3.0 AFFECTED ENVIRONMENT

This chapter describes the baseline or existing condition within the geographic areas potentially affected by the alternatives described in Chapter 2.0.

The National Environmental Policy Act (NEPA) requires that the analysis address those locations and the components of the environment potentially affected by the Proposed Action or alternatives. Locations and environmental resources with no potential to be affected need not be analyzed. Public and agency scoping comments were used to focus the analysis on those environmental resources of interest to scoping participants. Environmental consequences are addressed in Chapter 4.0. Cumulative effects associated with other federal and regional actions are described in Chapter 5.0.

The expected geographic area of potential impacts is known as the region of influence (ROI). The ROI for this project is defined for each environmental resource as the outermost boundary of potential environmental consequences. The ROI generally is focused on the four-state region underlying the proposed airspace. For some resources, such as airspace, air quality, and socioeconomics, the ROI extends beyond the four-state area directly under the proposed airspace.

3.1 Airspace/Air Traffic

3.1.1 Definition of the Resource

Airspace management and Air Traffic Control (ATC) consist of the direction, control, and coordination of flight operations in the "navigable airspace" that overlies the geopolitical borders of the United States (U.S.) and its territories. Navigable airspace consists of airspace above the minimum altitudes of flight prescribed by regulations under United States Code (USC) Title 49, Subtitle VII, Part A, and includes airspace needed to ensure safety in the takeoff and landing of aircraft (49 USC § 40102). The U.S. government has exclusive sovereignty over all airspace extending from the surface to above 60,000 feet mean sea level (MSL) (49USC 40103(a)(1). The ROI for airspace has direct and indirect components. The direct ROI is the Powder River Training Complex (PRTC) airspace proposed for training activities and the airports under the proposed PRTC. The indirect ROI consists of airports on the periphery of the proposed PRTC, as well as more distant aviation facilities which could be affected by changes in flight patterns resulting from the proposed PRTC.

Several small public airports and private airfields are located under the proposed airspace with larger airports on the periphery of the airspace. Air travel can be the most practical means of transport for remote areas in southeastern MT, the western Dakotas, and northeastern WY. Emergency transport operations use the air space for the medical evacuation of patients to regional medical centers from remote areas. Rapid delivery of machinery parts and personnel can be critical during harvesting periods or other industrial operations. During scoping meetings, participants indicated that ranchers and farmers use private aircraft for access, crop-dusting, and general property surveillance. Often these pilots fly without local or regional radio contact and much of the area in which they fly has limited radio or radar tracking.

3.1.2 Regulatory Setting

Congress has charged the Federal Aviation Administration (FAA) with the responsibility to develop plans and policy for the use of the navigable airspace and to assign by regulation or order, the use of the airspace necessary to ensure the safety of aircraft and its efficient use (49 USC § 40103(b)). Special Use Airspace (SUA) identified by FAA for military and other governmental activities is charted and published by the National Aeronautical Charting Office in accordance with FAA Order 7400.2 and other applicable

regulations and orders. Airspace management considers how airspace is designated, used, and administered to best accommodate the individual and common needs of military, commercial, and general aviation. The FAA considers multiple, and sometimes competing, demands for aviation airspace in relation to airport operations, federal airways, jet routes, military flight training activities, and other special needs to determine how the National Airspace System can best be structured to address all user requirements.

The United States Air Force (Air Force) requests airspace from FAA and schedules and uses airspace in accordance with processes and procedures detailed in Air Force Instruction (AFI) 13-201 *Air Force Airspace Management*. AFI 13-201 implements Air Force Planning Document 13-2, *Air Traffic Control, Airspace, Airfield, and Range Management*, and Department of Defense (DoD) Directive 5030.19, *DoD Responsibilities on Federal Aviation and National Airspace System Matters*. AFI 13-201 addresses the development and processing of SUA, and covers aeronautical matters governing the efficient planning, acquisition, use, and management of airspace required to support Air Force flight operations (Air Force 2001a). Ellsworth Air Force Base (AFB) schedules the Powder River A and B Military Operations Areas (MOAs) and would schedule the proposed PRTC MOAs. Air Traffic Control Assigned Airspace (ATCAA) is controlled by Air Route Traffic Control Centers (ARTCC) and may be released for military use when requested.

