slightly affect overall numbers if we assume that lateral transfers occur before or after they are recorded in our data. In any case, our overall analysis is unaffected.

### Personnel numbers

#### SWO community

The model starts out with the number of SWO accessions in each scenario. We then use a series of assumptions and historical data to show differences between the status quo and other scenarios (table 5).

In the status quo, we assume that the Navy accesses 780 new SWOs every year. We assume that 53 officers enter Surface from other URL communities. At the same time, 2.3 percent of all SWOs attrite in their first 2 years and 0.6 percent of SWOs leave for the RL/Staff in their first 2 years. We assume that these officers are early training

attrites. This leads to 810 SWOs in YOS 3 in the status quo (780 SWO accessions).

Table 6. Model assumptions

Variable	Assumed value
SWO training attrition	2.3%
Early out from SWO to RL/Staff	0.6%
Original fraction lateral	19.5%
Original SWO retention	34.0%
Lateral retention	69.4%
Direct retention	50.0%
Early entrant retention	55.0%
Other URL to SWO	53
RL/Staff early entrant from non-SWO	85
Lateral to RL/Staff from non-SWO	89

Each year, the Surface community must create 275 department heads (DHs) to fill control grade billets. We assume that the Surface community does this by raising bonuses to keep the necessary number of officers. This assumes 34 percent SWO retention from YOS 3 to YOS 9; this estimate is reasonable and comes from the Surface community.

In the status quo, we assume that there are 158 laterals from the Surface community from YOS 3 to YOS 8. This assumes a lateral rate of 19.5 percent. In scenarios with fewer SWO accessions, we assume the following:

- A constant percentage of officers originally wish to lateral to RL/Staff communities
- The SWO bonus is increased to get 275 SWO DHs
- Half of the additional SWO DHs come from those who would have left the Navy, and the other half come from those who would not have left the Navy.

When accessions fall from 780 to 620, the YOS 3 inventory falls from 810 to 655, which implies 34 percent retention to DH in the status

quo and 43 percent retention to DH when accessions fall. This implies that 53 additional SWO DHs are created by the increase in the SWO bonus.

There are 158 laterals in the status quo, and assuming a constant percentage of laterals implies that there are only 128 laterals when SWO accessions fall to 620 from 780. However, since the 53 additional SWO DHs from the SWO bonus increase are taken equally from those who would have lateraled and those who would have left the Navy, there are 26 fewer laterals than there otherwise would have been, leading to a new total of 102 laterals.

Every SWO who does not lateral or make department head leaves the Navy.

### **RL/Staff communities**

The bottom half of the SWO to RL/Staff personnel flow model details the RL/Staff communities. The totals represent all the RL communities (except for Aeronautical Engineering, which comes from Aviation and starts at YOS 10) and two Staff communities: Civil Engineering and Supply.

Every year, 85 officers enter the RL/Staff from non-SWO URL communities (average from FY98-02). Four or five officers enter from SWO before YOS 3, and laterals enter at or after YOS 3 from SWO. The number of laterals is the calculated number of laterals that leave the Surface community; 158 SWOs lateral at 780 SWO accessions, and 102 SWOs lateral at 620 SWO accessions.

The number of SWO accessions was calculated for each scenario so that total RL/Staff endstrength remained constant and that strength was the same as the total number of billets. We assumed that keeping the total O-1-O-4 endstrength constant would be the equivalent of keeping the entire RL/Staff endstrength constant. To compute total O-4 endstrength, we assumed that the total number of O-4s was the sum of a constant multiple of each type of accession (direct, lateral, and early entrant) determined by the average over FY98-02. We then used the average year-by-year evolution for each type of accession to determine the likely number of officers in each YOS. The totals from

O-1 to O-4 were summed to get the total number of officers. Direct accessions were determined by back-calculating the number of direct accessions needed to give the same number of total RL/Staff officers in each scenario (6,970 O-1 to O-4).

Implicitly, this process assumes that the Navy promotes RL/Staff officers from O-3 to O-4 earlier if they are short of O-4s and that the number of O-4s does not affect retention. The Navy does promote earlier (within DOPMA guidelines) in communities that are short on O-4s, but it is unclear whether the current number of O-4s affects O-3 retention.

