4.0 ENVIRONMENTAL CONSEQUENCES

Chapter 4.0 presents the environmental consequences of the proposed force structure changes at Shaw AFB for each of the resource areas discussed in Chapter 3.0. To define potential direct and indirect impacts, this chapter evaluates the project elements described in Chapter 2.0 against the affected environment provided in Chapter 3.0. Cumulative effects of the proposed action with other foreseeable future actions are presented in Chapter 5.0.

4.1 AIRSPACE MANAGEMENT

The potential effects of the proposed action and alternatives on the regional air traffic environment were assessed by considering the changes in aircraft operations and airspace uses that could occur relative to current conditions under each. If required, measures that could minimize potential impacts on air traffic and the Air Traffic Control (ATC) system were considered.

The type, size, shape, and configuration of individual airspace elements in a region are based upon, and are intended to satisfy, competing aviation requirements. Potential impacts could occur if air traffic in the region and/or the ATC systems were encumbered by changed flight activities associated with any of the alternative actions. When any significant change is planned, such as new or revised defense-related activities within an airspace area or a change in the complexity or density of aircraft movements, the FAA reassesses the airspace configuration to determine if such changes could adversely affect:

- ATC systems and/or facilities;
- Movement of other air traffic in the area; or
- Airspace already designated and used for other purposes supporting military, commercial, or civil aviation.

4.1.1 Proposed Action

Under the proposed action, the total number of aircraft assigned to Shaw AFB would be reduced from 78 to 72. As a result, fewer aviation operations would be conducted from the base itself, and in each element of the military training airspace. The associated potential reduction percent in Shaw AFB F-16 use of the airspace would not be expected to be discernible.

F-16 operations from Shaw AFB would be reduced from 16,583 annual sorties to 15,307. This 1,277-sortie reduction equates to an approximate 7.7 percent decrease. The number of closed pattern operations conducted at Shaw would also be reduced proportionately.

Within the military training airspace, sortie-operations involving MTRs, MOAs, Warning Areas, and ranges would also be reduced. Shaw AFB's contribution to total MTR sortie-operations would be reduced by 285; MOA operations would be reduced by 832; operations in the Warning Areas would be reduced by 365; operations on Poinsett ECR would be reduced by 293. These decreases equate to 7.7 percent, 7.7 percent, 7.8 percent, and 8.0 percent reductions,

respectively by F-16 aircraft assigned to Shaw AFB. The ATC system would be capable of handling somewhat fewer operations under the proposed action.

4.1.2 Alternative A

In terms of airspace management, this alternative would be identical to the proposed action. Consistent with the proposed action, there would be six fewer aircraft assigned to Shaw AFB. As a result, the same decreases in aviation activities described above would also occur under this alternative.

Since the ATC system would handle somewhat fewer operations under Alternative A, a positive impact would result from implementing this alternative.

4.1.3 Alternative B: No-Action Alternative

Under the No-Action alternative, there would continue to be 78 F-16 aircraft assigned to units at Shaw AFB. Operations at Shaw AFB and in the associated military training airspace would continue as under current conditions and at current levels. All ATC systems and procedures are adequate for current conditions and levels of use.

4.2 SAFETY

Numerous federal, civil, and military laws and regulations govern operations at Shaw AFB. Individually and collectively they prescribe measures, processes, and procedures required to ensure safe operations and to protect the public, military, and property. These regulations govern all aspects of the daily activity at the base, and their applicability ranges from standard industrial ground safety requirements (e.g., wearing of hard hats and safety clothing) to complex procedures concerning aircraft flight and maintenance on munitions.

4.2.1 Proposed Action

GROUND SAFETY

Under the proposed action, the 20th FW would continue to operate F-16 aircraft. Aircraft arresting systems are presently installed on both runways. The fire and crash response capability currently provided is sufficient to meet all requirements both on Shaw AFB and Poinsett ECR. Existing mutual aid agreements currently in effect with abutting communities will remain in effect, thus providing additional response support should it be required.

The organizational realignment will result in a decrease in the number of aircraft assigned to Shaw AFB and in the total number of operations conducted from the base. This small reduction in flight operations will not change the CZ and APZs where encroachment is a concern.

Other on-going training activities such as the use of threat emitters on the ground under the MOAs, and the use of laser targeting on Poinsett ECR will continue. Procedures in effect that have ensured safe operation in the past will continue.