3.1.3 Existing Conditions

The alternatives presented in Chapter 2.0 describe the establishment of new MOAs and ATCAAs and modification to existing MOAs and ATCAAs. This section explains the national airspace structure and the management of that structure.

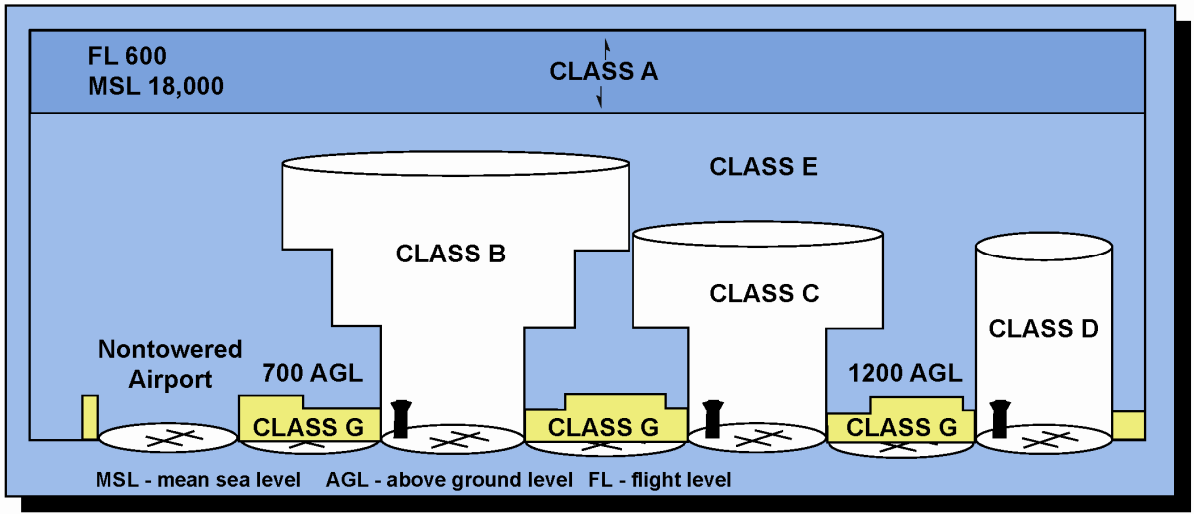
3.1.3.1 Airspace Categories

FAA defines two categories of airspace or airspace areas, regulatory and non-regulatory. Within these two categories, there are four types of airspace, Controlled, Special Use, Other, and Uncontrolled airspace (Class G). Controlled airspace is airspace of defined dimensions within which air traffic control service is provided to Instrument Flight Rules (IFR) flights and to Visual Flight Rules (VFR) flights in accordance with the airspace classification (FAA 2004).

Controlled airspace is categorized into five separate classes: Classes A through E. Class F airspace is not used in the U.S. The airspace classes are shown graphically in Figure 3.1-1. Classes A through E identify airspace that is controlled, airspace supporting airport operations, and designated airways affording en route transit from place-to-place. The classes also dictate pilot qualification requirements, rules of flight that must be followed, and the type of equipment necessary to operate within that airspace.

Class A airspace, generally, is that airspace from 18,000 feet MSL up to, and including, Flight Level (FL) 600. FL600 is equal to approximately 60,000 feet MSL. Flight levels are MSL altitudes based on the use of a directed barometric altimeter setting, and are expressed in hundreds-of-feet. The proposed PRTC ATCAAs where B-1, B-52, transient fighters, and Large Force Exercise (LFE) training could occur are in Class A airspace.

Class B airspace, generally, is that airspace from the surface to 10,000 feet MSL around the nation's busiest airports. The actual configuration of Class B airspace is individually tailored and consists of a surface area and two or more layers, and is designed to contain all published instrument procedures (FAA 2004). There is no Class B airspace in the direct ROI. The relationship of en-route aircraft to the use of training airspace above FL260 has been identified by FAA as a potential indirect impact upon scheduling in selected Class B airspace.



Source: United States Department of Transportation/FAA 2003

Figure 3.1-1. Controlled/Uncontrolled Airspace Schematic

Uncontrolled airspace is designated Class G airspace.