## Costs

The personnel numbers were multiplied by total costs to come up with cost savings for each scenario. The cost numbers for SWO and RL/Staff communities are given in table 6. The SWO costs in the table do not include the costs of bonuses, which are added in later. The RL/Staff costs are a weighted (by personnel in that paygrade) average of all RL and Staff communities included in this study.

Table 7. SWO and RL/Staff costs (in dollars)

	SWO	RL/Staff
O-1	99,525	105,956
O-2	116,188	117,338
O-3	134,447	136,775
O-4	155,930	152,912

Total costs are the total personnel costs of all SWO and RL/Staff officers from YOS 1 to YOS 9, including SWO bonuses. These costs are adjusted to account for the fact that, in the scenarios where there are fewer SWO accessions, a larger fraction of total officers are in the YOS 1-9 paygrades. In that case, the expense of the extra officers is balanced by officer savings at higher YOS, and the total cost savings reflect this by subtracting the amount saved by having fewer officers at higher YOS.

## Appendix B: Warfare qualification regression results

RL and Staff communities prefer warfare-qualified officers because these officers, having been in the URL, understand the URL communities that RL/Staff communities support. We have little proof, however, that warfare-qualified officers are more productive in RL/Staff communities. Earlier in this paper, we found that warfare-qualified officers stay in the Navy longer and promote further in RL/Staff communities than non-warfare-qualified officers.

Perhaps there are other reasons why warfare-qualified officers stay in the Navy longer and promote further than non-warfare-qualified officers. Warfare-qualified officers could have other characteristics that make them higher quality officers. Some of these may be unobservable, such as general commitment to the Navy, while others may be observable, such as grades and college quality. By definition, we cannot measure unobservables, but we can see if observable traits affect RL/Staff retention and change the relationship between RL/Staff warfare qualification and retention and promotion.

### Data description and regression methodology

The regressions follow the methodology of past work examining retention of URL officers [4]. Each regression is a logit regression with the dependent variables mentioned earlier in the paper:

- Officer still in Navy at 108 months
- Officer promoted to O-4 by 132 months
- Officer promoted to O-4 by 132 months given he is still in the Navy at 108 months
- Officer promoted to O-5 by 204 months

- Officer promoted to O-5 given he is still in the Navy at 168 months.

The independent variables are the same in each regression:

- Whether an officer is warfare qualified
- Accession source (USNA, NROTC, OCS, Enlisted, or missing)
- Fiscal year (starts in 1975)
- Female
- Race (white, black, Hispanic, Other)
- Competitive college (from Peterson's Guide)
- Historically black college, historically Hispanic college
- Major (policial science, engineering, business, science/math, other)
- Grades (missing, good (GPA 3.2 or above), bad (GPA under 2.2), or average (GPA 2.2 to 3.2))
- Married upon entering officer corps.

The data used in these regressions are taken from CNA's officer files. They include all officers that have served in the RL, CEC, or Supply communities and entered the Navy long enough ago that they could have completed the milestones specified in the dependent variable. In other words, if we are measuring whether an officer has reached O-4 by 132 months, he needs to have entered the Navy more than 11 years ago to be in the regression.

Overall, about 37.6 percent of all officers that enter RL/Staff communities make it to O-4 (table 7). They are split between accession sources, and about 1/4 are female. About 88 percent of officers in this sample are white. Thirty-four percent went to competitive colleges, while almost 10 percent went to universities heavily populated by Hispanics. About 32 percent were engineering majors, while 19 percent were science/math majors, 17 percent were business majors, and 27 percent had other majors. Most officers have average grades, and 25 percent have good grades (GPA > 3.2). Twenty-one

percent of officers were married upon entering the officer corps. Only 13 percent of the officers in our sample are warfare qualified.

The relatively small percentage of RL/Staff officers that are warfare qualified means that warfare qualified officers are important to RL/Staff communities only if they retain and promote at much higher rates than non-warfare-qualified officers. Earlier in this paper, we suggested that this was the case, and in the next section we move to confirm this using regression analysis.