Overall, no adverse impacts to ground safety are anticipated at any location.

EXPLOSIVE SAFETY

Ordnance currently in use will continue to be used as under current conditions. Adequate storage and maintenance facilities exist. All facilities are fully licensed for the ordnance stored, and no waivers are anticipated.

FLIGHT SAFETY

As a result of the proposed action's aircraft and organizational realignments, Shaw AFB F-16 sortie-operations in the military training airspace is projected to be reduced by 7 to 8 percent. This change will not have a discernible effect on flight safety.

AIRCRAFT MISHAPS

Table 4.2-1 provides a comparison of the current risk of Class A mishaps with the risks resulting from the reduction in sortie-operations associated with the proposed action. The statistically estimated changes are not expected to be discernible.

BIRD-AIRCRAFT STRIKES

As noted in Section 3.2, bird-aircraft strikes involving 20th FW aircraft have reduced in recent years. As with all other aspects of flight safety, the reduced exposure associated with fewer operations should further reduce risk of bird-aircraft strikes.

4.2.2 Alternative A

For safety considerations, this alternative is identical to the proposed action. The organizational realignment of the 20th FW would still result in six fewer aircraft being assigned to the units, and the same reductions in sortie-operations would occur. All ground, explosive, and flight safety impacts would be positive, and would be as described above.

4.2.3 Alternative B: No-Action Alternative

Under this alternative, no new aircraft would be assigned to Shaw AFB, and no 20th FW organizational realignments would occur. All activities would remain as described in Section 3.2. While no specific safety impacts result from the No-Action alternative, risks associated with ground, explosive, and flight safety would remain unchanged from current conditions.

4.3 NOISE

The changes in noise level associated with the proposed action or Alternative A are not discernible when compared to the No-Action alternative.