Class C airspace, generally, is that airspace from the surface to 4,000 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower, are serviced by a radar approach control, and that have a certain number of IFR operations or passenger enplanements. Although the actual configuration of Class C airspace is individually tailored, it usually consists of a surface area with a 5 nautical mile (NM) radius, and an outer circle with a 10 NM radius that extends from 1,200 feet to 4,000 feet above the airport elevation (FAA 2004). Billings is within Class C airspace.

Class D airspace, generally, is that airspace from the surface to 2,500 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower. The configuration of each Class D airspace area is individually tailored and when instrument procedures are published, the airspace will normally be designed to contain the procedures. Arrival extensions for instrument approach procedures may be designated as Class D or Class E airspace (FAA 2004). Bismarck, Gillette, Ellsworth AFB, Rapid City, and Minot AFB have Class D airspace.

Class E airspace is controlled airspace that is not Class A, B, C, or D. The floor of Class E airspace is generally 700 feet above ground level (AGL). There are areas where Class E airspace begins at either the surface or 700 feet AGL that are used to transition to/from the terminal or en route environment (around non-towered airports). These areas are designated by VFR sectional charts. In most areas of the U.S., Class E airspace extends from 1,200 feet AGL up to, but not including, 18,000 feet MSL, the lower limit of Class A airspace. No ATC clearance or radio communication is required for VFR flight in Class E airspace. VFR visibility requirements below 10,000 feet MSL are 3 statute miles visibility and cloud clearance of 500 feet below, 1,000 feet above, and 2,000 horizontal. Above 10,000 feet MSL the requirement is 5 statute miles visibility, and cloud clearance of 1,000 feet below, 1,000 feet above, and 1 mile laterally (FAA 2003). Most airspace in the ROI below FL180 is Class E. There are seven types of Class E airspace, as described below.

- **Surface Area Designated for an Airport.** When so designated, the airspace will be configured to contain all instrument procedures.
- **Extension to a Surface Area.** These are Class E airspace areas that serve as extensions to Class B, C, and D surface areas designated for an airport. This airspace provides controlled airspace to

contain standard instrument approach procedures without imposing a communications requirement on pilots operating under VFR.

- **Airspace Used for Transition.** These are Class E airspace areas beginning at either 700 or 1,200 feet AGL used to transition to/from the terminal or en route environment.
- **En Route Domestic Airspace Areas.** These areas are Class E airspace areas that extend upward from a specified altitude to provide controlled airspace where there is a requirement for IFR en route air traffic control services, but where the Federal Airway system is inadequate.
- **Federal Airways.** Federal Airways (Victor Airways) are Class E airspace areas, and, unless otherwise specified, extend upward from 1,200 feet to, but not including, 18,000 feet MSL. The proposed Gap MOAs are along Victor Airways within the ROI.
- **Other.** Unless designated at a lower altitude, Class E airspace begins at 14,500 feet MSL to, but not including, 18,000 feet MSL overlying: a) the 48 contiguous states, including the waters within 12 miles from the coast of the 48 contiguous states; b) the District of Columbia; c) Alaska, including the waters within 12 miles from the coast of Alaska, and that airspace above FL600; d) excluding the Alaska peninsula west of 160°00'00" west longitude, and the airspace below 1,500 feet above the surface of the earth unless specifically so designated.
- **Offshore/Control Airspace Areas.** This includes airspace areas beyond 12 NM from the coast of the U.S., wherein air traffic control services are provided (FAA 2004). There are no offshore/control airspace areas in the proposed airspace changes.

Airspace that has not been designated as Class A, B, C, D, or E airspace is Uncontrolled Airspace (Class G) (FAA 2004). Class "G" airspace generally underlies Class E airspace with vertical limits up to 700 feet AGL, 1,200 feet AGL, or 14,500 feet AGL, whichever applies. Cloud clearance and visibility requirements differ by altitude and day versus night.

Most of the airspace directly affected by the proposed PRTC consists of Class E. As noted above, some airports in the ROI include Class D airspace.