Table 8. Summary statistics

Variable	Mean	Standard deviation	Minimum	Maximum
O-4 by 132 months	0.376	0.484	0	1
Officer candidate school	0.275	0.446	0	1
NROTC	0.185	0.388	0	1
Other	0.063	0.243	0	1
Missing	0.008	0.089	0	1
Was enlisted sailor	0.318	0.466	0	1
Female	0.250	0.433	0	1
Black	0.058	0.234	0	1
Hispanic	0.027	0.161	0	1
Other race	0.036	0.186	0	1
Competitive college	0.335	0.472	0	1
Historically Black college	0.022	0.147	0	1
Historically Hispanic college	0.098	0.297	0	1
Political Science major	0.057	0.233	0	1
Science/Math major	0.186	0.389	0	1
Business major	0.168	0.374	0	1
Other (non-engineering) major	0.272	0.445	0	1
Grades not available	0.177	0.382	0	1
School not available	0.098	0.297	0	1
GPA > 3.2	0.248	0.432	0	1
GPA < 2.2	0.042	0.201	0	1
Married entering O-1	0.213	0.409	0	1
Warfare qualified	0.131	0.337	0	1

## Regression results

### Summary of regressions

The first logit regressions we run compare the raw probabilities of a warfare-qualified officer and a non-warfare-qualified officer reaching the milestones listed before (O-4, 108 months, O-4 given making 108 months, O-5, and O-5 given making 168 months) (table 8). These columns were computed by regressing whether or not an officer made the milestone against warfare qualification and a constant. The percentages are computed directly from the logit coefficients.

The last column details the retention/promotion percentages controlling for any observable differences between warfare-qualified and non-warfare-qualified officers. The differences between regression-adjusted and non-regression-adjusted percentages are minimal and never greater than 3.2 percentage points.

Table 9. Effect of warfare qualification robust to controls

Dependent variable	Warfare qualification (percentage)		
	None	Qualified	Qualified (regression adjusted)
Promote to O-4	32.4	71.8	74.3
Made 108 months	46.7	89.8	90.9
Promote to O-4   made 108 months	45.6	66.5	63.6
Promote to O-5	20.7	48.4	51.3
Promote to O-5   made 168 months	65.0	68.9	66.7

Overall, we find that regression analysis does not greatly affect the conclusions or the size of the positive effect that warfare qualification has on retention and promotion in RL/Staff communities.

### Individual regression results

This section details the individual regression results for all regressions.

Compared with Naval Academy graduates, NROTC graduates have lower promotion rates to O-4 (table 9). We note that those officers who were once enlisted have higher promotion rates to O-4. Also, those who go to competitive colleges have lower promotion rates to O-4 (possibly because of better job opportunities outside the Navy), but Hispanics and those who attend predominately Hispanic universities have higher O-4 promotion rates. Engineering majors have lower promotion rates to O-4, and officers that are married upon entering the officer corps are more likely to promote to O-4.

Table 10. Promotion to O-4 by 132 months<sup>a</sup>

Variable	Coefficient	Standard error	z
Officer Candidate School	0.014	0.055	0.25
NROTC	-0.356	0.055	-6.47
Other	0.542	0.080	6.76
Missing	1.521	0.175	8.71
Was enlisted sailor	0.278	0.057	4.89
Female	0.477	0.035	13.83
Black	-0.045	0.069	-0.65
Hispanic	0.262	0.086	3.04
Other race	-0.056	0.077	-0.73
Competitive college	-0.270	0.038	-7.17
Historically Black college	0.052	0.104	0.5
Historically Hispanic college	0.200	0.051	3.94
Political Science major	0.274	0.068	4.01
Science/Math major	0.149	0.046	3.25
Business major	0.259	0.049	5.31
Other (non-engineering) major	0.167	0.044	3.77
Grades not available	-1.571	0.056	-27.91
School not available	-0.456	0.073	-6.26
GPA > 3.2	0.056	0.033	1.69
GPA < 2.2	-0.084	0.072	-1.18
Married entering O-1	0.450	0.036	12.57
Warfare qualified	1.795	0.047	38.31
Constant	-0.760	0.097	-7.86

a. 25,177 observations. Year dummies (FY75-92) were also included.