4.3.1 Proposed Action

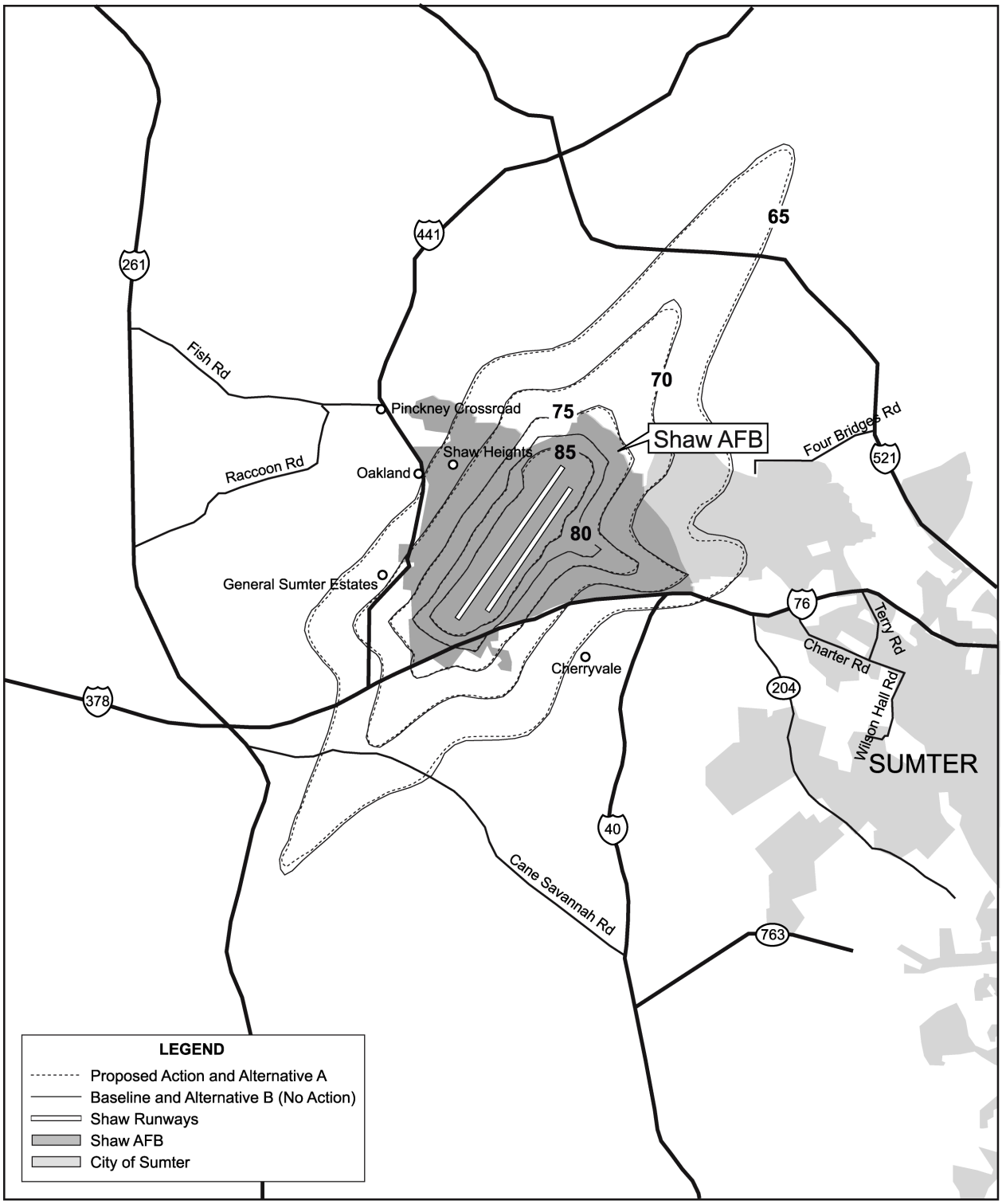
SHAW AIRFIELD

Figure 4.3-1 shows the proposed action L_{dnmr} 65, 70, 75 and 80 dB noise contours in conjunction with the corresponding no-action noise contours. The inner dashed contour line represents the proposed action and the outer solid line shows the No-Action alternative. The calculated change in contour size would not effectively change the noise environment associated with the airfield under the proposed action.

Table 4.2-1. Projected Class A Mishap Risk (Proposed Action)

Airspace	Proposed Levels of Use		Projected Years Between Mishaps (Based on Mishap Rate of 3.60 per 100,000 Flight Hours) [1]	
	Sortie-Operations	Flight Hours [1]	Current	Proposed
IR-002	60	19	1,321.7	1,431.8
IR-012	18	6	4,197.1	4,430.3
IR-074	17	9	2,876.0	3,214.4
IR-089	22	10	2,445.2	2,667.5
IR-090	4	2	14,671.4	14,671.4
IR-721/VR-1721	52	25	1,022.7	1,101.4
IR-726/VR-1726	52	19	1,322.8	1,424.5
IR-743/VR-1743	45	17	1,529.6	1,631.6
VR-058	118	60	425.5	461.6
VR-085	297	103	247.7	268.5
VR-086	30	16	1,627.6	1,736.1
VR-087	538	256	99.8	108.3
VR-088	651	278	92.1	100.0
VR-092	128	65	391.8	425.5
VR-093	67	36	688.8	760.7
VR-094	116	45	565.3	614.0
VR-095	231	137	187.8	203.2
VR-096	9	3	7,440.5	8,267.2
VR-097	172	146	175.4	189.6
VR-1059	688	550	46.6	50.5
VR-1060	60	37	685.6	742.7
VR-1061	19	7	3,576.5	3,764.8
W-161	1,966	983	26.1	28.3
W-177	2,399	1,199	21.4	23.2
Bulldog A/B	5,589	2,794	9.2	9.9
Gamecock C	788	394	64.4	70.5
Gamecock D	3,385	1,692	15.2	16.4
Gamecock I	103	51	496.0	539.4
R-6002	3,353	1,676	15.2	16.6

Notes: 1. Numbers are rounded
Source: Air Force Safety Center 2002.



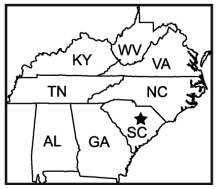
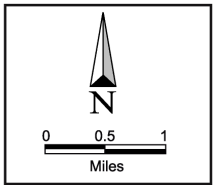


Figure 4.3-1

Baseline and Projected Noise Contours at Shaw AFB



AIRSPACE (RESTRICTED AREA, MTRS, AND MOAS)

The proposed action is not projected to change noise levels in the MTRs. Nine of the MTRs are calculated to have a 0.1 dB reduction in noise levels as a result of the proposed action. Such a change would not be discernible.

