UNDERSTANDING THE IMPACT
CLOSING NAVAL AIR STATION BRUNSWICK

MAINE STATE PLANNING OFFICE
JANUARY 2007

UNDERSTANDING THE IMPACT
CLOSING NAVAL AIR STATION BRUNSWICK

A Planning Document Prepared by:

Maine State Planning Office
38 State House Station
Augusta, Maine 04333
207-287-6077
www.maine.gov/spo

January 2007

Henry Renski, PhD, Economist

Catherine Reilly, State Economist

Our sincere thanks to all those who contributed to the preparation of this report: Michael Montagna and Joyce Benson (SPO); Michael Braun (NSAB BRAC Office); Frank O'Hara (Planning Decisions, Inc.); Peter Ogden (Maine Bureau of Veterans' Services); John Dorrer, Gerard Dension, and Glenn Mills (Maine LMIS); Ginny Carroll (Maine DOL); Jon Lee and Adam Cooper (REMI, Inc.); Craig Seymour (RKG Associates); and the Governor's Advisory Council for Base Redevelopment and Reuse.

Cover photos used with permission from Naval Air Station Brunswick, Brunswick Downtown Association, and Bowdoin College.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The closure of Naval Air Station Brunswick (NASB) will give a new face to the mid-coast Maine communities that have hosted military personnel and their families for years. Businesses will look for new customers; base workers will change jobs; landlords will advertise for new tenants; and everyone will contemplate potential reuses of the base. In short, the entire community will feel the change. The closure will also bring opportunities. Research shows that most communities facing a military base closure recover after an initial adjustment period. Some even experience enhanced economic growth when military facilities are successfully converted to civilian use.

Understanding the expected economic impact of a base closure is vital to successful redevelopment. Knowing which of Maine's economic sectors will experience growth during the closure can help local communities capitalize on new opportunities. Knowing which sectors will not grow as much can help mitigate the potential negative effects.

In earlier analysis, the Maine State Planning Office estimated the economic impact of NASB's closure at the state level. This report looks at the same impact on the local and regional levels.

This report isolates the impact of the closure alone, and does not incorporate any mitigating effects of redevelopment. This information will help policymakers and service providers plan for the adjustment period. However, because redevelopment is not considered, the actual observed impact of the closure will likely be less than predicted by this analysis. Such has been the experience with prospective impact analyses nationwide.

We find that Maine's economy will experience moderate growth during and after the closure of NASB. Statewide employment will continue growing, just at a slightly slower pace. Closing NASB lowers the forecast for 2006-2012 employment growth from 8.4% to about 7.7%, a difference of roughly 6,000 jobs. That is not an estimate of actual job losses. Rather, it is the difference between forecasts of employment growth with NASB and new forecasts of growth without NASB. Roughly half of the jobs will be federal military and civilian positions. The rest are both lost jobs and reduced job growth during the adjustment period. NASB's closure will result in a less than one percent reduction in the state's expected growth in Gross State Product, employment, population, and total and per capita personal income.

Some private sector industries will continue to expand throughout the closure. Others will feel the impact more acutely, specifically retail, construction, food services and drinking places, professional services, and administrative support services. Impacts on retail and food services are a direct consequence of the loss of federal payrolls and the

ripple effects of lost consumer spending by federal employees. The construction sector will feel the loss of base contracts, as well as reduced demand for residential construction as vacated military housing comes onto the market. Impacts on local government employment, which includes public schools, are also near the top of the list, accounting for roughly five percent of total job reductions.

Communities immediately adjacent to the base and communities where base workers live will experience the fullest effects of the closure. The Brunswick Labor Market Area—which includes the communities of Brunswick, Bath, and Topsham—will experience roughly 85 percent of the employment and 75 percent of the population impacts. Over half of this is attributable to the direct loss of base-related jobs. The neighboring labor markets of Portland-South Portland, Lewiston-Auburn, and Augusta may also see small to moderate impacts, following the spread of NASB commuters and contractors. Together the three neighboring regions account for 13 percent of employment and 22 percent of population impacts. The impact on the rest of the state will be minimal beyond a relatively small number of long distance commuters and contractors based in other regions.

These findings offer guidance for region and state planning efforts. First, most of the indirect impact comes from lost spending by households supported by federal military and civilian jobs. That underscores the need to repopulate the base and surrounding areas with new households, and replenish the community with new families.

Second, studies from prior BRAC rounds show that most communities recover from major base closures. Some actually experience higher long-term economic growth if military facilities are successfully converted to private-sector uses. But the transition period immediately following the closure is often challenging for individuals, communities, and businesses with direct ties to the base. Swift economic recovery hinges on early planning, leadership, coordination of key stakeholders, and full community involvement.

Third, the relative health of the Mid-Coast bodes well for economic recovery, but the region may be more susceptible to economic shocks during the recovery period. Military staffing levels are not susceptible to economic cycles and provide a stable economic base during slow-downs in the private sector economy. After the base closure, the region should seek to leverage base and regional assets to diversify its industrial base as a buffer against future economic shocks.

Fourth, redevelopment efforts must be cognizant of prevailing market forces. In particular, on- and off-base redevelopment plans should capitalize on the unique strengths and assets of the mid-coast economy, such as the potential growth of its nascent composite materials and boat building cluster. More research may be necessary to identify other sectors with high-growth potential, with a particular eye to those that

could take advantage of the base's special assets. This further reinforces the importance of continued coordination between on-base redevelopment effects spearheaded by the two Local Redevelopment Authorities (LRAs) and the off-base efforts led by the Governor's Advisory Council for Base Redevelopment and Reuse.

I. INTRODUCTION

In 2005, the federal government initiated its most recent round of military base closures under the Base Realignment and Closure (BRAC) process. The U.S. Department of Defense (DoD) and Congress have used this process five times over the last two decades to reduce and realign the nation's military installations.

During the 2005 BRAC round, three Maine military installations were targeted for closure or realignment: Naval Air Station Brunswick, Portsmouth Naval Shipyard, and the Defense Finance and Accounting Services center in Limestone. In August 2005, the federal BRAC Commission saved two of those installations, but voted to close Naval Air Station Brunswick (NASB). Beginning in 2007, the DoD will gradually relocate squadrons currently based in Brunswick to Jacksonville, Florida.

In an earlier report released in July 2005, the Maine State Planning Office assessed the potential economic impact of NASB's closure. This report provides further detail on the near- and intermediate-term impacts. Written during the BRAC review process, the initial analysis was constrained by insufficient data on the magnitude of the proposed changes. At that time, NASB was only slated for realignment, not full closure, and there was limited information on which positions would be reassigned and the how much operational expenditures would be scaled back. This analysis addresses those limitations by making full use of the wealth of information collected in the period following the announcement of the base closure.

This study delves deeper into the nature, timing, and geographic distribution of NASB impacts. Using economic forecasting and modeling tools, SPO estimates which industries will be most effected by the closure and how large those impacts will be. We also estimate which communities will be most effected, by overlaying statewide estimates onto data of the location of current NASB employees and contractors, and

regional industrial capacity. This information will help local businesses and service providers, individuals, policymakers, and government agencies as they plan for life after NASB.

Having clear understanding of the economic effects of a base closure is vital to redevelopment planning. When used correctly, knowledge of the likely impacts can help mitigate its negative effects while enabling the region to capitalize on the new opportunities it affords. Hardship is far worse when a facility's closure is sudden and unexpected. With advance notice, economic development officials can begin searching for new tenants, initiate targeted workforce retraining efforts, and reduce financial pressures on local schools, infrastructure, and public services by postponing expansion plans or consolidating existing activity.

A detailed and thorough economic impact analysis can also help target economic and workforce development resources to the most heavily effected industries, occupations, and communities. For example, we show that secondary impacts will be highest in retail, services, and construction, with the impacts largely contained to communities immediately adjacent to the base and communities where base workers live. With detailed information on the most effected industries, the Maine Department of Labor can tailor its retraining and re-employment efforts to target the most effected occupations. They can then identify growing industries where these workers can be readily employed with minimal training, or work to develop curricula customized to their backgrounds. They can also advertise existing resources or establish training centers in the most deeply effected communities in order to reach the targeted population. These estimates can also be used to update the state's long-term economic forecasting models, which, in turn, are used to help the state develop projections of future revenues.

The closure of NASB will undoubtedly alter the local communities that have hosted military personnel and their families for years. Businesses will search for new customers; individuals who worked on the base will look for new employment; landlords will advertise for new tenants; and everyone will contemplate potential reuses of the base. In short, the entire community will feel the change. The closure will also bring opportunities. Research shows that most communities facing a base closure recover after an initial adjustment period (Appendix A). Some even experience enhanced economic growth when military facilities are successfully converted to civilian use. Understanding the information contained in this report is one step on the path to successfully planning for life after NASB.

II. PROJECT SCOPE AND LIMITATIONS

This study reports the total estimated impact of closing Naval Air Station Brunswick (NASB) on Maine's economy. It provides detailed estimates of the timing of impacts and the types of businesses and communities most likely to bear the brunt of the base closure. We use an economic model designed by Regional Economic Models, Inc. (REMI) to estimate the near- and intermediate-term impacts of the base closure while simultaneously accounting for regional adjustment mechanisms, such as changes in wages, income, and population.

Beginning with the year 2006, we project the impacts of the base closure out to 2015, four years after the expected departure of the last military units from the base. The total effect of the base closure is measured by changes in several indicators of statewide economic well-being: Gross State Product (GSP), employment, personal income, and population. These include impacts directly resulting from the reassignment of active-duty military and federal civilian employees, working spouses of military households, forgone contracts to Maine businesses, local expenditures of drilling reservists, loss of federal school aid, and the possible out-migration of military retirees. The closure of the air station will also have far reaching indirect or "ripple" effects as forgone base expenditures, payrolls, and federal transfer payments reduce the demand for goods and services of local businesses in other sectors of the states' economy.

Every study has limitations. It is imperative that this study's are clearly recognized so that its findings are not misinterpreted or misused. First, the study only considers the economic impacts of the base closure on output, jobs, and income. It does not estimate the influence of the base closure on state and local tax collections, local property values, occupancy rates, or school enrollments. Estimating these impacts requires additional data and a different economic modeling framework. Second, there is only limited information on some of the sources of prospective impacts. As a consequence, not all

economic impacts can be estimated with equal precision or confidence. For example, no one knows precisely how many retired military will move after the base closes (although regional experts generally agree that it will be a small share of those currently living closest to the base). Rather than provide an exact estimate, we estimate impacts over a likely range of relocating retirees.

Third, the model does not include the long-term impacts of the base closure on Navy retirees moving into the region. NASB has long acted as a magnet for Navy veterans who learn of the Mid-Coast while stationed there. Although the loss of this resource may soften growth in the demand for housing, health care, and local consumer goods and services, these impacts will not be felt until well after the study period. We comment on this issue in the section on statewide impacts.

Fourth, and most important, this study only captures economic impacts resulting from the closure of NASB. It does not consider other major changes to the mid-coast economy, such as expansions or layoffs at other regional employers such as Bath Iron Works. Nor does this study consider offsetting positive impacts from base redevelopment or reuse, off-base economic development initiatives such as the recent designation of Brunswick as a Pine Tree Zone, or new economic activity stimulated by federal redevelopment funds. Because it does not account for reuse, this study represents the economic impact of the base closure under a "worst-case" scenario—that is, no redevelopment at all. Assuming that state and community leaders carry out the redevelopment planning efforts that they have set in place, the actual impact of closing NASB will likely be more moderate than estimated in this analysis.

III. METHODOLOGY

SPO conducted this economic impact analysis using an economic model developed by Regional Economic Models, Inc. (REMI). Like other impact modeling software packages, the REMI Policy Insight model includes a regional input-output component that measures changes in transactions between businesses as well as changes in household consumption. Unlike other impact models, REMI also incorporates a full-spectrum of regional adjustment mechanisms, such as changes in regional wage rates, prices, market shares, and migration. This not only provides a more dynamic and realistic picture of economic responses to external shocks, but allows the analyst to answer a far broader range of policy questions.

STEP 1: BASELINE FORECAST

Modeling economic impacts in REMI is done in a loose sequence of steps. The first step involves working with REMI staff to develop a statewide

Impact Estimation Terminology

Change in Final Demand
A change in the value of goods and services sold to consumers and businesses outside the region by businesses inside the region.

Direct Effects
Direct effects are the immediate changes to final demand for goods and services that result from an economic shock. Direct effects are often represented by the number of employees laid-off from a plant closing. In the case of NASB, direct effects will be the lost military or contract jobs that are now directly supported by DoD funds.

Indirect (Ripple) Effects
Indirect effects (also called "ripple" or "secondary" effects) are the economic impacts of direct effects. A reduction in final demand reduces the total volume of dollars circulating in the local economy. That affects businesses that sell goods or services to the base or its employees. Faced with lower sales, these businesses will reduce their purchases of goods and services, some from other local businesses and some from businesses outside the region. Likewise, dislocated workers may reduce their purchases. These secondary rounds of reduced consumer and business sales and purchases are called "indirect effects." Reduced (or forgone) purchases from businesses outside the region are called "leakage" and have further no impact on the local economy. The cycle of reduced activity continues until all of the original impacts have leaked out of the region.

Intermediate Goods/Demand
"Intermediate goods" are products and services that are bought by one business from another business. "Intermediate demand" is demand for intermediate goods.

Induced Effects
Some indirect effects are due to reductions in business-to-business transactions and others are due to reduced household expenditures. The latter are called "induced" effects.

forecast of economic growth and demographic change.[1] The REMI forecast is based on forecasts of U.S. growth, past economic and demographic trends in Maine, standard economic theories of general equilibrium, and statistical estimates of key relationships between different markets. This forecast provides a counterfactual, or "baseline," scenario of what would happen if NASB remained open. All changes in employment, income, and population that result from the base closure are measured against this baseline. To check for consistency, the REMI forecast for Maine was compared with independent forecasts produced by Maine economists and the U.S. Census Bureau.

STEP 2: DIRECT ECONOMIC IMPACTS

The next step involves collecting the background data necessary to estimate the direct sources of base-closure impacts and to distinguish these from indirect or ripple effects. Accurate measurement of direct effects is the most important component of a quality economic impact analysis. The closure of any major private or public enterprise, whether a textile factory or military facility, reduces a region's economic base by reducing the amount of income coming into the region from sales of goods and services to consumers and businesses outside the region. This is otherwise known as a "change in final demand." In the case of a military facility, most income comes from federal tax dollars that support base operations and pay the salaries of military personnel and federal civilian employees. A portion of NASB operational expenditures are absorbed into the state's economy when the base purchases supplies, equipment, construction, and repair services from local businesses. Military families and base civilian employees are also active participants in their local economies and provide a sizable customer base for local businesses, particularly those in the retail, personal services, and entertainment industries.

[1] This forecast is only used to provide a baseline for simulating impacts. It should not be viewed as a substitute or alternative for other forecasts of the Maine economy, such as that of the Consensus Economic Forecasting Commission.

This study considers an exhaustive list of the potential sources of base-related economic impacts. This list was compiled through a thorough review of previous base closure reports, academic studies, and discussions with local experts and BRAC personnel. We consider potential impacts from:

- Active-duty military personnel
- Federal civilian employees
- On-base employees of private businesses
- Professional spouses of military families
- Contracts to local businesses
- Local expenditures by reservists
- Out-migration of existing retirees
- Federal transfer payments to local schools and governments

Appendix B fully describes how these potential sources of economic impacts are measured and estimated in the REMI framework.

The largest source of base closure impacts is the lost wages and salaries of NASB's military and civilian workforce. All active military positions qualify as direct effects, simulated in REMI as a reduction in the state's military workforce by approximately 2,700 jobs.

Some of the civilian workforce layoffs qualify as direct effects, and some as indirect effects. The civilian workforce consists of three types of positions: appropriated federal employees, non-appropriated federal employees, and employees of private businesses that operate on base. Appropriated workers staff key administrative, operations, safety, and technical support positions required to ensure continuity of base operations (see Appendix C). Because they are appropriated in the DoD budget, all of the roughly 380 appropriated workers are included as direct effects. Thirty-five percent of the base's federal employees staff non-appropriated positions. The most common non-appropriated occupations are sales clerks, housekeepers, recreational attendants, and food service workers. Many of these positions are not financed by export revenues but through payments for services rendered to other on-base personnel and workers or

through a portion of a service member's Basic Housing Allowance (BHA). Through a detailed examination of worker occupations, we identified 87 non-appropriated employees as direct effects, and the remaining 114 as indirect effects. An additional 118 civilians work for private vendors, such as the Embry Riddle Aeronautical University, Taco Bell, Subway, the Navy Credit Union, Southern New Hampshire University, and Hertz Rent A Car. Most of these positions also qualify as indirect because they derive their income by serving local demand.[2]

The closure of a military base also generates negative direct effects through the forgone purchase of goods and services from Maine businesses. Like most large military facilities, NASB purchases relatively little from local businesses compared to large private sector employers such as manufacturing facilities. Large scale purchases of specialized capital equipment and construction typically follow established military procurement guidelines, with the vast majority of awards going to out-of-state businesses. Much of the supplies and equipment necessary for daily operations also come from national vendors.