Contingent on retaining to 108 months, the significant control variables change (table 10). Female officers are more likely to promote to O-4 contingent on promoting to O-4, while officers from Historically Black institutions are less likely to promote. Engineers are less likely to promote, while officers who have good grades or are married upon entering the officer corps are more likely to promote to O-4 contingent on completing 108 months.

Table 11. Promotion to O-4 by 132 months given retention to 108 months<sup>a</sup>

Variable	Coefficient	Standard error	z
Officer candidate school	0.139	0.075	1.86
NROTC	-0.099	0.076	-1.31
Other	0.380	0.110	3.47
Missing	1.187	0.314	3.77
Was enlisted sailor	0.116	0.078	1.49
Female	0.245	0.050	4.94
Black	-0.131	0.092	-1.42
Hispanic	0.136	0.115	1.18
Other race	-0.272	0.099	-2.75
Competitive college	0.098	0.054	1.82
Historically Black college	-0.281	0.134	-2.09
Historically Hispanic college	0.049	0.073	0.67
Political Science major	0.467	0.099	4.72
Science/Math major	0.292	0.063	4.62
Business major	0.201	0.065	3.12
Other (non-engineering) major	0.256	0.060	4.25
Grades not available	-0.378	0.084	-4.49
School not available	-0.316	0.098	-3.23
GPA > 3.2	0.275	0.048	5.76
GPA < 2.2	-0.133	0.094	-1.41
Married entering O-1	0.206	0.048	4.26
Warfare qualified	0.733	0.056	13.08
Constant	0.947	0.138	6.87

a. 13,251 observations. Year dummies (FY75-92) were also included.

Promotion to O-5 is affected by several control variables (table 11). Accessions from OCS and NROTC are less likely to promote to O-5 than USNA accessions. Black officers are less likely to promote to O-5, while Hispanic officers are more likely. Business majors are more likely to promote to O-5, as well as those with good grades, while those with poor grades are less likely to promote. All of these aforementioned control variables have much less effect on promotion to O-5 than warfare experience.

Table 12. Promotion to O-5 by 208 months<sup>a</sup>

Variable	Coefficient	Standard error	z
Officer candidate school	-0.144	0.071	-2.03
NROTC	-0.317	0.073	-4.37
Other	0.220	0.103	2.14
Missing	1.270	0.233	5.46
Was enlisted sailor	-0.358	0.070	-5.12
Female	0.306	0.045	6.82
Black	-0.242	0.098	-2.48
Hispanic	0.337	0.120	2.81
Other race	-0.101	0.113	-0.9
Competitive college	0.033	0.047	0.7
Historically Black college	0.240	0.142	1.68
Historically Hispanic college	0.080	0.063	1.28
Political Science major	0.116	0.090	1.29
Science/Math major	0.082	0.056	1.47
Business major	0.301	0.061	4.92
Other (non-engineering) major	0.081	0.057	1.42
Grades not available	-1.478	0.091	-16.25
School not available	-0.526	0.099	-5.31
GPA > 3.2	0.107	0.040	2.67
GPA < 2.2	-0.483	0.107	-4.52
Married entering O-1	0.034	0.046	0.76
Warfare qualified	1.393	0.049	28.59
Constant	-0.916	0.102	-9.02

a. 18,740 observations. Year dummies (FY75-86) were also included.

Contingent on completing 168 months, OCS officers are less likely to promote to O-5, as are prior enlisted and female officers (table 12).

Those with good grades and from competitive colleges are more likely to promote, while those with bad grades are less likely to promote. Officers who are married when they first become officers are less likely to promote to O-5 given retaining to 168 months.