The change in noise levels for Warning Areas, Bulldog B MOA and Restricted Area 6002 all result in a reduction of 0.1 dB as a result of the proposed action. Gamecock C and Gamecock I MOAs result in no change in noise level.

4.3.2 Alternative A

Implementation of Alternative A would also result in the total of 78 currently assigned F-16 aircraft being reduced to 72. Therefore, Alternative A has noise effects identical to those under the proposed action.

4.3.3 Alternative B: No-Action Alternative

Under the No-Action alternative, the baseline conditions, as described in section 3.3 would remain unchanged. Consequently, implementation of the No-Action alternative would have no change on noise levels or noise contour locations.

4.4 AIR QUALITY

Air emissions resulting from the proposed action and alternatives were evaluated in accordance with federal, state, and local air pollution standards and regulations.

The air quality impacts from a proposed activity or action would be significant if they:

- increase ambient air pollution concentrations above any NAAQS;
- contribute to an existing violation of any NAAQS;
- interfere with or delay timely attainment of NAAQS; or
- impair visibility within any federally mandated PSD Class I area.

The approach to the air quality analysis was to estimate the change in emission levels due to the proposed action or any alternatives.

4.4.1 Proposed Action

Under the proposed action, the Shaw AFB F-16 contribution to base operations (takeoffs, landings, and closed patterns) and in the associated military training airspace would be reduced by 7 to 8 percent. Annually, approximately 1,300 fewer sorties would be conducted from Shaw AFB; 285 fewer sortie-operations would be conducted on MTRs, 365 fewer sortie-operations would be conducted in the Warning Areas; 832 fewer sortie-operations would be conducted in the MOAs; and, 293 fewer sortie-operations would be conducted on Poinsett ECR. These decreases in operations would result in a minimal change in emissions presented in Table 4.4-1.

Table 4.4-1. Emissions Reduction

Location	*POLLUTANT REDUCTIONS (IN TONS PER YEAR)*				
	CO	*SO_2*	*NO_2*	*PM_{10}*	*VOC/THC*
Shaw AFB	14.69	0.61	16.04	1.87	0.98
MTRs	1.38	0.25	9.60	0.32	0.01
MOAs	3.70	0.68	25.72	0.85	0.01
W-Area	1.62	0.30	11.28	0.37	0.01
Range	1.30	0.24	9.06	0.30	0.01
Total	22.69	2.08	71.70	3.71	1.02

Source: O'Brien and Wade 2002.

According to USEPA's General Conformity Rule in 40 CFR Part 51, Subpart W, any proposed federal action that has the potential to cause violations in a nonattainment or maintenance area must undergo a conformity analysis. The proposed action emissions are reduced or remain unchanged in every element of airspace, there are no adverse impacts to air quality and a conformity determination is not required.

4.4.2 Alternative A

Under Alternative A, no new F-16 aircraft would be delivered to Shaw AFB. However, operating squadrons would still be realigned, and a total of six currently assigned aircraft would be relocated. As with the proposed action, implementation of Alternative A would result in the total of 78 currently-assigned F-16 aircraft being reduced to a total of 72 aircraft.

Under Alternative A, the same reductions in aircraft operations proposed for the proposed action would also occur. Since the engines of the aircraft currently assigned are the same as those used by any new aircraft that might have been delivered under the proposed action, the reductions in emissions described for the proposed action would also occur under this alternative.

As with the proposed action, there would be no adverse impacts to regional air quality, any nonattainment area, or any PSD Class I areas.

4.4.3 Alternative B: No-Action Alternative

Under the No-Action alternative, all operations at the airfield and in the military training airspace would continue as under current conditions. There would be no change in emissions.

4.5 LAND USE AND TRANSPORTATION

This section analyzes the impacts of the proposed action and alternatives on general land use patterns, land management, and transportation. The land use discipline is interrelated with noise, discussed in section 4.3. Impact analysis requires identification of management plans and

use areas, followed by determination of potential effects due to potential construction, personnel changes, and military operations.

4.5.1 Proposed Action

The proposed action would not require change to any land use at Shaw AFB since no new construction or facility modification would occur on Shaw AFB. The reduction in personnel would not necessitate changes in land use.