The REMI software automatically incorporates the loss of local operational expenditures of military facilities. It assumes that operational expenditures are in direct proportion to the number of military positions eliminated. REMI may not fully account for non-operational expenditures, such as procurements from Maine businesses. We estimate annual local NASB procurement at roughly $5.5 million based on reports from the Department of Defense's Statistical Information Services Division. Roughly half is spent on construction and related services such as building and facilities maintenance. The remainder is largely spent on grounds keeping, trash removal, snow plowing, administrative services, and housekeeping services.

[2] The twenty-five employees working for Embry Riddle and Southern New Hampshire University are counted as direct effects and modeled as a negative shock to the private educational services sector in REMI. See Appendix B for an explanation.

The loss of a major military facility has numerous additional, more subtle effects beyond employment, payrolls, and contract awards. Working spouses of military households also contribute to the local economy. Most spouses are expected to vacate their jobs and move when the base closes. NASB attracts many drilling reservists into the region who spend money in the local community, namely in retail, food and beverages, and other consumer goods. Because these reservists will drill out-of-state after the base closes, their lost spending counts as a negative change in final demand.

The federal government provides transfer payments to local schools in the communities where military personnel live and work. Brunswick, Topsham (SAD 41), and Bath receive the bulk of these payments estimated at just under $1.3 million a year. NASB also makes additional payments to the town of Brunswick to cover public safety and other infrastructure costs.

NASB provides many services to the sizable population of retired military personnel living in the Mid-Coast. These services range from discount shopping at the exchange and commissary, to emergency medical services at the base medical center, to recreational opportunities such as bowling and golf. Upon losing these services, some retired military personnel may move from the region, although the exact number of likely out-migrants is difficult to estimate with precision. The loss of their retirement income counts as another negative impact to the state economy.

STEP 3: STATEWIDE INDIRECT AND TOTAL ECONOMIC IMPACTS

The next stage of the estimation process is modeling the closure of NASB as a negative shock to the state economy. This generates a new forecast to compare to the baseline forecast from Step 1. The size of the direct effects and prevailing industrial organization of the state's economy determine the indirect and total effects of the base closure. When NASB closes, businesses that lose federal contracts or serve the on-base workforce may have to reduce hours, lower wages, lay off personnel, move, or shut-down altogether.

Cutbacks from contractors and businesses that directly serve base employees will further reduce demand for goods and services from other businesses in the state, some of whom may lay off workers and curtail expenditures. The indirect effects of the base closure are the sum of these downstream reductions in economic activity. Whereas the direct effects must be explicitly delineated, indirect effects are estimated by REMI as a function of estimated buyer-supplier linkages between industries in the study region, household consumption of locally produced goods, and the size and industrial composition of the study region.

STEP 4: REGIONAL ECONOMIC IMPACTS

In the final stage of our analysis we estimate the total population and employment impacts of the base closure on specific regions within the state. The most common method of estimating regional impacts is to use regional economic multipliers estimated at the county level. This is not appropriate for NASB, which belongs to a labor market that cuts across Cumberland, Sagadahoc, and a small portion of Lincoln county. Rather than estimate impacts from county multipliers, we distribute statewide impacts to regional labor markets based on the location of the effected businesses and workers. To do this, we collected information on the location of NASB employees, spouses, retirees, and independent contractors and service providers. Direct job loses, whether on or off base, are counted at the place of business. Indirect impacts from reduced household consumption are assigned to each worker's place of residence. Impacts from reduced intermediate goods purchases are distributed according to each region's industrial composition.

IV. BASELINE FORECAST: ESTIMATED GROWTH WITHOUT NASB CLOSURE

This section describes REMI's forecast of state economic growth if Naval Air Station Brunswick remained open (the baseline forecast described in Step 1 of the Methodology section). In the absence of the base closure, REMI forecasts modest, but steady, economic and population growth for the state as a whole. Gross State Product (GSP), an estimate of the value of all goods and services produced in the state each year, is expected to increase by roughly $11 billion from 2006 to 2015, an average annual growth rate of 2.4 percent (Figure 1).[3] This corresponds with recent U.S. Bureau of Economic Analysis estimates of 2.4 percent average annual GSP growth over the past four years (2001-2005). Personal Income, which includes income from employment earnings, pensions and insurance payments, interest, and investments, is expected to grow at a slightly higher annual rate of 3.11 percent. REMI also predicts steady growth in population and total employment. In the absence of the base closure, statewide

Figure 1
Baseline Forecast
Gross State Product and Personal Income

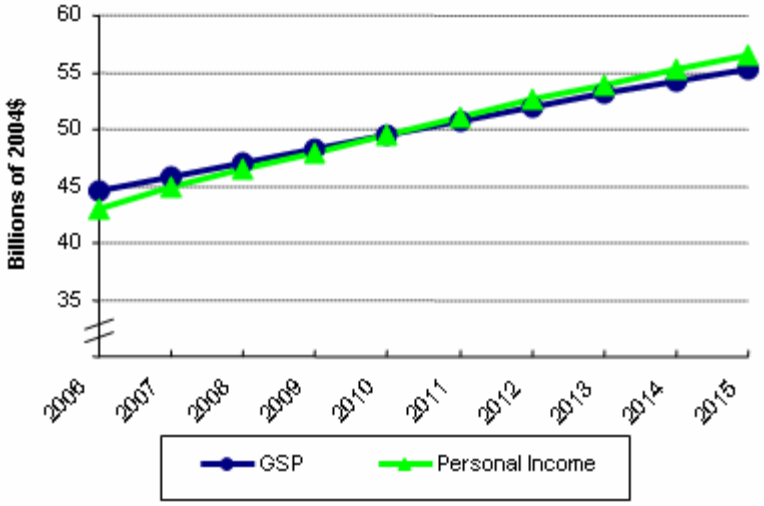
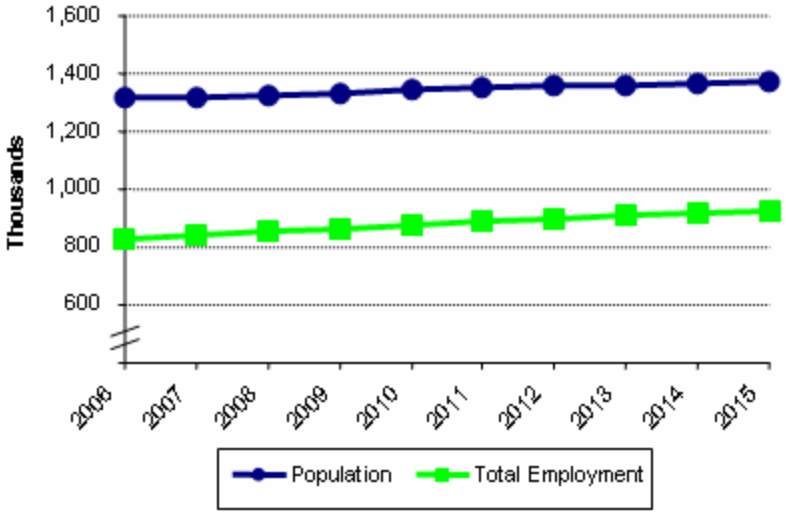


Figure 2
Baseline Forecast
Population and Employment Growth



[3] State GSP is measured by real chained dollars to match current BEA estimates.

population is expected to grow by approximately 60,000 persons from 2005 to 2015 (Figure 2), just below current U.S. Census Bureau projected growth of 70,000 over the same period. REMI also predicts an additional 100,000 jobs by 2015, corresponding to an average annual growth rate of 1.24 percent. This is slightly higher than the state's current predicted average annual wage and salary employment growth rate of 0.6% for the years between 2005 and 2011.[4]

[4] As reported in the November 2006 *Report of the Consensus Economic Forecasting Commission (CEFC).* REMI estimates are likely to be higher, in part, because REMI's forecasts do not include sole-proprietors, which are not included as part of the CEFC forecasts. While the baseline forecast may differ, is doubtful that these differences significantly affect our estimated impacts of the NASB closure.

V. DIRECT ECONOMIC IMPACTS: OVERVIEW AND TIMELINE OF NASB CLOSURE

NASB's closure will result in the relocation of approximately 2,700 active-duty military positions, and the loss or relocation of roughly 700 civilian jobs.[5] Most of the civilian positions (83 percent) are federal civilian employees. The remainder work for private businesses with license to operate on the base such as Embry Riddle Aeronautical University, Southern New Hampshire University, Taco Bell, Subway, and the Navy Federal Credit Union.

Table 1
Timetime of BNAS Closure
as of June 2006

	FY '07	FY '08	FY '09	FY '10	FY '11	Total
Active duty military						
number	11	10	603	1,654	408	2,686
share	0.4%	0.4%	22.4%	61.6%	15.2%	100%
Federal civilians						
number	24	52	123	189	193	581
share	4.1%	9.0%	21.2%	32.5%	33.2%	100%
Private vendors	0	0	26	73	18	118

Source: Brunswick Naval Air Station, BRAC Office

Military and civilian staff reductions will occur over several years. Downsizing is expected to begin almost immediately in federal fiscal year 2007 (July 1, 2006 – June 30, 2007) with the final squadrons pulling out during fiscal year 2011. The timing of reductions is largely regulated by the buildup of additional capacity at Naval Air Station Jacksonville. Table 1 provides the tentative timetable of civilian and military personnel layoffs as of June 2, 2006. The exact timing and levels of personnel reductions will likely change as NASB continues its ongoing assessment of clean-up and closure activities, and as more information becomes available on Jacksonville's ability to

[5] The number of active-duty military personnel stationed at NASB and the size of the civilian workforce vary from year to year. This fact likely accounts for any small discrepancies with earlier reports.

accommodate additional personnel and equipment. It is expected that only a mild trickling of military and civilian workers will leave during the first few years.

The first major reductions in active-duty military are expected in fiscal year 2009 when 22 percent of the military personnel will relocate. The largest force reductions will be during the final two years, 62 percent in 2010 and the remaining 15 percent in 2011. The pull out of the civilian workforce will be more gradual, starting with 4 percent in fiscal year 2007, scaling up to 33 percent in fiscal years 2010 and 2011. There are no independent estimates of the timing of reduction for employees of private vendors. Because these positions predominantly cater to on-base residents, visitors, and employees, we assume that reductions will be directly proportional to the withdrawal of military personnel.

VI. STATEWIDE IMPACTS

The impacts of base closure are measured by the difference between the baseline forecast and a forecast of the state's economy with a gradual elimination of operations at NASB. It is important to remember that these impacts only pertain to the air station closure and its indirect effects. We do not consider the combined impacts from other exogenous events, such as the successful redevelopment of base property or possible changes in employment levels at Bath Iron Works. When reuse and redevelopment are not considered in economic impact models, observed job losses are often less than predicted. Expanding opportunities from redevelopment and the influx of new residents into vacant housing will help compensate for public and private sector job and population losses.

We offer two base closure scenarios to account for uncertainty in the precise number of retired veterans who may decide to move after NASB closes. Under the first scenario, we assume that two percent of the full-pensioned Navy retirees currently living within 20 miles of NASB leave the region when the base closes. Under the second scenario we increase this share to ten percent. The true number of migrant retirees likely exists somewhere within this range. Appendix B provides a more detailed explanation behind our estimates of retiree out-migration.

We report the total (direct,indirect, and induced) effect of the base closing by the anticipated change in several key indicators: Gross State Product, total employment, personal income, wage and salary income, per capita personal income, and population. Tables 2 and 3 provide summaries of these measures, plus a breakdown of population impacts and employment impacts by their primary components.

Table 2

Summary Economic and Population Impacts
Scenario 1: Two percent retiree outmigration

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Gross State Product (mils, 2004 $)	-3.2	-8.4	-90.0	-303.2	-368.6	-367.1	-369.5	-370.9	-372.1
Population	-33	-76	-1,614	-5,802	-6,836	-6,767	-6,699	-6,626	-6,546
Retirees	0	0	0	-49	-98	-98	-98	-98	-98
Military	-9	-17	-505	-1,845	-2,176	-2,176	-2,176	-2,176	-2,176
Military Dependents	-15	-29	-856	-3,124	-3,683	-3,683	-3,683	-3,683	-3,683
Personal Income (millions, 2004 $)	-2	-6	-73	-255	-317	-322	-326	-330	-333
Wage & Salary Income (millions, 2004 $)	-2	-5	-53	-178	-222	-226	-230	-234	-236
Per capital personal income (2004 $)	-0.8	-2.2	-8.4	-21.0	-27.5	-26.8	-27.6	-28.1	-28.6
Total Employment	-52	-138	-1,465	-4,945	-6,069	-6,085	-6,066	-6,019	-5,960
Government	-32	-85	-853	-2,833	-3,449	-3,446	-3,438	-3,430	-3,421
Nat Res, Mining, Util, Const	-3	-9	-101	-367	-514	-557	-567	-555	-534
Manufacturing	0	-1	-14	-49	-59	-57	-55	-54	-52
Wholesale Trade	0	-1	-14	-48	-58	-56	-55	-53	-51
Retail Trade	-5	-12	-135	-455	-551	-546	-542	-534	-526
Transp, Inform, Fin Act	-2	-5	-61	-206	-241	-232	-223	-213	-205
Services	-9	-25	-288	-986	-1,197	-1,190	-1,187	-1,180	-1,171

Table 3

Summary Economic and Population Impacts
Scenario 2: Ten percent retiree outmigration

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Gross State Product (mils, 2004 $)	-3.2	-8.4	-90.0	-313.8	-390.3	-388.7	-390.6	-391.4	-391.6
Population	-33	-76	-1,614	-6,079	-7,407	-7,367	-7,319	-7,258	-7,183
Retirees	0	0	0	-281	-561	-561	-561	-561	-561
Military	-9	-17	-505	-1,845	-2,176	-2,176	-2,176	-2,176	-2,176
Military Dependents	-15	-29	-856	-3,124	-3,683	-3,683	-3,683	-3,683	-3,683
Personal Income (millions, 2004 $)	-2	-6	-73	-275	-357	-363	-367	-370	-372
Wage & Salary Income (millions, 2004 $)	-2	-5	-53	-184	-235	-240	-244	-247	-249
Per capital personal income (2004 $)	-0.8	-2.2	-8.4	-27.5	-40.0	-37.9	-37.5	-37.0	-36.3
Total Employment	-52	-138	-1,465	-5,169	-6,523	-6,541	-6,512	-6,448	-6,367
Government	-32	-85	-853	-2,852	-3,489	-3,488	-3,481	-3,473	-3,464
Nat Resources, Mining, Utilities, Constru	-3	-9	-101	-393	-574	-628	-641	-627	-601
Manufacturing	0	-1	-14	-54	-67	-65	-62	-60	-57
Wholesale Trade	0	-1	-14	-52	-65	-64	-62	-60	-57
Retail Trade	-5	-12	-135	-495	-630	-623	-615	-604	-591
Transp, Inform, Fin Act	-2	-5	-61	-224	-275	-264	-252	-241	-229
Services	-9	-25	-288	-1,099	-1,423	-1,410	-1,399	-1,385	-1,368

Gross State Product

At its peak, the closure of NASB will reduce total state output by approximately $370 to $390 million (Figure 3). While a seemingly large number, this corresponds to less than one percent of forecasted GSP under the baseline scenario (Figure 4). The sharpest decline in output will occur between 2009 and 2010, coinciding with the timing of reductions of the on-base military and civilian workforce. As shown in Figure 5, this reduction is relative, not absolute. GSP will continue to grow, just at a slightly slower pace.