Table 13. Promotion to O-5 by 208 months given retention to 168 months<sup>a</sup>

Variable	Coefficient	Standard error	z
Officer candidate school	-0.343	0.114	-3.02
NROTC	-0.172	0.121	-1.42
Other	-0.429	0.159	-2.69
Missing	-0.300	0.398	-0.75
Was enlisted sailor	-0.719	0.114	-6.29
Female	-0.154	0.067	-2.29
Black	-0.193	0.143	-1.35
Hispanic	0.124	0.167	0.74
Other race	-0.255	0.155	-1.65
Competitive college	0.251	0.074	3.38
Historically Black college	0.204	0.211	0.97
Historically Hispanic college	-0.009	0.093	-0.1
Political Science major	0.227	0.137	1.65
Science/Math major	0.042	0.082	0.52
Business major	0.166	0.089	1.87
Other (non-engineering) major	0.087	0.082	1.06
Grades not available	-0.243	0.141	-1.72
School not available	-0.431	0.138	-3.13
GPA > 3.2	0.217	0.059	3.67
GPA < 2.2	-0.504	0.140	-3.61
Married entering O-1	-0.306	0.061	-5.04
Warfare qualified	0.077	0.066	1.16
Constant	0.979	0.160	6.13

a. 7,078 observations. Year dummies (FY75-86) were also included.

Overall, there are few patterns in the control variables, and in general, the magnitudes of the control variables are much smaller than the effect of warfare experience on promotion. Everything else equal, USNA officers promote well, while OCS officers have problems

promoting from O-4 to O-5. Hispanics promote well, while Blacks promote less well, especially to O-5. Graduates of Historically Black Colleges and Universities promote poorly to O-4. Those with good grades promote higher, especially to O-5, and those with poor grades do not advance as far. Finally, officers that are married upon entering the officer corps promote well to O-4 and less well to O-5.



## References

- [1] Michael Hansen and Jennie W. Wenger, with Albert B. Monroe IV and Henry Griffis. *Is Enlisted Retention Too High?* Oct 2003 (CNA Research Memorandum D0008594.A2)
- [2] Patrick C. Mackin et al. "A Model of Navy Surface Warfare Officer Retention," Jan 2002 (SAG Corporation memo)
- [3] Ann D. Parcell, Donald J. Cymrot, and Carol S. Moore. *The Officer Structure in the 21st Century*, May 2001 (CNA Research Memorandum D0003570.A2)
- [4] Ann D. Parcell, with Apriel K. Hodari and Robert W. Shuford. *Predictors of Officer Success*, Dec 2002 (CNA Research Memorandum D0007437.A1)References



## List of figures

Figure 1.	Lateral transfer from the URL to RL from FY86 to FY02 . . . . .	7
Figure 2.	Percentage of lateral transfers by warfare community. . . . .	7
Figure 3.	Percentage of URL laterals with warfare qualification (FY86 to FY02) . . . . .	8
Figure 4.	Percentage of warfare qualified by community . . . . .	9
Figure 5.	Proportion of warfare-qualified laterals by community . . . . .	9
Figure 6.	Fraction lateral transfer in RL/Staff communities (O-1 to O-6) . . . . .	10
Figure 7.	Warfare-qualified RL/Staff officers stay longer and promote farther . . . . .	12
Figure 8.	SWO to RL/Staff personnel flow model . . . . .	16
Figure 9.	Effect of reducing SWO accessions on RL/Staff manning at YOS 9 . . . . .	24



## List of tables

Table 1.	Reducing SWO accessions saves money . . . . .	23
Table 2.	Cutting SWO accessions increases direct accessions and decreases laterals . . . . .	24
Table 3.	Changes resulting from an improvement in the economy . . . . .	26
Table 4.	Changes resulting from an increase in the number of female SWOs . . . . .	28
Table 5.	Changing SWO pyramid has little effect on cost savings . . . . .	28
Table 6.	Model assumptions . . . . .	34
Table 7.	SWO and RL/Staff costs (in dollars) . . . . .	36
Table 8.	Summary statistics . . . . .	39
Table 9.	Effect of warfare qualification robust to controls . . . . .	40
Table 10.	Promotion to O-4 by 132 months. . . . .	41
Table 11.	Promotion to O-4 by 132 months given retention to 108 months . . . . .	42
Table 12.	Promotion to O-5 by 208 months. . . . .	43
Table 13.	Promotion to O-5 by 208 months given retention to 168 months . . . . .	44