The reduction in personnel would result in an estimated 5 percent reduced number of vehicle trips on and off base. However, this should not appreciably alter vehicular circulation on base or within the vicinity of the installation.

As depicted on Figure 4.3-1, noise contours will constrict slightly under the proposed action. However, specific noise sensitive areas in the vicinity of the airfield will experience no discernible change in noise levels.

Land use patterns or management practices would not be affected by the minimal decrease in the annual use of airspace and munitions delivery training at Poinsett Weapons Range. Decreased use under the proposed action in the military training airspace would include a slight reduction in aircraft overflights and noise.

Implementation of the proposed action would have no significant impacts to land use or manpower reductions, sortie-operations, and transportation at Shaw AFB or beneath the affected airspace.

4.5.2 Alternative A

Alternative A is operationally the same as the proposed action resulting in identical noise levels. Like the proposed action, no construction or facility changes are required. Therefore, no impacts to land use or transportation would be expected.

4.5.3 Alternative B: No-Action Alternative

No impacts to land use or transportation are anticipated under the No-Action alternative. Land use and land status near Shaw AFB would remain as described for baseline conditions in section 3.5. All operations in the military training airspace would continue as under current conditions.

4.6 BIOLOGICAL RESOURCES

This section analyzes the potential for impacts to biological resources from implementation of the proposed action and alternatives. Impacts potentially result from the projected changes in aircraft operations at the base and in the associated airspace. Analysis of impacts on base focuses on whether and how ground-disturbing activities and changes to airfield operations may affect biological resources. For airspace, the analysis emphasizes those wildlife resources that might be affected by projected changes in airspace use.

Determination of the significance of potential impacts to biological resources is based on: 1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource; 2) the

proportion of the resource that would be affected relative to its occurrence in the region; 3) the sensitivity of the resource to proposed activities; and 4) the duration of ecological ramifications. Impacts to biological resources are significant if species or habitats of high concern are adversely affected over relatively large areas or disturbances cause reductions in population size or distribution of a species of high concern.

4.6.1 Proposed Action

There would be no ground disturbance or new construction at Shaw AFB associated with the proposed action; therefore, there would be no significant impacts to biological resources on the installation. Shaw AFB F-16 aircraft use of munitions would be reduced by 7 to 8 percent under the proposed action; there would be no significant impacts to biological resources. Implementation of the proposed action would result in a small reduction of sorties within affected airspace. Noise levels would not change discernibly from existing conditions. Biological resources underneath these airspace units would not be significantly impacted with the implementation of the proposed action.

Since Shaw AFB aircraft sortie-operations would continue to occur over the ocean and not along the shoreline where wildlife nest and congregate, adverse effects from noise to shoreline habitats and associated species are not expected. Marine airspace is currently used for aircraft operations above 5,000 feet MSL. Under the proposed action, sortie-operations and associated noise levels within the Warning Areas would decrease slightly.

Contact has been initiated with state USFWS offices concerning Threatened and Endangered Species. Due to: 1) the lack of any proposed ground disturbance; 2) a proposed reduction in personnel and aircraft operations; and 3) decrease in aircraft operations, it is unlikely that the proposed action would have an effect on species listed or proposed for listing in accordance with the ESA. Furthermore, the proposed action would not adversely modify critical habitat as defined under ESA.

4.6.2 Alternative A

For purposes of the biological resources analysis, Alternative A is the same as the proposed action. As with the proposed action, no impacts to biological resources are expected under Alternative A.

4.6.3 Alternative B: No-Action Alternative

Under the No-Action alternative, aircraft and sortie-operations at the base and within the affected airspace would not change from existing conditions. Consequently, no impacts to biological resources of the ROI would occur.

4.7 CULTURAL RESOURCES

4.7.1 Proposed Action

No impacts to cultural resources at Shaw AFB are expected; no construction or renovation is planned on base. Neither of the two National Register-eligible cultural resources on base,

Rosemary Fire Tower and Building 611, would be impacted by the proposed action. Contact has been initiated with the South Carolina SHPO regarding this action.

No impacts to cultural resources under airspace are anticipated under the proposed action. The action would result in a 7 to 8 percent decrease in the annual use of airspace and munitions delivery training at Poinsett Weapons Range, and a decrease in the numbers of aircraft from 78 to 72. There are numerous cultural resources under the airspace, many of which are eligible for, or listed on, the National Register. However, cultural resources impacts are not expected because of the overall decrease in projected airspace use from current levels.