Personal Income

At its peak in 2015, the base-induced reductions in aggregate personal income range from $330 to $370 million (Figure 6). The range is slightly larger than that of GSP because personal income includes pensions and

Figure 3

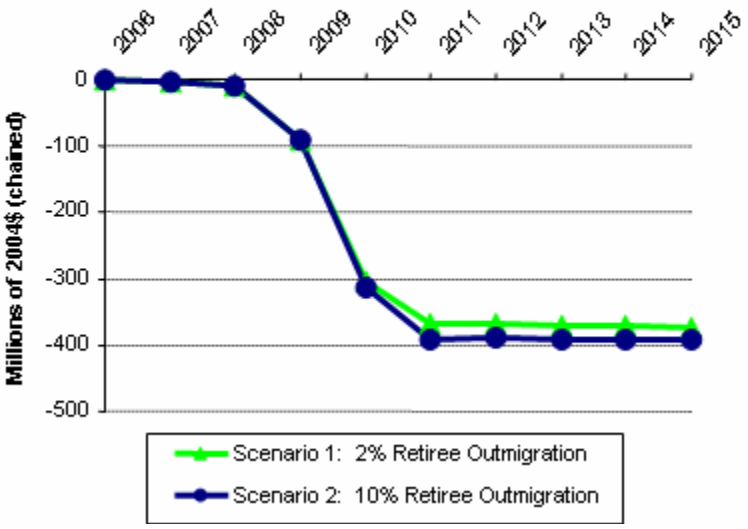


Figure 4

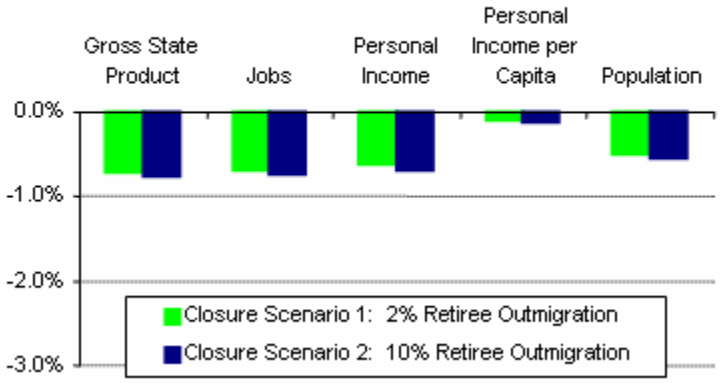
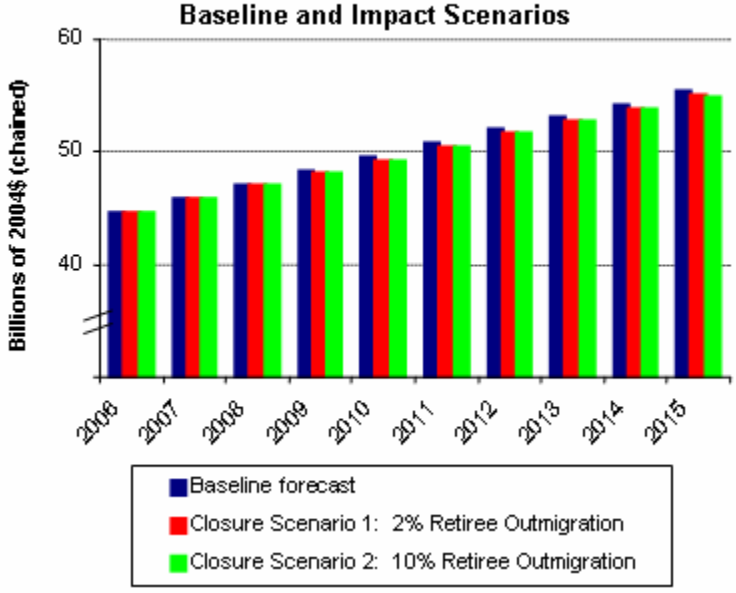
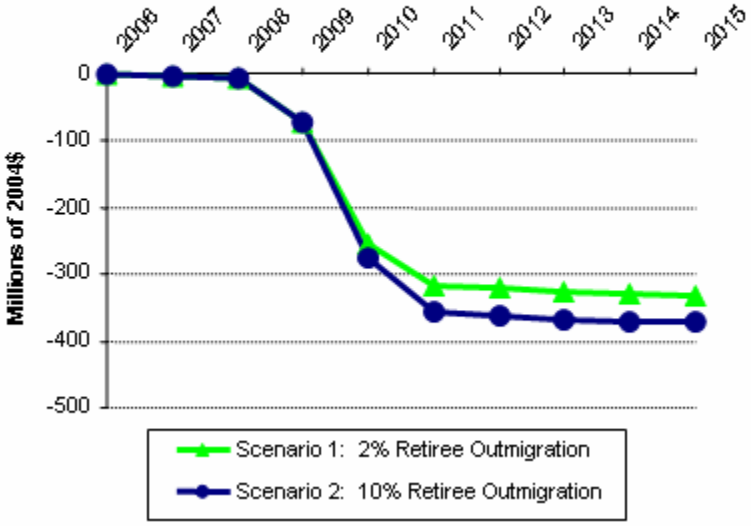


Figure 5



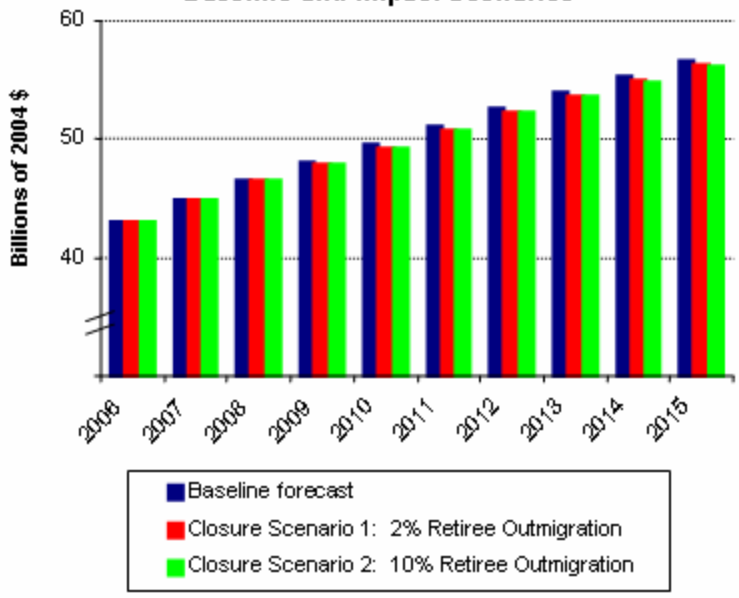
retirement income and is more sensitive to assumptions of retiree out-migration levels. Again, these reductions are relative, not absolute. As shown in Figure 7, personal income will continue to grow, just at a slightly slower pace.

Figure 6
Impact on Personal Income
Difference from Baseline Forecast



The base closure is expected to have little influence on *per capita* personal incomes. Unlike other mass layoff events, military base closures trigger the immediate departure of active-duty personnel and their spouses, as well as many civilian employees, particularly the federal employees who qualify for relocation assistance. The silver lining of this migration is that it minimizes the number of newly unemployed looking for work. In other words, the drop in labor demand triggered by the closure is partially offset by a reduction in labor supply through out-migration. The experience of other BRAC communities supports this conclusion of little or no long-run change in either unemployment or wage rates.

Figure 7
Personal Income (levels)
Baseline and Impact Scenarios



Growth of state per capita personal income is anticipated to decline by less than 0.2 percent, or from $30 to $40 per person (Table 2 and 3). Most of this reduction will be from reduced incomes of dislocated workers. We expect no reduction in the prevailing wage rates of employed workers, although the temporary increase in the number of people looking for work in the Brunswick area may slightly depress wage growth during the adjustment period.

EMPLOYMENT

The statewide employment impact of the base closure is expected to be from 6,000 to 6,500 fewer jobs compared to the baseline scenario (Figure 8). **This does not mean that 6,000 to 6,500 people will be laid off and looking for work.** As shown in Figure 9, these reductions are relative, not absolute. Statewide employment will continue to grow, just at a slightly slower pace. Roughly half (about 3,300) of the employment impacts are due to lost federal military and civilian jobs (Figure 10). Most of the active military and some of the federal civilians will be reassigned to another facility.

Figure 8
Impact on Total Employment
Difference from Baseline Forecast

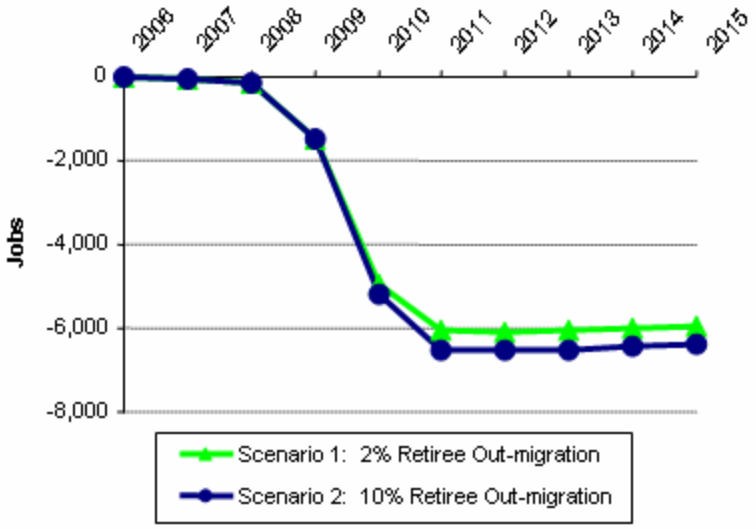
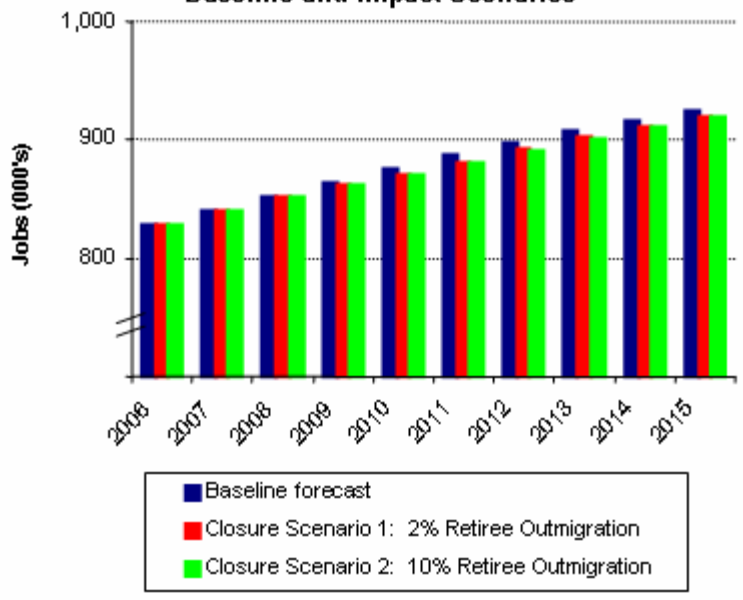
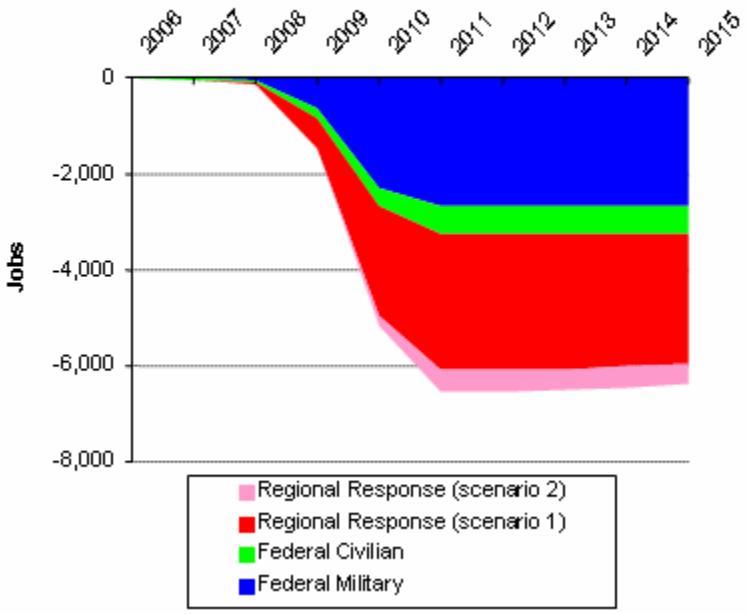


Figure 9
Total Employment (levels)
Baseline and Impact Scenarios



Reassigned workers will not add to the number of dislocated workers actively seeking re-employment in the state, although their lost spending power will have an impact on local retailers and services.

Figure 10
Components of Employment Change
Difference from Baseline Forecast



The regional (off-base) response to the base closure will likely be between 2,800 to 3,300 fewer jobs assuming no offsetting redevelopment (Figure 10). **Again, this does not mean 2,800 to 3,000 laid-off workers.** While some job losses will inevitably occur, these figures also reflect fewer new jobs being created due to a slowdown in job growth. REMI does not distinguish between layoffs and lower job growth in its estimates. Some businesses may layoff workers and others may close, especially those that are heavily reliant on direct sales to the base or its workers. Other businesses will not lay off existing staff, but may hire fewer additional workers or leave vacant positions unfilled while the region rebounds. There may also be a temporary lull in employment growth from new business starts.[6] The upcoming section on industry-specific impacts will discuss this issue further.

Direct and Indirect Effects

We distinguish the change in total employment attributable to direct effects, changes in intermediate demand, and induced effects. Direct effects, in this case, are the net

[6] Recent research into plant-level dynamics shows that new business starts are particularly sensitive to fluctuations in business cycles, explaining most of the slow down in employment growth during regional recessions. For additional information see *Davis, Haltiwanger and Schuh (1996) Job Creation and Destruction. MIT Press.*

employment equivalent of all the direct sources of changes in statewide final demand. Changes in intermediate demand are the collective impact of a slowdown in sales and purchases between local businesses. Reduced consumption of goods and services by local households are the induced effects.[7]

The direct effects of closing NASB are more than twice as large as the collective sum of indirect effects in the larger economy (Table 5). Estimates of direct effects are equal under both scenarios because the impact of additional migration is reduced household consumption, an induced effect. Additional retiree migration also has a small effect on intermediate demand as lower business sales decrease the volume of local sales between businesses.

Table 5
Employment Impacts: Direct, Intermediate Demand, and Induced (Household Consumption) Effects

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Scenario One	**-52**	**-138**	**-1,465**	**-4,945**	**-6,069**	**-6,085**	**-6,066**	**-6,019**	**-5,960**
Direct	-31	-83	-837	-2,785	-3,382	-3,380	-3,380	-3,380	-3,379
Change in intermediate demand	-4	-11	-168	-585	-693	-665	-636	-608	-582
Change in household consumption	-17	-45	-460	-1,576	-1,995	-2,040	-2,049	-2,032	-1,998
Implied Multiplier	*1.67*	*1.67*	*1.75*	*1.78*	*1.79*	*1.80*	*1.79*	*1.78*	*1.76*
Scenario Two	**-52**	**-138**	**-1,465**	**-5,169**	**-6,523**	**-6,541**	**-6,512**	**-6,448**	**-6,367**
Direct	-31	-83	-837	-2,785	-3,382	-3,380	-3,380	-3,380	-3,379
Change in intermediate demand	-4	-11	-168	-633	-789	-758	-725	-692	-660
Change in household consumption	-17	-45	-460	-1,750	-2,352	-2,402	-2,406	-2,377	-2,328
Implied Multiplier	*1.67*	*1.67*	*1.75*	*1.86*	*1.93*	*1.94*	*1.93*	*1.91*	*1.88*

The induced effects from lower household expenditures account for the second largest source of job losses. At its peak, the reduction in household consumption will cost the state somewhere between 2,000 and 2,400 jobs, roughly 30 percent of the total employment impact. Lower household expenditures mainly affect businesses that

[7] Impacts due to equilibrating adjustment mechanisms are incorporated into intermediate demand and household consumption. The impacts from adjustment mechanisms are almost negligible given the short timeframe considered in this study.

directly serve the residential population, such as local retail stores, restaurants, entertainment services, and other consumer services. Impacts from reduced demand for intermediate goods account for less than eleven percent of total impacts, the equivalent of 700 to 800 fewer jobs. Military bases generally have relatively small impacts on intermediate goods sales, at least relative to private sector manufacturers of equivalent size. Military bases buy relatively little from local producers, favoring national vendors secured through sizable procurement bids. National chain-store retailers, who likely absorb the majority of NASB household expenditures, also have relatively few connections to local producers and limited ripple effects.

EMPLOYMENT MULTIPLIERS

Economic impact studies often explain employment impacts in terms of multiplier effects. Employment multipliers are often misinterpreted as meaning: "for every job lost [on the base], the region will lose an *additional x* jobs." This interpretation is mistaken on several counts. First, employment multipliers are calculated as the ratio of *total* to *direct* impacts, not *indirect* to *direct* impacts. They should be interpreted as meaning: "for every job lost [on the base] the region will lose a *total* of *x* jobs, including the original lost job." Furthermore, on-base employment is not the only source of direct impacts and not all on-base employment counts as direct effects. Some on-base employment is supported by payment for services rendered to other base personnel and qualifies as indirect effects.