3.1.3.2 Special Activity Airspace

Special Activity Airspace (SAA), a term that includes Airspace for Special Use, SUA, and others (i.e., Temporary Flight Restrictions [TFRs]), is any airspace with defined dimensions within the National Airspace System wherein limitations may be imposed upon aircraft operations. This airspace may be prohibited areas, restricted areas, military operations areas, air traffic control assigned airspace, and any other designated airspace areas.

Airspace for Special Use includes Military Training Routes (MTRs) (Instrument Routes [IR]/Visual Routes [VR]), ATCAA, aerial refueling track/anchors, slow routes, and low-altitude tactical navigation areas. MTRs, IRs, ATCAAs, and aerial refueling tracks are within the ROI. Establishment of new ATCAAs and changes to existing ATCAAs are part of the proposed airspace changes to support B-1 and B-52 training.

SUA is defined airspace wherein activities must be confined because of their nature, or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. The types of SUA are Prohibited Areas, Restricted Areas, MOAs, Warning Areas, Alert Areas, Controlled Firing Areas, and National Security Areas. MOAs are SUAs in the ROI. Establishment of new MOAs and changes to existing MOAs are part of the proposed airspace changes to support B-1 and B-52 training.

3.1.3.2.2 Military Operations Areas

MOAs are established to separate or segregate certain non-hazardous military activities from IFR aircraft traffic and to identify VFR aircraft traffic where these military activities are conducted (see Figure 2-2). Ellsworth AFB manages existing MOAs, and is proposing new MOAs as part of the PRTC. A MOA is SUA of defined vertical and lateral limits established outside Class A airspace to separate and segregate certain non-hazardous military activities from IFR traffic and to identify for VFR traffic where these activities are conducted (FAA 2004). MOAs are considered "joint use" airspace. Non-participating aircraft operating under VFR are permitted to enter a MOA, even when the MOA is active for military use. Aircraft operating under IFR must remain clear of an active MOA unless approved by the responsible ATC. If an IFR aircraft is approved to transit a MOA that part of the MOA is effectively made not active for military training during the IFR aircraft transit.

Within an active MOA, flight by both participating and VFR non-participating aircraft is conducted under the "see-and-avoid" concept, which stipulates that "when weather conditions permit, pilots operating VFR are required to observe and maneuver to avoid other aircraft. Right-of-way rules are contained in Code of Federal Regulations (14 CFR) Part 91" (FAA 2004). The responsible ATC provides separation service for aircraft operating under IFR and MOA participants. The see-and-avoid procedures mean that if a MOA were active during weather with restricted visibility, the general aviation pilot flying VFR could not safely access the MOA airspace and a pilot requesting IFR clearance would not be permitted to access the active MOA. An aircraft flying VFR which encountered weather or other conditions requiring IFR flight would need to declare an in-flight emergency and communicate with the ATC who would communicate with Ellsworth AFB to contact training aircraft and establish a temporary floor in the MOA high enough for the VFR pilot to be safely directed IFR by ATC.

Figure 3.1-2 presents the existing Powder River airspace and the proposed PRTC. The existing Powder River A MOA has a charted altitude from the surface to FL180 and is used intermittently by Notice to Airmen (NOTAM). Powder River B MOA has a charted altitude from 1,000 feet AGL to FL180 and is used intermittently by NOTAM (Billings Sectional Aeronautical Chart). When there is a change in the MOA activation, such as a mechanical delay in launch of a B-1 training mission, a new NOTAM is issued two hours in advance of the launch. Powder River A and B MOAs exclude airspace below 1,500 feet AGL over the Broadus and Belle Creek public airports and have avoidance areas over Lanning, Laird, and Sky private airfields, as well as over other locations. During scoping, some individuals expressed dissatisfaction with the existing Powder River airspace MOAs and others individuals noted that training in the MOAs does not significantly impact ranching activities.

3.1.3.2.3 Air Traffic Control Assigned Airspace

ATCAA is airspace of defined vertical and lateral limits, assigned by Air Traffic Control for the purpose of providing air traffic segregation between the specified activities being conducted within the assigned airspace and other IFR air traffic (FAA 2004). This airspace, if not required for other purposes, may be made available for military use. ATCAAs are in Class A airspace and are frequently structured and used to extend the horizontal and/or vertical boundaries of MOAs. ATCAAs overlie the Powder River MOAs (conceptually depicted in Figure 2-2) and would be part of the PRTC (see Figure 3.1-2).