No traditional resources have been identified at Shaw AFB (Shaw AFB 2001d). The nearest federally recognized Native American group is the Catawba Indian Nation located near Rock Hill, South Carolina (U.S. Department of Commerce 2000). Contact has been initiated with the Catawba Indian National regarding this action.

4.7.2 Alternative A

From the perspective of cultural resources, Alternative A is the same as the proposed action. As with the proposed action, no impacts to cultural resources would be expected.

4.7.3 Alternative B: No-Action Alternative

Impacts to cultural resources are not expected under the No-Action alternative. Management of cultural resources on Air Force lands would continue in compliance with federal and state laws and regulations. No impacts to cultural resources under airspace have been identified under current use levels.

4.8 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

Socioeconomic consequences are addressed in terms of direct and secondary effects. Direct effects represent changes in Air Force employment and expenditures associated with the proposed action, and the immediate effect on community resources associated with those changes. Secondary effects include impacts to regional businesses and employment resulting from changes in Air Force regional purchases and changes in the household spending of affected Air Force personnel and their dependents.

4.8.1 Proposed Action

EMPLOYMENT AND EARNINGS

The proposed aircraft conversion at Shaw AFB would require a reduction in staffing of approximately 300 personnel, representing approximately 5.5 percent of the total base manpower of 5,991 full-time military and civilian personnel. Shaw AFB has had personnel and resulting population changes throughout its history. Full-time military and civilian personnel numbers moved from a total of 7100 in 1993 to a total of 6200 in 1996. From the 6200 in 1996 the total has gone to 6600 in 2000 and then to 6000 in 2002. The community has been accommodating such variations as part of the regularly changing military mission of the base.

Secondary employment in the ROI supported by activities at the base would decrease by approximately 73 workers as a result of the reduction in personnel at Shaw AFB. The total employment impact associated with the proposed action would amount to a loss of 455 jobs in the ROI, or 0.8 percent of total regional employment. Potential employment impacts of this magnitude would not be considered significant.

The total reduction in regional earnings associated with the proposed action is expected to amount to approximately $18 million, representing 1.3 percent of total 1999 regional earnings of $1.4 billion. The direct earnings impact, estimated based upon current military pay and benefit factors, is expected to be $16 million. The secondary earnings impact was estimated to be $2 million, based upon average earnings per job of $25,896 (USDCESA 2000). While total earnings in the region would be affected as a result of the proposed conversion, impacts to median household income and per capita income in the ROI are expected to be negligible.

POPULATION AND HOUSING

Based on the expected employment impacts, assumed relocation ratios, and reported average household size data, population out-migration associated with the proposed conversion may amount to as many as 675 persons. This would result in a 0.6 percent reduction of the ROI population from 104,646 persons in 2000 to 103,971. An estimated 335 households could relocate out of the region as a result of the proposed action. Approximately 97 percent of the total relocating population is expected to be active duty officers and enlisted personnel and their dependents. Population shifts of this kind are expected on a military installation and within adjacent communities that rely heavily on military activities.

Population out-migration associated with implementation of the proposed action would result in a decrease in the demand for housing within the ROI. The on-base military family and unaccompanied personnel units would be expected to remain at current occupancy rates. This would result in the total number of off-base housing units that could be vacated to be approximately 335 units. The overall vacancy rate in the ROI could increase from its current level of 9.6 percent to 10.4 percent under the proposed action. A decrease in housing demand of this magnitude would be noticeable but would not be expected to have significant impact on the housing market in the ROI due to the long-term influence of a shifting military population.

ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN

No disproportionate adverse effects on minority persons, low-income populations or children would be anticipated under implementation of the proposed action.

4.8.2 Alternative A

Proposed manpower changes at Shaw AFB are equivalent under the proposed action and Alternative A, so the resulting potential impacts on the socioeconomic resources of the region under Alternative A would be the same as those described for the proposed action. No significant impacts to the socioeconomic and environmental justice resources of the region would be anticipated under Alternative A.

4.8.3 Alternative B - No Action Alternative

Under the No-Action alternative there would be no change in the aircraft mix at Shaw AFB, therefore no change in manpower requirements. No impacts to socioeconomics or environmental justice are projected to occur under the No-Action alternative.