With these caveats in mind, we estimate implied employment multipliers that range from 1.80 (Scenario 1) to just under 1.94 (Scenario 2), at their peak in 2011 (Table 5). This means that for every lost job that contributes to final demand (whether on- or off-base) there will be one additional 0.80 to 0.94 jobs lost in the region (or a total of 1.80 to 1.94 lost jobs). These multipliers are slightly higher than earlier SPO estimated multipliers of 1.4, but close to the DoD's estimated NASB employment multipliers of 1.8. These multipliers differ from the earlier SPO study because of information released

in recent months that was not available at the time of the original report. Specifically, the earlier SPO study did not have access to data on the occupations of NASB civilian workers which is necessary to distinguish on-base direct from on-base indirect jobs. Lacking such data, impact studies typically assume that all on-base jobs count as direct effects, which reduces the ratio of indirect to direct job loses and thereby reduces the size of employment multipliers.

NASB employment multipliers are in line with other Maine industries. They are, however, relatively low compared to the manufacturing sector. Military installations have fewer linkages with local economies than comparably sized manufacturing firms, because they purchase large portions of their supplies and materials from national rather than local vendors. Military personnel also spend a sizable portion of their earnings on the base, unlike employees of private-sector firms who purchase relatively more goods and services within the local economy. For comparison, the following are employment multipliers for Maine calculated by the U.S. Bureau of Economic Analysis: paper manufacturing, 4.64; utilities, 3.37; broadcasting and telecommunications, 3.10; machinery manufacturing, 2.48; real estate, 2.09; construction, 1.90; retail, 1.47; food services and drinking places, 1.42.

EMPLOYMENT BY INDUSTRY

The spread of impacts across industries is fairly typical of military facilities whose primary connection to the local economy is through reduced consumption and out-migration of military and federal civilian households. Table 6 shows the total employment impacts for the twenty-five most heavily impacted industries under each impact scenario. Federal military and federal civilian workers are the first and fourth most heavily impacted industries. Together they make up just over half of total job reductions one year after the base closure. The most heavily impacted private sector industries include: retail, construction, food services and drinking places, professional services, and administrative support services. Impacts on retail and food services are a

direct consequence of the loss of federal payrolls and the ripple effects on personal income. The construction sector will be effected by the loss of $2.5 million in annual procured base contracts as well as a slowdown in demand for new residential construction as vacated military housing comes onto the private market. Impacts on local government employment, which includes public schools, are also near the top of the list, accounting for roughly five percent of total job reductions.

REMI does not differentiate between layoffs of the currently employed and a slowdown in the rate of growth compared to the baseline forecast. To identify industries where layoffs are most and least likely we examine REMI forecasts of absolute employment change, i.e. not measured as deviations from the baseline forecasts. Industries showing little absolute change or declining employment are likely candidates for layoffs. Industries expected to expand regardless of the base closure are more likely to experience a slowdown in growth rather than layoffs. These are only approximations based on aggregate, statewide trends. The experiences of individual businesses may deviate substantially from industry averages. Even within fast growing industries, some severely effected businesses may have to lay off workers, while businesses in slow growing or declining industries may not.

Table 6

Employment Impacts, Top 25 Industries

Scenario 1: Two percent retiree outmigration

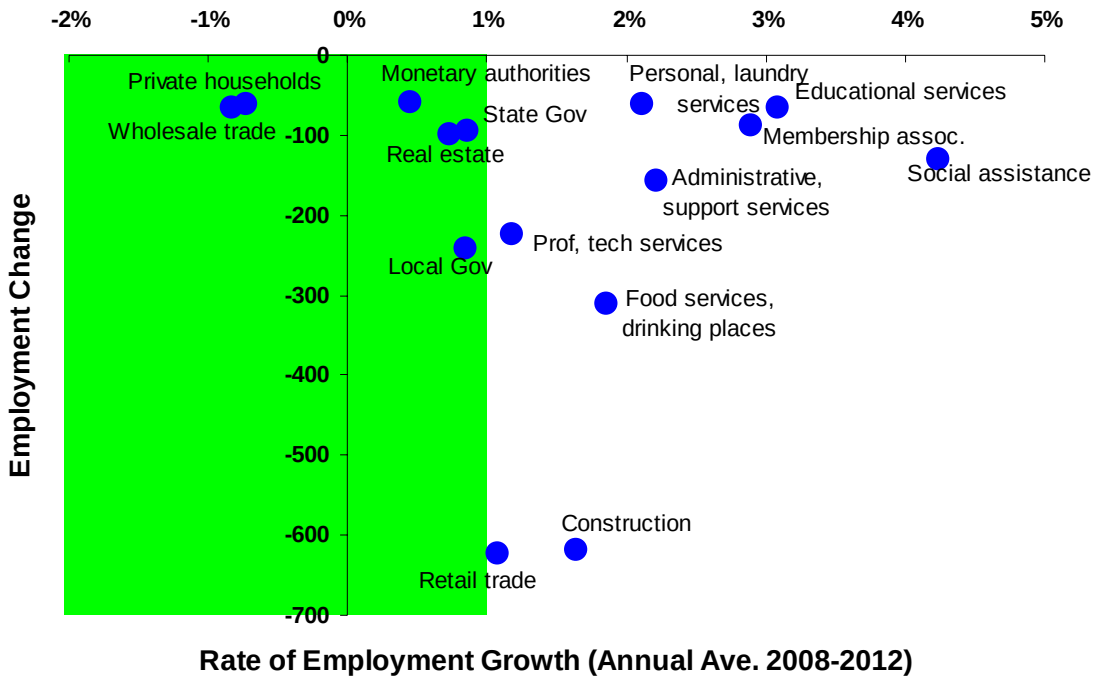
Variable	2007	2008	2009	2010	2011	2012	2013	2014	2015
Federal Military	-11	-21	-624	-2,278	-2,686	-2,686	-2,686	-2,686	-2,686
Construction	-3	-8	-98	-358	-503	-547	-558	-547	-527
Retail trade	-5	-12	-135	-455	-551	-546	-542	-534	-526
Federal Civilian	-20	-61	-160	-312	-467	-467	-467	-467	-467
Food services, drinking places	-2	-7	-67	-223	-271	-270	-270	-268	-267
Local Gov	-1	-2	-49	-175	-215	-213	-207	-201	-195
Prof, tech services	-1	-2	-48	-172	-207	-207	-207	-206	-204
Administrative, support services	-1	-2	-33	-116	-140	-139	-138	-136	-134
Social assistance	-1	-2	-26	-90	-111	-113	-114	-115	-115
Real estate	-1	-2	-24	-82	-93	-88	-83	-78	-73
State Gov	0	-1	-19	-69	-82	-81	-78	-76	-73
Membership assoc, organ	-1	-2	-18	-61	-74	-75	-75	-75	-74
Educational services	0	-1	-15	-49	-59	-59	-60	-60	-61
Wholesale trade	0	-1	-14	-48	-58	-56	-55	-53	-51
Personal, laundry services	0	-1	-13	-42	-52	-52	-52	-52	-52
Private households	-1	-1	-14	-45	-53	-51	-51	-50	-50
Monetary authorities, et al.	-1	-1	-13	-45	-53	-51	-49	-47	-46
Repair, maintenance	0	-1	-12	-40	-49	-49	-48	-47	-47
Performing arts, spectator sports	0	-1	-11	-38	-46	-45	-45	-45	-45
Amusement, gambling, recreation	0	-1	-11	-36	-44	-44	-44	-44	-44
Hospitals	0	0	-5	-19	-24	-23	-22	-22	-21
Nursing, residential care facilities	0	-1	-5	-18	-23	-23	-23	-22	-22
Rental, leasing services	0	0	-4	-14	-17	-18	-18	-18	-18
Truck transp; Couriers, msngrs	0	0	-3	-10	-12	-12	-12	-12	-11
Waste mgmnt, remed services	0	0	-3	-11	-12	-12	-12	-11	-11

Scenario 2: Ten percent retiree outmigration

Variable	2007	2008	2009	2010	2011	2012	2013	2014	2015
Federal Military	-11	-21	-624	-2,278	-2,686	-2,686	-2,686	-2,686	-2,686
Retail trade	-5	-12	-135	-495	-630	-623	-615	-604	-591
Construction	-3	-8	-98	-382	-562	-617	-631	-618	-593
Federal Civilian	-20	-61	-160	-312	-467	-467	-467	-467	-467
Food services, drinking places	-2	-7	-67	-244	-312	-309	-308	-305	-301
Local Gov	-1	-2	-49	-188	-242	-241	-236	-231	-225
Prof, tech services	-1	-2	-48	-179	-222	-223	-222	-220	-217
Administrative, support services	-1	-2	-33	-125	-158	-156	-155	-152	-149
Social assistance	-1	-2	-26	-99	-128	-130	-130	-130	-130
State Gov	-1	-2	-24	-87	-105	-98	-93	-87	-81
Real estate	0	-1	-19	-75	-94	-93	-91	-89	-86
Membership assoc, organ	-1	-2	-18	-66	-86	-86	-86	-85	-84
Educational services	0	-1	-15	-53	-66	-65	-66	-66	-66
Wholesale trade	0	-1	-14	-52	-65	-64	-62	-60	-57
Personal, laundry services	0	-1	-13	-46	-60	-59	-59	-59	-59
Private households	-1	-1	-14	-49	-61	-59	-58	-57	-56
Monetary authorities, et al.	-1	-1	-13	-49	-61	-58	-56	-54	-52
Repair, maintenance	0	-1	-12	-44	-56	-56	-55	-54	-52
Performing arts, spectator sports	0	-1	-11	-41	-52	-52	-52	-51	-51
Amusement, gambling, recreation	0	-1	-11	-39	-51	-51	-51	-50	-49
Hospitals	0	0	-5	-31	-48	-46	-45	-44	-44
Ambulatory health care services	0	-1	-1	-22	-43	-42	-41	-41	-40
Nursing, residential care facilities	0	-1	-5	-26	-38	-37	-37	-37	-36
Rental, leasing services	0	0	-4	-15	-20	-20	-21	-20	-20
Ins carriers, rel act	0	0	-4	-14	-17	-14	-12	-11	-10

To illustrate our findings, Figure 11 plots each of the fifteen most heavily impacted industries (excluding military and federal civilians), ranked by the forecasted average annual change in employment from 2008 to 2012. Because the results for both scenarios are very similar, Figure 11 only depicts the high retiree out-migration scenario (Scenario 2). Industries with expected employment growth of less than one percent are highlighted as candidates for possible layoffs. Peak employment impacts, i.e. the difference between closure and baseline forecasts in year 2012, are plotted on the vertical axis to show the magnitude of job change in each industry.

Figure 11
Forecasted Employment Growth vs. Employment Change
Top 15 Industries (excl. Military and Federal Civilians)
Scenario 2 (10% Retiree Outmigration)



Most of the heavily impacted industries can still expect positive job growth even under Scenario 2, the high-end base closure scenario. The three most heavily impacted sectors construction, retail, and food service and drinking places, all have anticipated job growth between one and two percent annually. While some employees in these industries may be laid off after the base closure, widespread dislocation is unlikely.

Given the somewhat ubiquitous nature of retail and food service businesses, workers laid off in Brunswick are likely to find employment elsewhere in the region or state. The primary slow growth/declining industries include: local and state government, wholesale trade, services to private households, monetary authorities (i.e. banks), and real estate. Although layoffs in these industries are possible, the skills of most workers coming from these industries are likely transferable to other, growing sectors of the economy.

The large number of military spouses currently working in the community will help soften these negative impacts. Their likely relocation will reduce the number unemployed workers. Furthermore, positions vacated by relocating spouses may become available to laid-off employees or allow employers to scale down operations without laying-off other workers. We estimate working spouses of military personnel will vacate just under 500 local jobs (Table 7).[8] Many of the occupations currently held by military spouses are also common to the most heavily impacted industries (i.e. retail, sales, services, administrative services, and education) and may further mitigate the need for additional layoffs.

Table 7

Occupations of Working Spouses of Military Households

Spouses likely to move, but not active military

	Share	Estimated Number
Professional/managerial	16%	79
Sales/retail	16%	79
Medical/dental	15%	74
Administrative/clerical	13%	64
Service	12%	59
Education	11%	54
Unknown/other	10%	49
Entrepreneur	3%	15
Technical	2%	10
Food service	2%	10
Total	**100%**	**492**

Source: Community Audit Survey, DEERS database, author's calculations

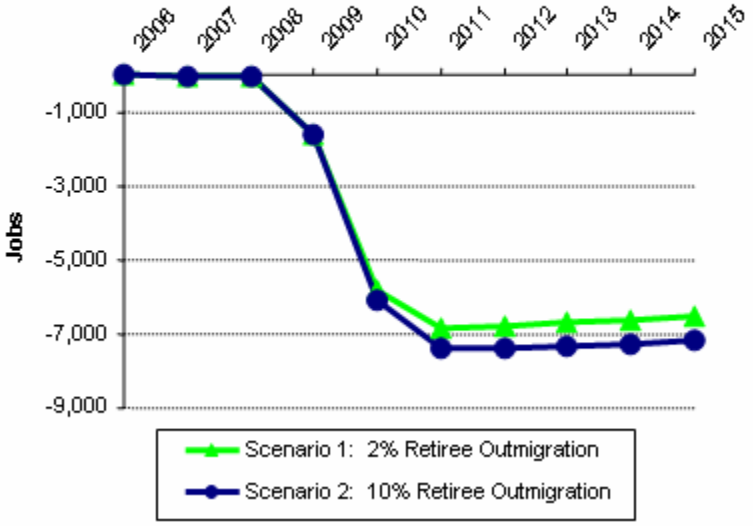
POPULATION

The closure of a large plant or military facility impacts residential population growth. A negative economic shock is often followed by a temporary increase in out-migration as dislocated workers seek employment opportunities elsewhere. Military base

[8] This estimate does not include relocations of spouses of dislocated base civilian employees.

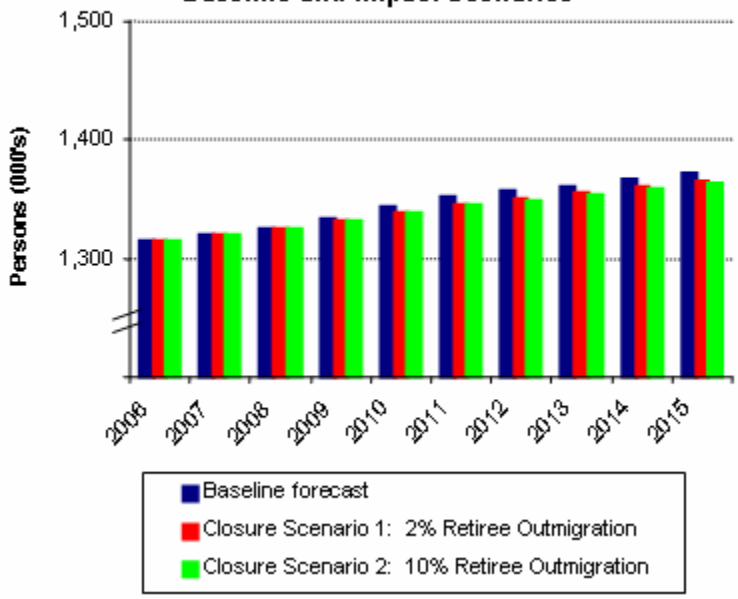
closures, in particular, have high levels of out-migration because most active military personnel and their families are reassigned to facilities elsewhere in the country. The slowdown in job growth also influences population growth by reducing the number of new people moving into the state looking for work.

Figure 12
Impact on Population
Difference from Baseline Forecast



Closing NASB will likely result in 6,800 to 7,400 fewer Maine residents than estimated under the baseline forecast (Figure 12). The timing of population loss mirrors that of job and output decline, with the largest declines from 2009 to 2011. As shown in Figure 13, statewide population will continue to grow, just at a slightly slower pace. The residential population is expected to slowly rebound almost immediately after the final year of the base closure. Increased housing availability will slow the growth of housing costs in the most

Figure 13
Population (levels)
Baseline and Impact Scenarios



effected communities and help lure new tenants. Early planning to fill vacated housing can help accelerate recovery and offset anticipated impacts on retail, government and schools, and consumer services industries.