The alternatives for the PRTC include establishment of new ATCAA airspace and modification to existing ATCAAs. Each MOA on Figure 3.1-2 is overlain by an ATCAA of the same airspace dimensions except for the Powder River 1B (PR-1B) MOA, where the proposed MOA includes a semi-circle cut-out to support the Sheridan, Wyoming (WY) airport. Figure 3.1-2 also depicts the proposed Gateway West and East ATCAAs which do not propose corresponding MOAs beneath the ATCAAs.

The MOAs and ATCAAs associated with the Powder River airspace are developed, coordinated, used, and managed in accordance with Letters of Agreement between the 28th Bomb Wing (28 BW) and Salt Lake City, and Denver ARTCCs. For the Powder River airspace, the Letter of Agreement defines responsibilities, and outlines procedures for aircraft operations, air traffic control operations, and utilization of airspace for which the 28 BW is the scheduling authority. Such Letters of Agreement are supplementary to the procedures in FAA Orders 7110.65T (Air Traffic Control) and 7610.4N (Special Military Operations). Currently, B-1s operate within all airspace units associated with the existing complex, while B-52 operations occur primarily within the Crossbow ATCAA above the Powder River A/B MOA.

Table 3.1-1 lists existing MOAs and ATCAAs associated with the current Powder River airspace. During scoping, the FAA explained that high altitude commercial flights traverse the existing ATCAAs and commercial airline representatives explained that they were usually above FL260. Figure 3.1-3 indicates the airspace boundaries of the controlling ARTCC overlain on the proposed PRTC.

Table 3.1-1. Existing MOAs and ATCAAs Associated with the Powder River Airspace

	ALTITUDES		
	Floor	***Ceiling***	***Controlling ARTCC***
Powder River A MOA	Surface	Up to but not including FL180	Salt Lake City
Powder River B MOA	1,000 feet AGL	Up to but not including FL180	Denver
Powder River ATCAA	FL 180	FL260 inclusive or as assigned	Denver
Gateway ATCAA	FL 180	FL260 inclusive or as assigned	Denver
Crossbow ATCAA	FL 270	FL 450 inclusive or as assigned	Denver
Black Hills ATCAA	FL 200	FL 230 inclusive	Denver

Note: FL180 = Flight Level 180 (approximately 18,000 feet MSL)

Source: FAA Order 7400.8 Special Use Airspace, Denver ARTCC/Salt Lake City ARTCC/28BW Letter of Agreement, Subject: Powder River Training Complex and Crossbow ATCAA. December 10, 2006.