The vast majority of population change (80 to 90 percent) comes directly from the relocation of roughly 2,200 active-duty military and 3,700 spouses and dependents (Figures 14 and 15).[9] Brunswick and neighboring communities will absorb the bulk of these loses. According to DoD records, 55 percent of NASB's military population lives in Brunswick and 76 percent lives within the Brunswick labor market area. Our estimates of retiree population loss are based entirely on assumptions of the share of the retiree population that moves when the base closes. We estimate that migrant retirees count for one

Figure 14
Scenario 1: Components of Population Change
Difference from Baseline Forecast

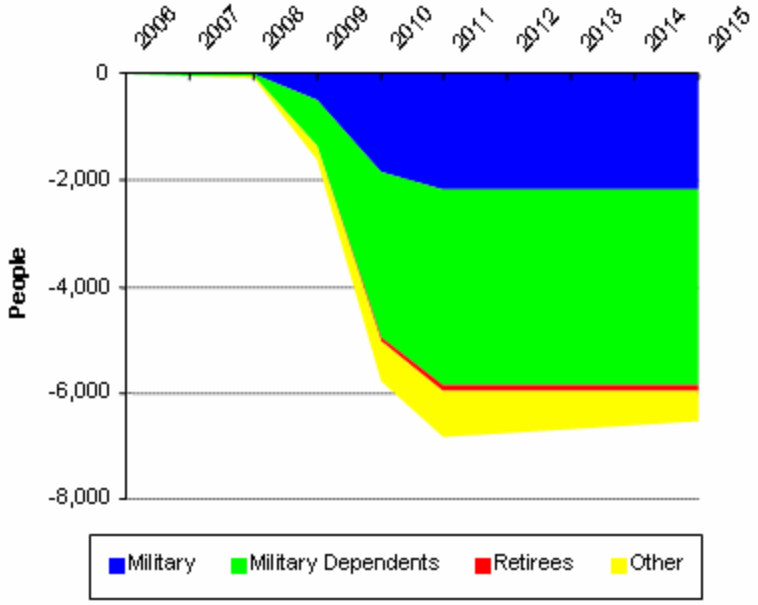
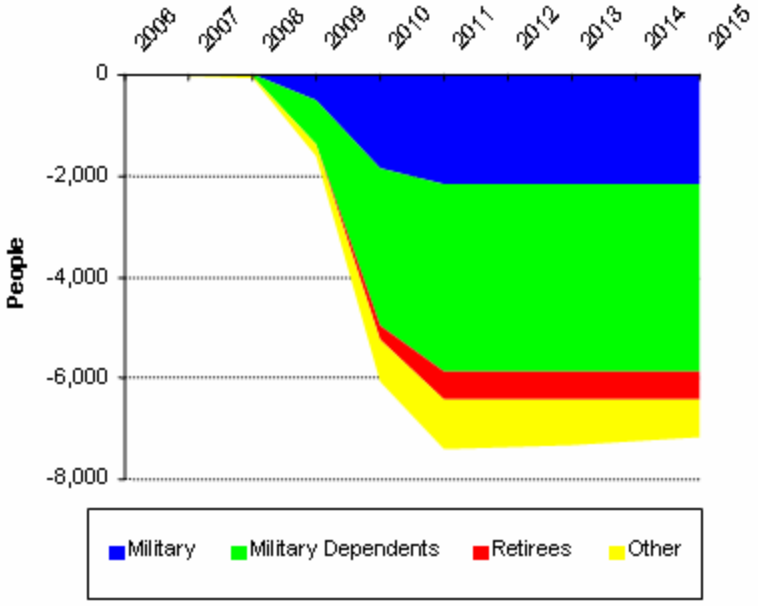


Figure 15
Scenario 2: Components of Population Change
Difference from Baseline Forecast



[9] A recent survey by Planning Decisions, Inc. estimates that approximately 19 percent of the current active-duty military personnel plan on staying in the region after closure of the base. While this effects migration, it does not reduce the number of military positions counted as direct loses, which are tied to the *job* and not whether the individual currently staffing the job moves or stays.

to eight percent of the total population impact of the base closing (Figures 14 and 15).

We estimate an additional 1,000 fewer residents (of all ages) in the state, beyond relocating active-duty and retired military households. Current DoD civilian employees and their families may have a higher likelihood of leaving. Some are career-oriented professionals in specialized fields who may find it difficult to transfer their skills to local employment opportunities. Some may decide to relocate regardless of local opportunities in order to continue employment with the federal government, which offers some job placement, relocation assistance, and hiring preference programs for dislocated civil service employees. Others may only decide to move if unable to secure local employment. Providing job placement and training assistance to base employees facing dislocation is key to retaining them and their families.

After the relocation of military, federal-civilian, and retiree households, additional population impacts should be relatively small and are likely to reflect a temporary slowdown of in-migration, rather than absolute population loss. As with employment, REMI does not distinguish population loss due to out-migration from "loss" due to slower growth. However, it is doubtful that a large number of dislocated retail, construction, and consumer service workers will chose to move out of the state.

Effect of Additional Retiree Migration

This section discusses the economic impact of migrant retirees, by focusing on the differences between the two impact scenarios. The two scenarios only differ by the number of current military retirees and their dependents who are predicted to move from the state after the base closure. In the first scenario we assume that two percent of the retiree population moves in the final two years of base operations. In the second, we increase this share to ten percent—an increase from 96 to 478 persons.

The lost income of migrant retirees has significant ripple effects on local spending, but an eight percent increase in out-migration only has minor effects on the economic prosperity of the state as a whole. The loss of an additional 380 retirees, including spouses, reduces GSP by approximately $21.7 million, total employment by 456 jobs and personal income by $41 million. For the state as a whole, this corresponds to a 0.05 percent reduction in GSP and population, a 0.09 percent reduction in personal income, and 0.06 percent fewer jobs.

Additional migrant retirees also have little effect on the distribution of reduced employment growth across specific industries (Table 6). Industries with the greatest employment change are retail (-76 employees), construction (-70 employees), food services (-39), ambulatory health care services (-35), local government (-29), and hospitals (-23). Given the shortage of skilled health care professionals, it is doubtful that lower demand will result in layoffs in hospitals or ambulatory health care services. Apart from state government, job impacts will be concentrated in and around Brunswick, where the at-risk population of Navy retirees is concentrated.

LONG-TERM EFFECTS ON FUTURE RETIREES

Over its long history, NASB has played a vital role introducing mid-coast Maine to generations of Navy families, some of whom decide to relocate in the area upon retirement. One of the most significant long-term impacts of the base closure will be the loss of this valuable recruitment mechanism.

This study already accounts for the retirement plans of existing base personnel. What is not known is how many *future* base personnel would have retired in the region had the base remained open. The answer to this depends on many unknown factors: the propensity of military personnel to retire in the area, the turnover rate of base personnel, the future availability and affordability of housing and health care, and the continued availability of other regional amenities that military retirees find attractive.

The long-term impact of fewer Navy retirees will not be felt until after 2015, beyond the near- and intermediate-term focus of this study. However, studying existing retiree residence patterns provides some insight into just how important the base is to attracting retirees. According to reports from the Department of Defense's TRICARE Defense Enrollment Eligibility Reporting System (DEERS), the ten miles surrounding NASB has 1,151 registered Navy retirees with a total of 1,997 spouses and other dependents, nearly twice the number of retirees from all other military branches combined. Farther away from the base, Navy retirees average one for every three retirees of other military branches.[10] In other words, there are nearly five times as many Navy retirees living in the area immediately surrounding NASB compared to what we would expect if Navy retirees followed residential patterns typical of the other military branches. The assumption is that many, if not most, of these additional Navy veterans learned of the Mid-Coast through NASB. So while we cannot predict the long-run impacts of the base on the recruitment of veterans, we can say that the impact may be substantial unless remedial action is taken.

[10] Taken from DEERS reports, measured as the area between 30 and 50 miles away from NASB.

VII. REGIONAL IMPACTS

Up to this point, we have measured the impacts of the base closure only on the state of Maine as a whole. In this final section we investigate the regional distribution of the impacts, which will not be shared equally across the state. Brunswick and its neighboring communities will be hit the hardest. This is where the bulk of NASB workers and retirees live and shop, and where most of NASB's direct contractors are based. But some of the impact will be felt in other parts of the state, mainly in nearby labor markets such as Lewiston, Augusta, and Portland. The negative impacts largely follow NASB worker commuting patterns, because people tend to spend most of their earnings close to where they live. Some of NASB's direct suppliers and contracted service providers are also located in other parts of state. Lastly, indirect economic impacts are calculated through multiple rounds of spending by households and businesses. Each time money changes hands (or stops changing hands in the case of a negative shock) the range of impacts spreads geographically.

REGIONAL IMPACT METHODOLOGY

Regional impacts are typically estimated with county-level economic multipliers.[11] However, the county is not an appropriate unit for studying regional NASB impacts. NASB is located at the intersection of two counties, Cumberland and Sagadahoc, neither of which adequately reflects the industrial structure of the primary impact area of the base closing. Because the size and distribution of regional impacts depends on the region's industrial structure, choosing the wrong study region can lead to erroneous estimates.

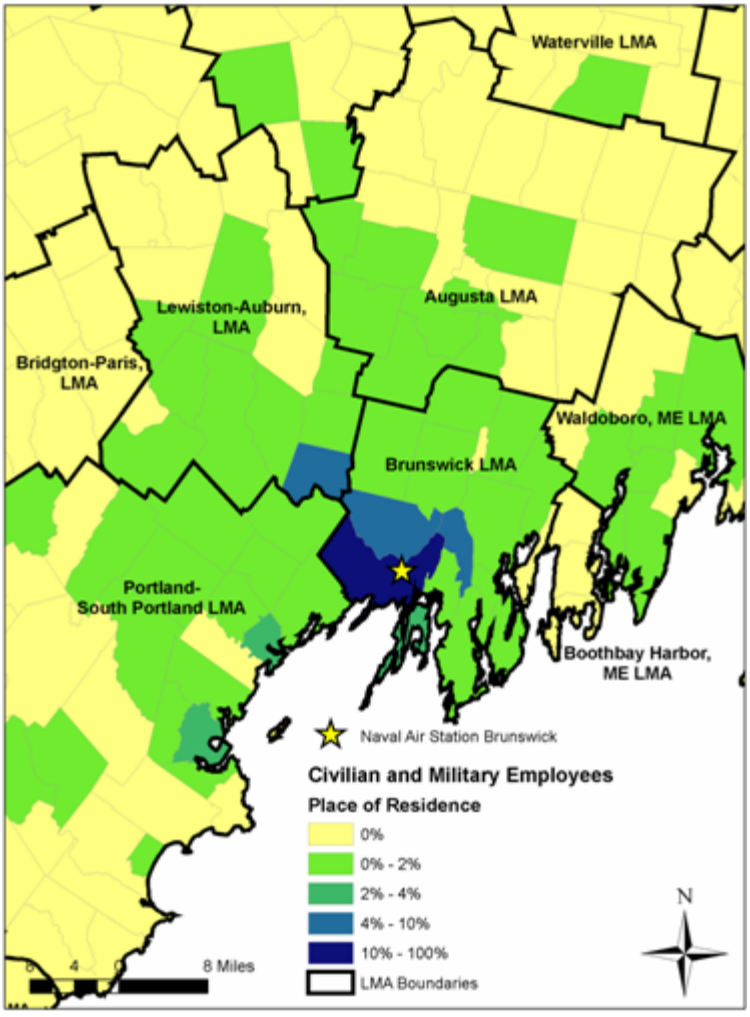
In this study, we estimate economic impacts for several of Maine's Labor Market Areas (LMAs) (Appendix D). LMAs are collections of neighboring municipalities that

[11] County multipliers are typically constructed based on national or state-level survey data, and then adjusted to reflect a county's industrial structure.

together form a functional regional economy. LMAs are based on commuting patterns. Their borders generally capture the lion's share of the consumer expenditures and other local economic transactions made by households and businesses within the LMA.

Regional multipliers only exist for counties and groups of counties, and not for labor market areas. Therefore, we take a different approach. Statewide impacts are assigned to specific labor markets based on the location of directly effected businesses and workers, and the industrial structure of each labor market. We start by identifying the point of origin for all of the primary sources of direct economic impacts in Table 8, assigning each to a specific labor market area. The town of residence of NASB federal and civilian employees was acquired from base staffing records. As shown in Figure 16, military and civilian residents are heavily concentrated in Brunswick and its neighboring communities. Over 68 percent of NASB federal civilian workers and 77 percent of the military workforce live in the Brunswick LMA. This is followed by the Portland-South Portland LMA (11 percent civilian, 10 percent military), and the Lewiston-Auburn LMA (6percent civilian, 10 percent military). We assume that

Figure 16
Place of Residence,
NASB Federal Civilian and Military Workers



working spouses follow a similar pattern as their active-duty partners.

The Department of Defense procurement database reports NASB contracting expenditures by town, which we aggregated to labor markets by industry and averaged over three years. NASB's contractors are slightly more spread out than its workers, although the Brunswick LMA still has the largest share of total contract expenditures (42 percent). Portland-South Portland has the second highest share of contract awards (28 percent), and Lewiston-Auburn is third (12 percent).

DEERS reports the location of Navy retiree households in ten-mile increments from the base. We assume retirees living within ten miles of the base all live in the Brunswick LMA. Those living between ten and twenty miles of the base are assigned to neighboring LMAs based on the approximate share of each community's resident population.[12] Using this strategy, we estimate that 70 percent of migrant retirees live in the Brunswick LMA, 15 percent live in the Portland-South Portland, and 10 percent live in the Lewiston-Auburn.

We assign all the remaining direct impacts (on-base private vendors, federal transfer payments to local governments and schools, and the expenditures of drilling reservists) to the Brunswick LMA. School districts and local governments outside the Brunswick area receive very little money from the federal government that can be directly tied to NASB. We assume that reservists will spend their money in the shopping areas closest to where they are temporarily stationed. We also assume that the direct and indirect impacts from the qualifying on-base private vendors will emanate from their place of business, and that the induced impacts from lower household expenditures by their employees will also stay in the region.

[12] Data on residential population by town is provided by the 2000 *U.S. Census of Population and Housing*. Only towns within twenty miles of BNAS are included in the calculations of each LMA residential population share.

After identifying the originating location of the direct effects, the next step is to distribute statewide population and employment impacts to specific labor markets. Roughly half of the total impacts of NASB are attributable to direct effects, which, by definition, are assigned to the place of business of the originating source. Induced effects are due to reductions in household spending. These will be centered where the employees of effected businesses live. For example, the direct employment loss of NASB federal and civilian workers are counted at their place of work (i.e. the Brunswick LMA) but the induced impacts from lower household consumption are assigned to their place of residence. In lieu of more detailed data on employee commuting patterns, we assume that induced impacts related to employees of contractors or indirectly-effected businesses are tied to the labor market of the business. These induced impacts are a relatively minor compared to those from NASB employees.

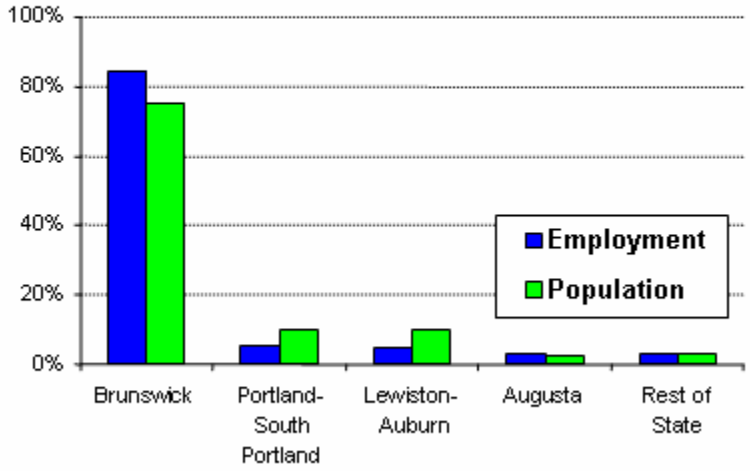
Indirect effects from changes in intermediate demand are impacts from the lower volume of purchases of supplies, equipment, and services from in-state vendors. These are the smallest of the three categories of impacts, comprising just over ten percent of the total employment loss in most years. The industrial composition of each region and its proximity to the direct source of the impacts largely determine its share of indirect impacts. Using detailed industry employment data provided by Maine Labor Market Information Services (LMIS), we estimate the share of each region's employment in each industry above or below that expected by the region's share of total state employment. We then compare these estimates to our predicted regional indirect employment losses. If an industry has an inordinately large number of job losses in a region, given its size, we reassign a portion of these losses to a neighboring region where the industry is more adequately represented.[13]

[13] Relatively few jobs losses were redistributed across regions. This is because the industries with the highest indirect impacts – retail, construction, local government, and services – are well represented in most regions.

REGIONAL EMPLOYMENT AND POPULATION IMPACTS

Our final estimates of regional population, total employment, and industrial employment impacts are reported in Tables 9 to 13 of Appendix E. These impacts correspond to the larger of our two statewide impact scenarios, i.e. Scenario 2, which assumes that ten percent of the at-risk Navy retirees leave the region upon base closure.[14] We describe the impacts on four specific Labor Market Areas: Brunswick, Portland-South Portland, Lewiston-Auburn, and Augusta. Together the four labor markets account for roughly 97 percent of the total statewide reduction in expected employment. We also report impacts for a residual "Rest of State" category.

Figure 17
Economic Impacts by Labor Market Area
Percent of Statewide Impacts



The Brunswick LMA will bear the brunt of the direct economic impacts from loss of NASB. The Brunswick LMA will have approximately 5,500 fewer jobs under the higher impact scenario. This is equivalent to roughly 84 percent of the anticipated reduction state employment growth. Much of this decline is directly attributable to the direct job losses of military and civilian employees, which accounts for nearly 60 percent of the region's employment impact. After federal military and civilian employment, the most heavily effected industries are expected to be retail, construction, food services, and local government.

[14] There was not enough distinction between the impacts for most regions to warrant inclusion of both impact scenarios. The vast majority of the difference is due to additional retiree out-migration.

Population impacts are also concentrated in the Brunswick LMA, albeit slightly less so than employment impacts. Population impacts are more diffuse because many NASB workers, particularly civilians, commute north and south along the Interstate 295 corridor and west toward Lewiston along Route 196. We estimate that the Brunswick LMA will see a peak reduction of roughly 5,600 people relative to baseline projections. This comprises 75 percent of the states total NASB-related population decline.

It is important to place these numbers in context so that the relative magnitudes of these impacts are clearly understood. The Brunswick LMA has just over 30,000 private sector wage and salary employees, with a relatively low unemployment rate of just over 4 percent. Due to methodological differences, wage and salary employment numbers cannot be directly compared with REMI employment estimates.[15] However, we estimate that the peak impact of NASB closure will be anywhere from 4 to 8 percent of the region's expected private sector employment if the base remained open. Again this figure is only a rough approximation and assumes no significant redevelopment to offset negative impacts.[16] Population estimates from the U.S. Census Bureau are more directly comparable. As of July 2005, total population of the Brunswick LMA was 70,000 persons. It has an average annual growth rate of 0.8 percent over the past five years, slightly above the state average but slightly below the nation's. Assuming that past trends persist to 2012, a negative population impact of 5,600 represents 7 percent of the region's forecasted population in the absence of the base closure.

The Portland-South Portland and Lewiston-Auburn LMAs follow a distant second and third in expected employment and population impacts. The Portland-South Portland

[15] REMI's employment numbers are based on the U.S. Bureau of Economic Analysis (BEA) estimates. Unfortunately, BEA employment estimates are not available for towns or LMAs and cannot be used to benchmark NASB's regional impacts. Wage and salary data are based on U.S. Bureau of Labor Statistics definitions and reported by Maine's Labor Market Information Services (LMIS). The two differ in that BEA employment includes the self-employed and several non-private sector industries not covered by LMIS wage and employment data. The BEA reports that, on average, wage and salary employment estimates are typically 95 percent of BEA employment estimates.

[16] The 4 to 8 percent estimate was developed by scaling LMIS estimates upward by five percent, excluding REMI industries not covered in the LMIS data, and assuming a modest annual employment growth rate of one percent.

LMA may have 356 fewer jobs than if the base stayed open, most notably due to a slowdown in construction, retail, administrative services, wholesale trade, and food and beverage services. The Lewiston-Auburn area may experience a maximum reduction of 283 fewer jobs, also concentrated largely in construction, retail, and food and beverage services. Population impacts are evenly split between the neighboring LMAs of Portland-South Portland and Lewiston –Auburn. Each accounts for 9.6 percent of the total NASB-related population decline.

The Augusta LMA is expected to have just under 200 fewer employees and 200 residents at peak impact than otherwise expected. This accounts for less than 3 percent of the state total impact in population and employment. The employment impacts are largely due to reductions in the size of the state government workforce, which REMI automatically scales down in direct proportion to population impacts. The rest of the state should be largely sheltered from NASB fallout, with just over 200 fewer than expected residents, and just below 200 fewer than expected jobs.

VIII. SUMMARY AND RECOMMENDATIONS

Naval Air Station Brunswick is currently one of Maine's largest employers. But compared to a manufacturing firm of similar size, it has fewer direct economic linkages to other Maine industries. The impacts of its closure will mainly be felt through reductions in local household consumption with little spillover to the high value-added sectors of the economy, such as manufacturing, information, or professional services. After peaking in the final year of the base closure, direct and indirect job loses stabilize, as does GSP growth, and population growth starts to show signs of recovery. Furthermore, even with near-term annual reductions of $400 million in GSP and 6,000 jobs, the state economy is still expected grow. Growth will simply be at a slightly slower pace for a few years. This forecast coincides with the generally favorable long-term economic outlook for Brunswick and the rest of the mid-coast region.

The results of this analysis offer important guidance for helping the regional and state economies adjust to life after NASB. First, most of the base closure's impact will stem from the lost spending of households supported by federal military and civilian jobs. That underscores the need to repopulate the base and surrounding areas with new households, and replenish the community with new families. The availability of prime commercial and industrial real-estate, and the instant availability of affordable housing units, will play key roles in this effort.

Second, the relative health of the Mid-Coast bodes well for economic recovery, but the region may be susceptible to economic shocks during the recovery period. Historically, NASB has helped to shield the region from negative shocks because military employment is fairly insensitive to market cycles (i.e., economic booms and recessions). Without NASB, the region becomes more susceptible. The industries and communities that are most effected by the closure will be especially vulnerable to additional shocks.

Third, studies from prior BRAC rounds show that most communities recover from major base closures. Some actually experience higher long-term economic growth if military facilities are successfully converted to private-sector uses. But the transition period immediately following the closure is often challenging for individuals, communities, and businesses with direct ties to the base. Swift economic recovery hinges on early planning, leadership, coordination of key stakeholders, and full community involvement.

Fourth, redevelopment efforts must also be cognizant of prevailing market forces. In particular, on- and off-base redevelopment plans should capitalize on the unique strengths and assets of the mid-coast economy.

APPENDIX A
LESSONS FROM OTHER BASE CLOSURES

To understand the full economic impact of closing Naval Air Station Brunswick, it is helpful to review studies of other base closures. These studies take several forms. Some studies, like this one, use an impact analysis framework to measure the anticipated impact of base closures. Others measure impacts retrospectively, tracking measures of regional economic health (e.g. unemployment, personal income per capital, employment growth) both before and after the base closure. The list below summarizes some of the key findings from these studies, giving greatest weight to those appearing in peer-reviewed scholarly journals.

MOST HOST COMMUNITIES RECOVER IN THE LONG-RUN

Many communities experience population loss, slower employment and income growth, and higher unemployment rates, but these are typically near- and intermediate-term phenomena. After an often challenging readjustment period most communities recover. Some communities even find themselves on a higher long-run growth path when military facilities are successfully converted to productive civilian uses. This is because private-sector businesses commonly have higher returns and are more embedded in their local economies than military bases.

NEGATIVE IMPACTS FROM BASE CLOSURES ARE OFTEN LOWER THAN PREDICTED

Retrospective analysis of the economic impacts of base closures often find that realized economic impacts are often much lower than those predicted by economic impact studies. In part, this is because the purpose of impact analysis is not to forecast the most likely future state of the region, but to estimate the impact of the base closing itself. This is equivalent to conducting experiments in a vacuum in order to rule out confounding factors. As stated several times in this report, we do not account for offsetting impacts from possible redevelopment or reuse. If redevelopment is successful, we expect the impacts to be lower than our predictions.

MILITARY BASES TYPICALLY HAVE SMALLER MULTIPLIER EFFECTS THAN COMPARABLY SIZED MANUFACTURING PLANTS

Military facilities typically buy the bulk of their operational supplies, capital equipment, and materials through contracts with national vendors or specialized suppliers. Because of this, they typically have relatively few direct trade associations with local businesses and smaller multiplier effects than comparably sized plants in other sectors (namely manufacturing). Military employees also tend to make less than their private sector counterparts in manufacturing, particularly for bases that have large number of low-rank, short-term enlisted personnel. NASB is somewhat of an exception due to its high number of officers and long-term enlisted personnel.

SMALL, ISOLATED COMMUNITIES HAVE GREATER DIFFICULTY RECOVERING FROM A MAJOR BASE CLOSURE

The larger the base relative to the size of the host community, the larger the negative impact of the base closure, and the longer the duration of the negative impact. Rural "military company towns" commonly lack the underlying industrial diversity to help buffer against negative shocks; a diverse, growing private sector can help absorb dislocated workers.

COMMUNITIES IN GROWING REGIONS RECOVER MORE QUICKLY

Dislocated workers will find new employment opportunities faster in a growing economy than a stagnant or declining one. Growing regions also often have latent demand for residential, commercial, and industrial real estate. In these places, additional capacity at the former base site is quickly occupied by new commercial, industrial, and residential tenants.

IMPACTS ARE OFTEN LOCALIZED TO THE COMMUNITIES WHERE MILITARY PERSONNEL RESIDE

The largest impacts of military bases typically come from the earnings of military and civilian workers. People tend to spend their disposable income fairly close to where they reside, assuming that the local area has the capacity to absorb these purchases. If not, they money is spent at nearby regional shopping hubs.

THE HIGHER THE SHARE OF ACTIVE-DUTY PERSONNEL LIVING ON-BASE, THE SMALLER THE IMPACT ON THE LOCAL COMMUNITY

Military persons living on-base do not participate in local housing markets, have most of their meals provided at on-base facilities, and buy fewer household supplies and services from area businesses. The loss of these workers has relatively little impact on the local private-sector economy.

THE CLOSURE OF ON-BASE SERVICES CAN HELP OFFSET ECONOMIC LOSSES

Large military facilities offer many services to area veterans, such as health care, discount shopping, credit unions, and travel services, as well as recreational and entertainment facilities such as restaurants, bars, bowling alleys and golf-courses. Upon shut-down, the retirees, military, and civilian employees who stay in the area will divert some of their base-related spending to area businesses. So while it may not make up for all base-related loses, it may provide some relief to area retail, entertainment, and customer service businesses.

RELOCATING MILITARY HOUSEHOLDS DO NOT PLACE ADDITIONAL STRAINS ON LOCAL SOCIAL SERVICES

Compared to a similarly sized manufacturing plant shut-down, a base closure is less likely to trigger the long-term social or economic upheaval that can spin a community into a downward cycle of decline. The primary impacts of a base closure are felt by the workers who lose their jobs, and the local businesses that feel the pinch from lower

sales. Large plant closings have the additional impact of straining state and local governments and other providers of social and employment services. These service providers, sometimes with little warning, face an increase in the number of people needing immediate assistance while losing revenues to help support those services. Over the long-term, a high level of persistent unemployment may create even more problems in the form of growing discontent, pessimism, and crime, which can discourage new investment. Some out-migration can relieve unemployment rates and the number of local residents requiring services. When a military base closes, this process is expedited. Base closures are generally accompanied by relatively high out-migration rates because of the relocation of military personnel and their families.

OUT-MIGRATION OF EMPLOYED SPOUSES CAN CREATE JOB OPENINGS FOR RESIDENTS

The more civilian or military spouses who work in the community or on base, the better the outcome from the local community. Most employed military spouses move when their active-duty partners are reassigned to other bases. Because they tend to be employed predominantly in local serving industries, the vacancies created by migrant spouses may become available to others, offsetting a sharp rise in unemployment. Voluntarily vacated positions also allow employers to scale down operations without laying-off other employees.

APPENDIX B
DETAILED DESCRIPTION OF THE SOURCES OF ECONOMIC IMPACTS

This appendix provides a detailed description of the sources of impacts of the base closure, and how these numbers were estimated. A master spreadsheet listing all of the specified sources of economic impacts are included as Table 8.

Table 8
Sources of Economic Impacts
All dollar values reported in thousands of 2004 dollars

Impact Category	2007	2008	2009	2010	2011
Active duty military personnel (jobs)	-11	-21	-624	-2,278	-2,686
local wage adjustment	-$130.5	-$249.2	-$7,405.2	-$27,033.9	-$31,875.8
housing allowance adjustment	-$122.1	-$233.2	-$6,928.6	-$25,293.8	-$29,824.0
Appropriated federal civilian employees (jobs)	-16	-50	-130	-254	-380
local wage adjustment	$268.3	$849.8	$2,225.1	$4,338.3	$6,496.3
Non-appropriated federal civilian employees (jobs)	-4	-11	-30	-58	-87
local wage adjustment	$108.4	$343.3	$898.9	$1,752.6	$2,624.4
On-base employees of private businesses					
Education services (jobs)	0	0	-6	-21	-25
Professional spouses of military families					
Prof, tech services (jobs)	0	0	-20	-75	-88
Hospitals (jobs)	0	0	-8	-31	-37
Contracts to local businesses					
Fabricated metal prod mfg	$0.0	$0.0	$0.0	-$0.1	-$0.2
Machinery mfg	$0.0	$0.0	-$1.0	-$3.7	-$4.3
Wholesale trade	-$1.2	-$2.2	-$66.3	-$242.2	-$285.6
Retail trade	$0.0	$0.0	-$0.2	-$0.6	-$0.8
Transit, ground pass transport	-$0.6	-$1.1	-$31.6	-$115.2	-$135.9
Warehousing, storage	$0.0	$0.0	-$0.3	-$1.2	-$1.5
Broadcasting	$0.0	$0.0	-$0.5	-$1.8	-$2.1
Rental, leasing services	-$0.1	-$0.2	-$5.2	-$18.8	-$22.2
Prof, tech services	-$2.4	-$4.6	-$137.6	-$502.2	-$592.1
Administrative, support services	-$5.2	-$9.9	-$295.0	-$1,077.0	-$1,269.9
Waste mgmnt, remed services	-$1.3	-$2.5	-$73.6	-$268.8	-$316.9
Ambulatory health care services	-$0.4	-$0.8	-$24.5	-$89.3	-$105.3
Food services, drinking places	-$1.5	-$2.9	-$85.5	-$312.2	-$368.1
Repair, maintenance	$0.0	-$0.1	-$1.6	-$5.9	-$7.0
Personal, laundry service	$0.0	-$0.1	-$1.8	-$6.6	-$7.8
Construction	-$10.0	-$19.1	-$567.0	-$2,069.9	-$2,440.7
Local expenditures by reservists					
Food and beverage	$0.0	-$23.4	-$46.8	-$70.2	-$93.5
Gasoline	$0.0	-$5.8	-$11.7	-$17.5	-$23.4
Other services	$0.0	-$5.8	-$11.7	-$17.5	-$23.4
Out-migration of existing retirees					
2% outmigration scenario (people)	0	0	0	-48	-96
10% outmigration scenario (people)	0	0	0	-359	-718
Federal transfer payments to local govt/schools	-$5.2	-$9.9	-$295.0	-$1,077.1	-$1,770.0

ACTIVE-DUTY MILITARY PERSONNEL

The forgone income and household consumption of active-duty military are the dominant source of negative economic impacts from the NASB closure. Estimates of the current number of active-duty civilian employees and the timing of their reassignment were provided by the Naval Air Station Brunswick BRAC Office (Table 1). There are 2,686 active-duty military personnel currently stationed at NASB. All of these positions are expected to be eliminated by 2011 and count toward a direct reduction in final demand.[17]

In addition to the number of forgone jobs, the reduction in the state's military workforce has direct impacts through the reduction in aggregate state payrolls beyond the amount assumed by REMI. By default, REMI assumes that all military personnel are paid according to national averages. In the case of Brunswick, this results in a gross undercount of the actual wage and salary contribution to the state economy. This is because NASB has a higher share of officers and senior enlisted personnel than the typical military installation. To correct this deficiency, we developed an independent estimate of the earnings profile of the NASB military workforce by combining information from the Department of Defense's retirement system database (DEERS), data from the recent Community Audit Survey, and standard military pay and housing allowance tables.[18]

Military payrolls are set at the national level and vary according to rank and years of service. In addition, each active-duty military employee receives a Basic Allowance for Housing (BAH) to offset housing costs. BAH rates are indexed to local housing market conditions, and vary by rank and whether the recipient has dependents. For those living off-base, the BAH dollars flow into the private housing market. For military living on-base, BAH funds are channeled directly to the Navy's housing services contractors, a portion of which supports the base's non-appropriated federal workforce. In both cases, we model BAH funds in REMI as supplemental personal income. We estimate of the distribution of NASB active-duty personnel by rank comes from reports generated by the DOD's TRICARE Defense Enrollment Eligibility Reporting System (DEERS). DEERS reports the branch and rank of all active-duty military personnel living within different distances from the air station.[19] Estimates of the approximate share of active-duty personnel with dependents and their average years of service by rank were developed from the findings of the Community Audit Survey.

---

[17] A recent survey by Planning Decisions, Inc. estimates that approximately 19 percent of the current active-duty personnel plan on staying in the region after closure of the base. This does not reduce the number of military positions that count toward direct effects, which are tied to the position and not the individual currently holding that position.

[18] Military wage tables are available on-line at http://www.dod.mil/dfas/militarypay/2006militarypaytables.html. Basic housing allowance tables for Brunswick are available for downloading at https://secureapp2.hqda.pentagon.mil/perdiem/bah.html.

[19] The DEERS-based estimates of the distribution of NASB personnel by rank was closely confirmed by results from the Community Audit Survey conducted by Planning Decisions, Inc.

Combining data from these three sources, we estimate total annual base payroll at $91.6 million, or approximately $34,000 per active-duty military. The housing allowance adds another $11,000 per worker. The total amounts to $62 million more than the REMI default estimates or roughly $23,000 per employee per year. We add this income back into our base closure simulations as an additional reduction in state military payrolls.

FEDERAL CIVILIAN EMPLOYEES

Estimates of the air station's federal civilian workforce were provided by the base BRAC office and supplemented with detailed civilian occupational profiles from the Maine Department of Labor (MDOL). NASB currently employs approximately 600 federal civilian workers. These positions are split between appropriated and non-appropriated workers. Most economic impact studies do not differentiate between appropriated and non-appropriated workers, and likely overestimate negative impacts of base closings as a result.

As the name implies, appropriated positions are financed directly from the DoD budget. Because military personnel may come and go, the appropriated workforce provides continuity to ongoing base operations by staffing key administrative, operations, safety, and technical support positions.

There are 380 appropriated workers at the air station. The relocation of these positions counts as a direct negative impact of the base closure on the state economy. As with the active-duty military workforce, it was necessary to make adjustments to REMI's estimates of the wage impacts of appropriated civilian employees. In this case, REMI over-estimates the annual salary of appropriated federal civilian workers by about $17,000 dollars per worker which must be added as a positive economic shock to the state's economy. Failing to do so would over-estimate the negative economic impact of the job loses. The timing of these wage impacts are assumed to be proportionate to the downsizing of base's civilian workforce.

Thirty-five percent of the air station's federal civilian workers are non-appropriated. These positions provide the ancillary services for on-base personnel, such as retail sales clerks, housekeepers, recreational attendants, and food service workers (Appendix C). Non-appropriated workers do not have a dedicated legislative appropriation but are financed by revenues generated by their activities. These positions may or may not qualify as a source of direct impacts, depending on whether the funds supporting each position have already been counted elsewhere. If the funds supporting these positions come from the out-of-pocket spending of base workers or residents, then their elimination counts toward indirect impacts. Because these positions are not supported by export revenues, counting them as direct effects would double count their true impact. Even though revenues may be pooled and redistributed at the national level, the on-base clientele would likely have purchased the same good or service from an off-

base provider had NASB not offered the service. Some jobs that provide support to on-base residents, such as the enlisted persons living in the barracks, are financed through basic housing allowance (BAH) funds. Since each worker's BAH allocation has already been included toward direct effect, counting the jobs supported by these funds as direct effects would be double-counting. If, on the other hand, the on-base service(s) do not require cash payment for services and are not supported by BAH funds, then the jobs associated with these positions qualify as direct effects.

Through a thorough review of occupational titles and discussions with NASB human resource personnel we identified 87 non-appropriated positions that qualify as direct impacts. The wage and earnings income of the 87 direct non-appropriated workers also needed to be adjusted downward. Non-appropriated NASB workers make considerably less than the typical federal employee, $31,811 per year compared to the federal annual average of $57,000. The average is lower because many NASB non-allocated workers are part-time and/or work in occupations requiring fewer specialized skills or formal education. Without adjustment, REMI would over-estimate the contribution of these jobs to the local economy. The remaining 114 non-appropriated positions are locally supported, and count as indirect impacts. Major locally supported occupations include the retail sales clerks, maids and housekeeping cleaners, janitors, food preparation workers, desk clerks, and cashiers.

ON-BASE EMPLOYEES OF PRIVATE BUSINESSES

The final category of NASB employment are the 118 workers employed by private businesses with on-base locations, mostly in retail, food and beverage services, entertainment facilities, and education services (Table 9). Information on on-base private vendors and their staffing levels was collected by the Maine Department of Labor. Despite their "behind the fence" location, these businesses largely operate as payment for service enterprises and the impacts of their closure will be captured as indirect effects of the base closure.[20]

The twenty-five on-site employees of the Embry Riddle University and the Southern New Hampshire University are an exception. Although educational services exist to serve local demand, military personnel often receive a sizable education and training stipends that is not fully captured by their wage and salary income. Because the funding that supports these positions is not accounted for elsewhere, staff reductions in these businesses are included as direct effects and modeled by a negative employment shock to the private educational services sector in REMI.

[20] For example, from an economic impact perspective, it makes no difference whether a NASB employee has lunch at the Subway restaurant on or off the base. In neither case does the transaction constitute a direct increase in regional export income, but rather a within-state transfer of payments.

Table 9
Private Sector NASB Employers

- Taco Bell/Fresh Grill
- Subway Restaurant
- Navy Federal Credit Union
- Southern New Hampshire University
- Laundry/Drycleaning/Tailoring
- Flower/Gift Shop
- Vending Service
- Optical Shop
- Hertz Rent A Car

PROFESSIONAL SPOUSES OF MILITARY FAMILIES

The spouses of military personnel are also active participants in the local economy, and most are expected to move when their spouses are reassigned. To estimate the economic impacts of military spouses, it is first necessary to estimate the number of working military spouses who are likely to vacate their jobs as a consequence of the base closure. Much of the information on military spouses was reported in the *Community Audit Survey* by Planning Decisions, Inc. The Community Audit Survey reports that 19 percent of the current military workforce will stay in the area even after the base closes. The spouses of those who stay are assumed to remain working in their current jobs. Of the 2,176 military expected to move, we estimate that half are married, resulting in our estimate of just over 1,000 military spouses leaving the region.[21] Fifty-two percent of the military spouses surveyed reported working outside the home, 13 percent of whom are active-duty military themselves and have already been included in our estimates. That leaves approximately 500 working spouses who are not active-duty military personnel, but are still likely to vacate their jobs after the base closes.

Not all of the vacated positions held by spouses qualify as a reduction in final demand. Most qualify as indirect effects or local transfers from one worker to another. Past experience from other base closures shows that many of the jobs vacated by spouses are not eliminated, and may create new employment opportunities for remaining local residents. We use estimates of the occupational profile of spouses from the Community Audit Survey to distinguish spouses that are likely to attract revenue into the state (basic) from those that serve the local population (non-basic). Occupations listed as professional/managerial or technical are designated as basic, and the estimated 89 spouses working in these occupations are included as direct effects. We also include half of the anticipated vacancies in medical/dental professions as direct impacts. Under normal circumstances, medical and dental professionals are non-basic sectors because they primarily serve the medical needs of area residents. However, the shortage of skilled health care professionals and anticipated growth of this industry may result in these positions remaining unstaffed for some time and may make the region less

[21] There are no direct estimates of NASB's married population. Both the Community Audit Survey and our estimates based on DEERS data indicate that 65 percent of NASB personnel are either married, have children, or both. Based on this information, 50 percent is a reasonably conservative estimate.

attractive to retirees. The timing of job reductions of working spouses is modeled in proportion to the downsizing of active military personnel.

CONTRACTS TO LOCAL BUSINESSES

Naval Air Station Brunswick also serves as an important client for many local businesses. We estimate that in a typical year, NASB purchases approximately $5.5 million worth of goods and services from Maine businesses, primarily in construction and related trades, administrative support services, food services, and wholesale trade. Given the size of the facility, $5.5 million in direct local spending may seem like a relatively small amount, especially compared to similarly sized employers in manufacturing or other goods producing sectors. But it is important to remember that military bases are very different from most private sector businesses. Large military facilities often have very few direct first-tier supplier linkages to businesses in their home states, and the few that do exist are geographically serendipitous. Most of the supplies and capital equipment expenditures made by bases are procured through national contracts.

Our dollar estimates of NASB local spending are taken from the DoD's Statistical Information Analysis Division.[22] The DOD reports the names, addresses, NAICS industry codes, and dollar value of the awarded contracts by year of allocation and military branch. The database also references each of the awards by its location of provision, allowing us to distinguish NASB procurements from others. To estimate in-state contracts, we only consider NASB procurements issued to firms with a Maine address. We estimate the annual level of future in-state awards by the annual average of the past three years of available data (2002-2005), by industry.[23]

LOCAL EXPENDITURES BY RESERVISTS

The direct economic impact of reservists comes primarily by way of their expenditures in local restaurants, stores, gas stations, and other off-base commercial enterprises. Similar to tourists, the local consumption of reservists only contributes to an increase in state output if the reservist brings in revenue from outside the state, or if, in the absence of NASB, Maine residents would make the same expenditures outside of the state.

Current base records identify 862 drilling reservists (DRILLRES) assigned to NASB. Just over half of these are Maine residents, with the remainder coming largely from other New England states and New York. The actual amount of time reservists spend on the base varies greatly. Roughly half (435) of the aforementioned are only *administratively* assigned to the base, and do not regularly drill in Maine. Other reservists can spent upwards of 90 days per year on base. NASB estimates a total of

[22] These datasets are available for downloading at http://siadapp.dior.whs.mil/procurement/Procurement.html.
[23] Keeping in mind the atypical level of on-base construction expenditures in the recent past, we eliminated one year (2003) from our calculations of in-state construction procurements. This year had over three times the annual construction allocation of the following two.

13,368 reservist man-days spent in Maine per year, an average of 31 days per person among those who regularly drill in the state. Upon shut-down of NASB, all but 85 to 100 reservists will be reassigned to another state. The remaining number of reservist man-days per year lost to Maine after the base closure is approximately 10,400.

There are no independent estimates of the level of off-base expenditures by reservists or the timing of when on-base reservist activities will be moved to another location. For simplicity, we assume off-base expenditures of $15 per man-day. We also assume that starting in 2008 a quarter of the current drilling reservists will be relocated each year, with the final reservists relocated by 2011.

OUT-MIGRATION OF RETIREES

There is some concern that closing Naval Air Station Brunswick will spark the out-migration of existing retirees from the mid-coast region. NASB plays an important role as a shopping, entertainment, and service center for the many veterans in the area. The base houses an emergency medical and dental clinic, discount shopping through the exchange, a bowling alley and fitness center, restaurants and bars, and a nine-hole golf course. All these services are available to area veterans and will either be closed or transferred to private ownership when the base closes. Just off-base in Topsham is the commissary that may or may not close, depending on whether a sufficient market remains even without the base.

In all likelihood, only a relatively small portion of existing retirees will move as a result of the base closure, despite the many services and benefits it provides to area veterans. The financial, psychological, and social costs of moving are extremely high. For most people, these costs will far outweigh the lost benefits associated with the closure of the air station. Conversations with local experts from NASB and the Maine Bureau of Veterans' Services and studies of other base closures support this general conclusion. Most retrospective studies of based closures also find that few veterans actually move with the closure of military bases. When they do move in large numbers, it is typically when the base is located in remote areas that lack the community-based services to offset the loss of on-base services. Health care is often the most critical service offered to older military retirees. The Brunswick region, by contrast, is rich in health services that already serve the health care needs for the majority of area veterans. NASB's on-base medical clinic offers only limited service to retirees. It focuses mainly on emergency services and care for enlisted persons. The incentive to move will be further reduced if the Topsham commissary, which offers discount groceries and other goods to veterans, remains open after the base closure.

Determining the impact of NASB's closure on the migration decisions of existing retirees requires information on the number of military retirees in the area who are likely to move with the base closure, and a measure of the forgone income associated with these migrants. The best estimates of the regional veteran population come from

the TRICARE Defense Enrollment Eligibility Reporting System (DEERS) database. Active-duty and retired service members are automatically registered in DEERS. Spouses and dependents must also register if they hope to receive TRICARE benefits. The NASB BRAC Office provided copies of DEERS tabulations of the number of active-duty and retirees living within fifty miles of NASB, classified by ten mile increments.

Navy retirees and dependents living within twenty miles of the base are considered to be the population most at risk of moving upon the base closure. This follows the assumption that those living closest are most likely to be receiving the greatest direct benefit from base-related activities and services. Lacking more precise figures, we estimate the share of migrant retirees at two and ten percent of the at-risk population. This amounts to 96 and 479 migrants, respectively. We expect the true number to lie somewhere within this range. The number of migrants is evenly split between the final two years of base operations, the period in which most services will cease operation.

REDUCTION IN FEDERAL TRANSFER PAYMENTS TO LOCAL GOVERNMENTS AND SCHOOLS

The final category of direct effects is the reduction of federal transfer payments to local governments and the school districts that educated children of NASB employees. The impacts of these reductions will be directly felt by lower local government revenues that may necessitate staff or program cut-backs. We do not consider the impacts of reduced funding and enrollments on local schools themselves, but only the impacts on the larger regional economy.[24] The data on public schools was collected through telephone interviews with school business managers for the towns where military families reside. We estimate the total NASB-related reduction in federal expenditures at $1.27 million per year. The largest impact will be on the Brunswick School District which will lose over one million dollars per year. This is followed by Topsham (SAD 75) and Bath, which expect an annual reduction of approximately $150,000 and $13,000, respectively. Other neighboring communities will see small reductions, typically no more than a few thousand dollars per year. The Town of Brunswick also receives an additional $550,000 a year to cover the costs of providing public safety services to off-base military housing.

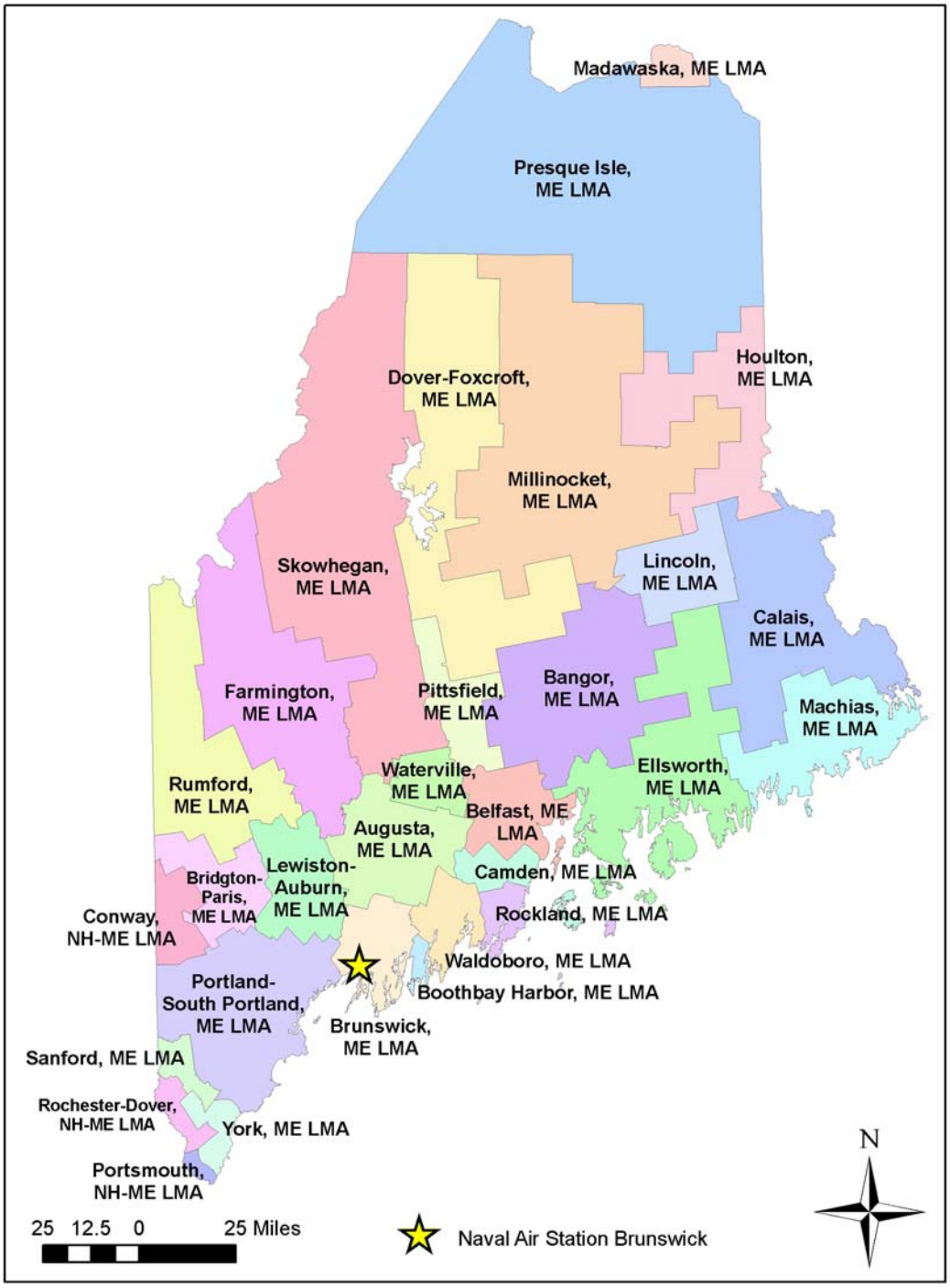
[24] The Community Audit Survey (p. 52) provides a more detailed discussion of the impact of the base closure on public schools.

APPENDIX C
NASB CIVILIAN WORKFORCE
TOP APPROPRIATED AND NON-APPROPRIATED OCCUPATIONS

APPROPRIATED	*WORKERS*
Fire Fighters	40
Teacher Assistants	37
Police and Sherriff's Patrol Officers	23
Stock Clerks and Order Fillers	15
Police, Fire, and Ambulance Dispatchers	11
Cashiers	10
Office Clerks, General	10
Stock Clerks- Stockroom, Warehouse, or Storage Yard	10
Bookkeeping, Accounting, and Auditing Clerks	7
Business Operations Specialists, All Other	7
General and Operations Managers	7
Child Care Workers	6
Operating Engineers and Other Construction Equipment Operators	6
Environmental Science and Protection Technicians, Including Health	5
First-Line Supervisors/Managers of Police and Detectives	5
Laborers and Freight, Stock, and Materials Movers, Hand	5
Management Analysts	5
Occupational Health and Safety Specialists	5
Word Processors and Typists	5
Butchers and Meat Cutters	4
Carpenters	4
Civil Engineer	4
Computer Systems Analysts	4
Executive Secretaries and Administrative Assistants	4

NON-APPROPRIATED	*WORKERS*
Retail Salespersons	31
Maids and Housekeeping Cleaners	24
Amusement and Recreation Attendants	22
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	12
General and Operations Managers	9
Combined Food Preparation and Serving Workers, Including Fast Food	8
Customer Service Representatives	7
Office Clerks, General	7
First-Line Supervisors/Managers of Retail Sales Workers	6
Barbers	5
Hotel, Motel, and Resort Desk Clerks	5
Cashiers	4
Recreation Workers	4
Bartenders	3
First-Line Supervisors/Managers of Housekeeping and Janitorial Workers	3
Industrial Truck and Tractor Operators	3
Laborers and Freight, Stock, and Material Movers, Hand	3
Maintenance and Repair Workers, General Utility	3
Stock Clerks and Order Fillers	3

APPENDIX D
MAINE LABOR MARKET AREAS (LMAS)



APPENDIX E
TABLES OF REGIONAL ECONOMIC IMPACTS

Table 9

Brunswick LMA

Variable	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total Population	**-24**	**-56**	**-1,233**	**-4,623**	**-5,593**	**-5,549**	**-5,502**	**-5,447**	**-5,384**
Total Employment	**-44**	**-119**	**-1,263**	**-4,406**	**-5,511**	**-5,526**	**-5,508**	**-5,465**	**-5,410**
Employment by Industry (Top 25)									
Federal Military	-11	-21	-624	-2,278	-2,686	-2,686	-2,686	-2,686	-2,686
Federal Civilian	-20	-61	-160	-312	-467	-467	-467	-467	-467
Retail trade	-3	-9	-101	-370	-466	-461	-455	-447	-438
Construction	-2	-6	-72	-283	-413	-453	-463	-454	-435
Food services, drinking places	-2	-5	-49	-178	-225	-224	-223	-221	-218
Local Gov	-1	-2	-37	-141	-181	-181	-177	-173	-168
Prof, tech services	-1	-2	-35	-131	-162	-162	-162	-161	-159
Social assistance	-1	-2	-20	-74	-95	-96	-96	-96	-96
Administrative, support services	0	-1	-17	-65	-83	-82	-81	-80	-78
Real estate	0	-1	-18	-66	-78	-73	-69	-65	-61
Membership assoc, organ	0	-1	-13	-50	-63	-63	-63	-63	-62
Educational services	0	-1	-12	-44	-54	-54	-54	-54	-54
Personal, laundry services	0	-1	-9	-35	-44	-44	-44	-44	-44
Private households	0	-1	-10	-36	-45	-44	-43	-42	-41
Monetary authorities, et al.	0	-1	-10	-37	-45	-43	-41	-40	-38
Repair, maintenance	0	-1	-9	-33	-41	-41	-40	-39	-39
Performing arts, spectator sports	0	-1	-8	-31	-39	-38	-38	-38	-37
Amusement, gambling, recreation	0	-1	-8	-29	-37	-38	-37	-37	-36
Hospitals	0	0	-3	-22	-33	-31	-31	-30	-30
Ambulatory health care services	0	0	-1	-14	-28	-27	-26	-26	-26
Nursing, residential care facilities	0	0	-4	-19	-27	-26	-26	-26	-26
Wholesale trade	0	0	-5	-19	-24	-23	-22	-22	-21
Rental, leasing services	0	0	-3	-11	-15	-15	-15	-15	-15
State Gov	0	0	-2	-8	-11	-11	-11	-11	-10
Truck transp; Couriers, msngrs	0	0	-2	-8	-10	-10	-10	-10	-9

Table 10

Portland-South Portland LMA

Variable	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total Population	**-3**	**-6**	**-159**	**-596**	**-714**	**-707**	**-700**	**-692**	**-683**
Total Employment	**-2**	**-5**	**-75**	**-281**	**-355**	**-356**	**-352**	**-345**	**-336**
Employment by Industry (Top 25)									
Construction	0	-1	-11	-41	-58	-63	-64	-63	-60
Retail trade	0	-1	-13	-48	-59	-59	-58	-57	-56
Administrative, support services	0	0	-7	-27	-34	-34	-33	-33	-32
Wholesale trade	0	-1	-7	-25	-31	-30	-30	-28	-27
Food services, drinking places	0	0	-6	-23	-29	-28	-28	-28	-28
Prof, tech services	0	0	-6	-22	-26	-25	-25	-25	-25
Social assistance	0	0	-3	-10	-12	-12	-12	-12	-12
Local Gov	0	0	-2	-9	-12	-12	-12	-12	-11
Real estate	0	0	-2	-9	-10	-9	-9	-8	-8
Membership assoc, organ	0	0	-2	-6	-8	-8	-8	-8	-8
Personal, laundry services	0	0	-1	-4	-6	-6	-6	-6	-6
Private households	0	0	-1	-5	-6	-6	-5	-5	-5
Monetary authorities, et al.	0	0	-1	-5	-6	-6	-5	-5	-5
Repair, maintenance	0	0	-1	-4	-5	-5	-5	-5	-5
Performing arts, spectator sports	0	0	-1	-4	-5	-5	-5	-5	-5
Amusement, gambling, recreation	0	0	-1	-4	-5	-5	-5	-5	-5
Ins carriers, rel act	0	0	-1	-5	-5	-4	-4	-3	-3
Educational services	0	0	-1	-3	-4	-4	-4	-4	-4
Hospitals	0	0	-1	-3	-4	-4	-4	-4	-4
State Gov	0	0	-1	-3	-4	-4	-4	-4	-4
Nursing, residential care facilities	0	0	-1	-2	-3	-3	-3	-3	-3
Ambulatory health care services	0	0	0	-1	-3	-3	-2	-2	-2
Rental, leasing services	0	0	0	-1	-2	-2	-2	-2	-2
Transit, ground pass transp	0	0	0	-2	-2	-2	-2	-2	-2
Truck transp; Couriers, msngrs	0	0	0	-1	-1	-1	-1	-1	-1

APPENDIX E
TABLES OF REGIONAL ECONOMIC IMPACTS (CONTINUED)

Table 11

Lewiston-Auburn LMA

Variable	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total Population	**-3**	**-6**	**-166**	**-608**	**-716**	**-704**	**-693**	**-682**	**-672**
Total Employment	**-2**	**-4**	**-66**	**-246**	**-296**	**-283**	**-280**	**-275**	**-269**
Employment by Industry (Top 25)									
Construction	0	-1	-9	-37	-52	-55	-55	-53	-51
Retail trade	0	-1	-13	-50	-58	-54	-54	-53	-52
Food services, drinking places	0	-1	-8	-29	-34	-32	-32	-32	-32
Prof, tech services	0	0	-5	-18	-21	-20	-20	-20	-20
Administrative, support services	0	0	-4	-16	-19	-18	-18	-18	-17
Local Gov	0	0	-3	-11	-15	-14	-14	-14	-13
Social assistance	0	0	-3	-10	-12	-11	-11	-11	-11
Real estate	0	0	-2	-9	-10	-9	-8	-8	-7
Membership assoc, organ	0	0	-2	-7	-8	-7	-7	-7	-7
Wholesale trade	0	0	-1	-5	-6	-5	-5	-5	-5
Personal, laundry services	0	0	-1	-5	-5	-5	-5	-5	-5
Private households	0	0	-1	-5	-6	-5	-5	-5	-5
Monetary authorities, et al.	0	0	-1	-5	-6	-5	-5	-5	-4
Repair, maintenance	0	0	-1	-4	-5	-5	-5	-5	-5
Amusement, gambling, recreation	0	0	-1	-4	-5	-4	-4	-4	-4
Educational services	0	0	-1	-3	-4	-4	-4	-4	-4
Performing arts, spectator sports	0	0	-1	-3	-3	-3	-3	-3	-3
State Gov	0	0	-1	-2	-3	-3	-3	-3	-3
Hospitals	0	0	-1	-2	-2	-2	-2	-2	-2
Nursing, residential care facilities	0	0	-1	-2	-2	-2	-2	-2	-2
Rental, leasing services	0	0	0	-2	-2	-2	-2	-2	-2
Truck transp; Couriers, msngrs	0	0	0	-1	-1	-1	-1	-1	-1
Mgmnt of companies, enterprises	0	0	0	-1	-1	-1	-1	-1	-1
Ins carriers, rel act	0	0	0	-1	-1	-1	-1	-1	-1
Broadcasting, exc Int; Telecomm	0	0	0	-1	-1	-1	-1	-1	-1

Table 12

Augusta LMA

Variable	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total Population	**0**	**-2**	**-33**	**-136**	**-178**	**-178**	**-178**	**-177**	**-176**
Total Employment	**-1**	**-4**	**-34**	**-136**	**-181**	**-181**	**-178**	**-174**	**-169**
Employment by Industry (Top 25)									
State Gov	0	-1	-16	-60	-74	-74	-72	-70	-68
Retail trade	0	-1	-3	-12	-17	-17	-17	-16	-16
Construction	0	0	-2	-8	-14	-16	-16	-16	-15
Administrative, support services	0	0	-3	-12	-15	-14	-14	-14	-14
Local Gov	0	0	-2	-8	-10	-10	-9	-9	-9
Food services, drinking places	0	0	-2	-6	-9	-9	-8	-8	-8
Prof, tech services	0	0	-1	-7	-8	-8	-8	-8	-8
Social assistance	0	0	-1	-2	-4	-4	-4	-4	-4
Ambulatory health care services	0	0	0	-1	-3	-3	-3	-3	-3
Real estate	0	0	-1	-2	-3	-3	-2	-2	-2
Hospitals	0	0	0	-2	-3	-3	-2	-2	-2
Membership assoc, organ	0	0	0	-2	-2	-2	-2	-2	-2
Wholesale trade	0	0	0	-1	-2	-2	-2	-2	-1
Private households	0	0	0	-1	-2	-2	-2	-2	-2
Personal, laundry services	0	0	0	-1	-2	-2	-2	-2	-2
Monetary authorities, et al.	0	0	0	-1	-2	-2	-2	-1	-1
Nursing, residential care facilities	0	0	0	-1	-2	-2	-2	-2	-2
Repair, maintenance	0	0	0	-1	-2	-2	-2	-1	-1
Performing arts, spectator sports	0	0	0	-1	-2	-1	-1	-1	-1
Amusement, gambling, recreation	0	0	0	-1	-1	-1	-1	-1	-1
Educational services	0	0	0	-1	-1	-1	-1	-1	-1
Rental, leasing services	0	0	0	0	-1	-1	-1	-1	-1
Ins carriers, rel act	0	0	0	0	-1	0	0	0	0
Mgmnt of companies, enterprises	0	0	0	0	0	0	0	0	0
Truck transp; Couriers, msngrs	0	0	0	0	0	0	0	0	0

APPENDIX E
TABLES OF REGIONAL ECONOMIC IMPACTS (CONTINUED)

Table 13
Rest of State Impacts

Variable	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total Population	**-3**	**-6**	**-22**	**-117**	**-206**	**-228**	**-246**	**-260**	**-269**
Total Employment	**-4**	**-6**	**-27**	**-100**	**-179**	**-196**	**-194**	**-189**	**-183**
Employment by Industry (Top 25)									
Retail trade	-1	-1	-4	-16	-29	-32	-32	-31	-30
Construction	0	-1	-3	-12	-24	-30	-32	-32	-31
Local Gov	0	0	-5	-19	-24	-24	-24	-23	-22
Food services, drinking places	0	-1	-2	-8	-15	-17	-16	-16	-16
Ambulatory health care services	0	0	0	-5	-10	-10	-10	-10	-10
Administrative, support services	0	0	-1	-4	-7	-8	-7	-7	-7
Social assistance	0	0	-1	-3	-6	-7	-7	-7	-7
Prof, tech services	0	0	-2	-2	-6	-7	-7	-7	-6
Hospitals	0	0	0	-3	-6	-6	-6	-6	-6
Membership assoc, organ	0	0	-1	-2	-4	-5	-5	-5	-4
Nursing, residential care facilities	0	0	0	-2	-4	-4	-4	-4	-4
Real estate	0	0	-1	-2	-4	-4	-4	-4	-4
Performing arts, spectator sports	0	0	-1	-3	-4	-4	-4	-4	-4
Private households	0	0	-1	-2	-3	-3	-3	-3	-3
Personal, laundry services	0	0	0	-2	-3	-3	-3	-3	-3
Monetary authorities, et al.	0	0	0	-2	-3	-3	-3	-3	-3
Wholesale trade	0	0	0	-2	-3	-3	-3	-3	-3
Repair, maintenance	0	0	0	-2	-3	-3	-3	-3	-3
Waste mgmnt, remed services	0	0	-1	-3	-3	-3	-3	-3	-3
Amusement, gambling, recreation	0	0	0	-1	-3	-3	-3	-3	-3
Educational services	0	0	0	-1	-2	-3	-3	-2	-2
State Gov	0	0	0	-1	-2	-2	-2	-2	-2
Rental, leasing services	0	0	0	-1	-1	-1	-1	-1	-1
Ins carriers, rel act	0	0	0	-1	-1	-1	-1	-1	0
Mgmnt of companies, enterprises	0	0	0	0	-1	-1	-1	-1	-1

APPENDIX F
SELECTED REFERENCES

Atkinson, Robert D. (1993) "Defense Spending Cuts and Regional Economic Impact: An Overview." *Economic Geography*. 69:2. pp. 107-122.

Bartlett, Peter S., Nielson, Annette (2005) What if the Shipyard Closed? The Economic Impact of Portsmouth Naval Shipyard Closure on New Hampshire. Economic and Labor Market Information Bureau, New Hampshire Employment Security Commission.

Bradshaw, Ted K. (1999) "Communities Not Fazed: Why Military Base Closures May Not be Catastrophic." *Journal of the American Planning Association*. 65:2. pp.193-208.

Bradshaw, Ted K. (1993) "Which impact? The local impact of base closure needs closer examination." *Working Paper No 602*. Berkeley: University of California, Institute of Urban and Regional Development.

Dardia, Michael, Kevin McCarthy, Jesse Malkin, and Georges Vernez. (1996) The Effects of Military Base Closures on Local Communities: A Short-Term Perspective. RAND National Defense Research Institute.

Department of Economic and Community Development, State of Connecticut (2005) "The Contribution of the Groton Naval Sub Base and the Electric Boat Company to the Economies of Connecticut and Southeastern Connecticut."

Gorman, Heidi K. (2006) "The Economic Consequences for a Community Following the Closure of a Military Base: BRAC 2005 List: Naval Air Station, Brunswick, Maine" Master's Thesis: Department of Architecture, Planning and Preservation. Columbia University.

Hooker, Mark and Michael M. Knetter (2001) "Measuring the Economic Effects of Military Base Closures" *Economic Inquiry*. 39:4. pp. 583-598.

Planning Decisions, Inc. and Career Prospects, Inc. (2006) Brunswick Region Community Audit. Prepared for the Coastal Counties Workforce Board and the Defense Employment and Transitions Steering (DETS) Committee.

Poppert, Patrick E. and Henry Herzog Jr. (2003) "Force Reduction, Base Closure, and the Indirect Effects of Military Installations on Local Employment Growth." *Journal of Regional Science*. 43:3 pp. 459-481.

RKG Associates, Inc. (2005) BRAC Preparedness Strategy: Brunswick, Maine. Prepared for the Town of Brunswick, ME.

United States Government Accounting Office (2005) Military Base Closures: Updated Status of Prior Base Realignments and Closures. Report to Congressional Committees.