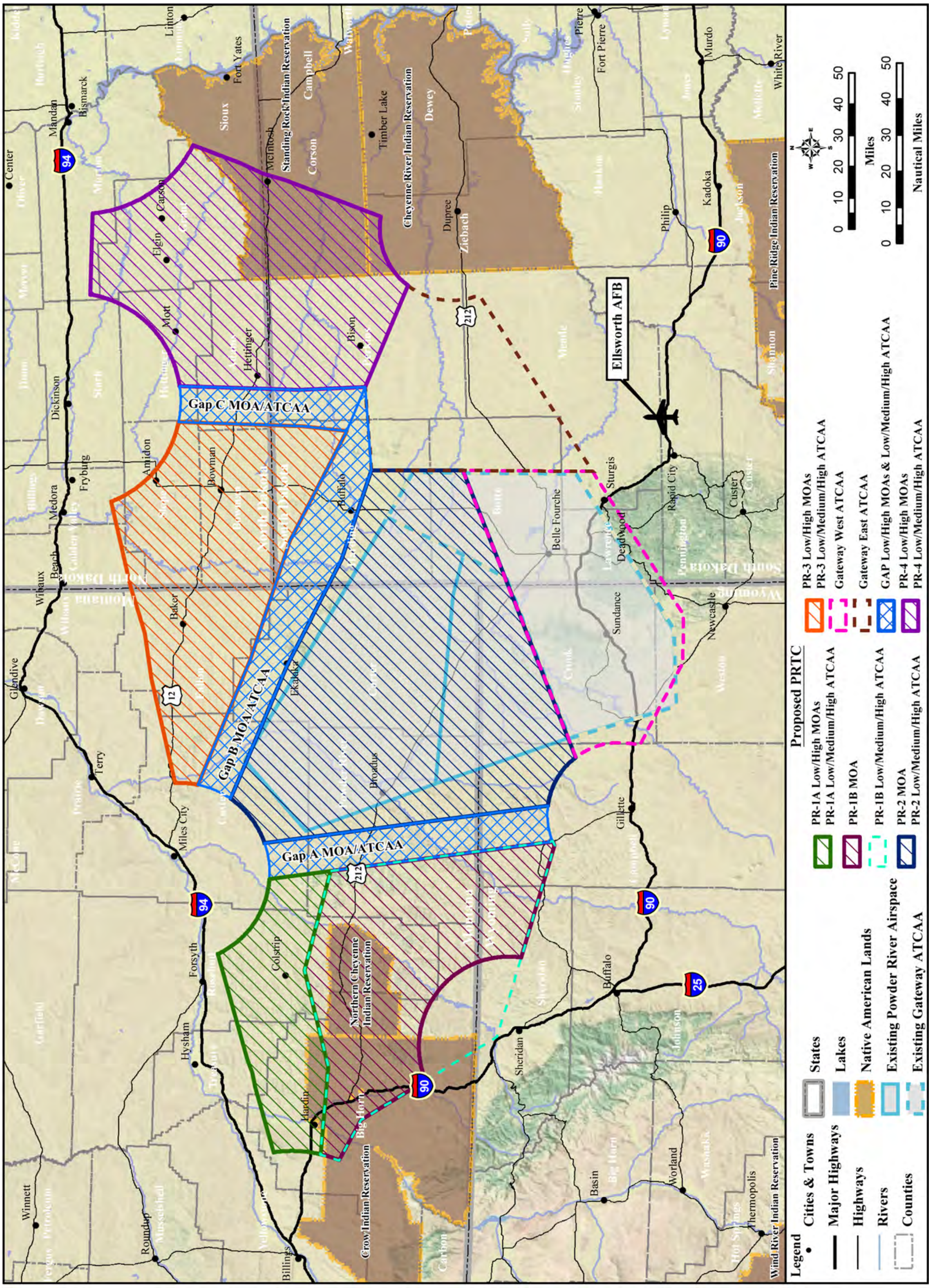


Figure 3.1-2. Current and Proposed PRTC Airspace

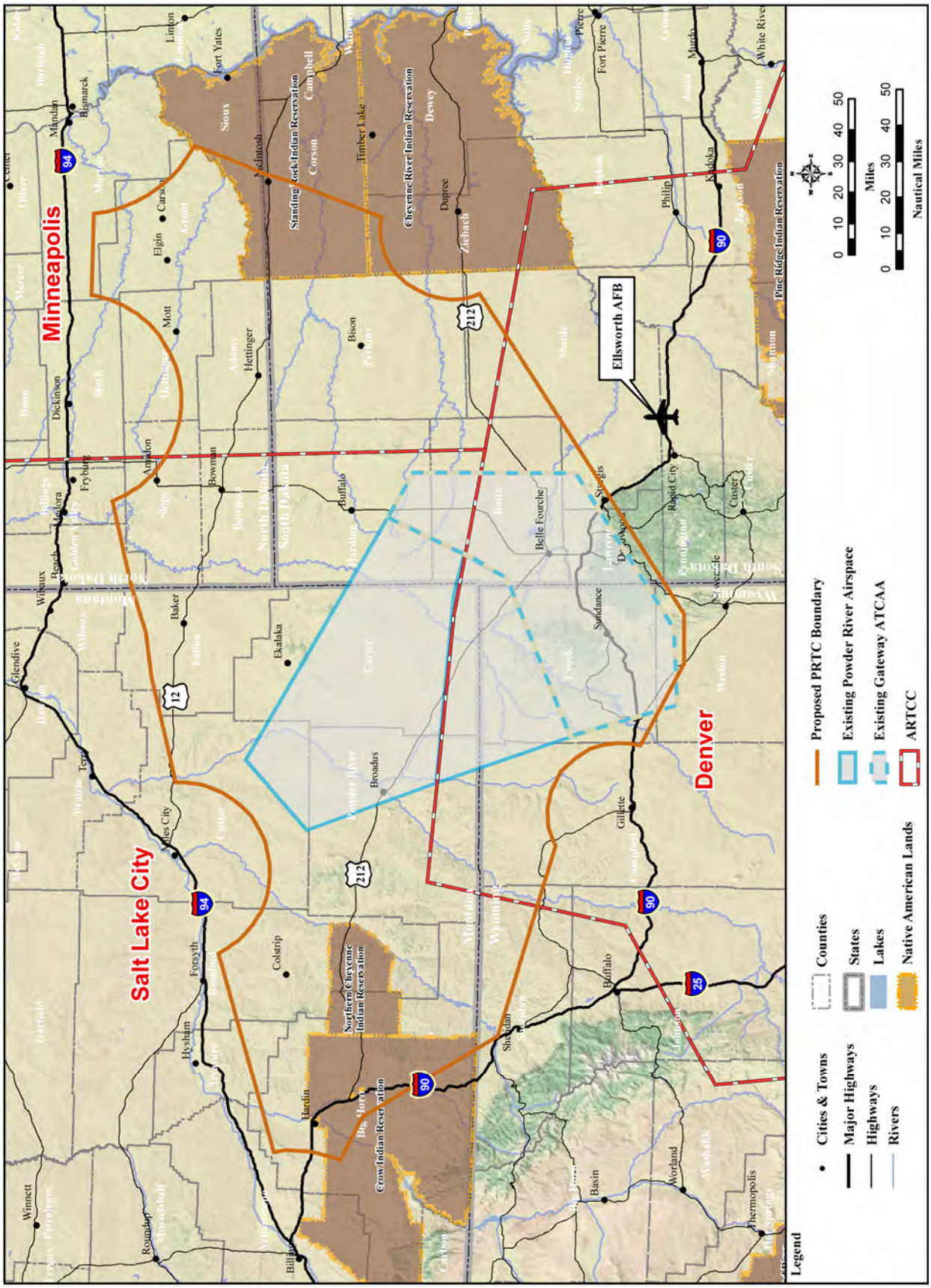


Figure 3.1-3. Controlling ARTCCs and the Proposed PRTC

3.1.3.3 Military Training Routes

MTRs are single direction flight corridors developed and used by the DoD and associated Air National Guard (ANG) units to practice high-speed, low-altitude flight, generally below 10,000 feet MSL. Specifically, MTRs are airspace of defined vertical and lateral dimensions established for the conduct of military flight training at airspeeds in excess of 250 knots indicated airspeed (FAA 2004). MTRs are developed in accordance with criteria specified in FAA Order 7610.4 (DoD 2005). They are described by a centerline with defined horizontal limits on either side of the centerline and vertical limits expressed as minimum and maximum altitudes along the flight path. MTRs are identified as VR or IR.

B-52 (pictured here) and B-1 bombers have historically used MTRs in Montana, North Dakota, South Dakota, and Wyoming for low-altitude penetration mission training.

MTRs designated as VR are flown under VFR conditions whereas MTRS designated as IR are flown under IFR conditions. Figure 3.1-4 shows the three IRs which traverse the area and have been used by a variety of aircraft over the years, including B-1 and B-52 aircrews training for their low-level penetration missions. During public scoping meetings, participants under the proposed Powder River 3 (PR-3) and Powder River 4 (PR-4) MOAs noted having experienced low-level B-52 and B-1 overflights on the MTRs. Public comments during scoping noted that B-52s were easier to see and avoid than fighters on the IRs. A public concern was expressed that fully loaded crop dusters at 500 feet AGL would be unable to avoid a high speed low-level B-1 and could experience wake vortex impacts. IR-473, IR-485, and IR-492 converge on the Belle Fourche Electronic Scoring Site (ESS) with simulated threats and targets. These IRs were extensively used for low-altitude Cold War era penetration training. The PRTC proposal does not involve any changes to the structure or use of MTRs.

Aviation and Airspace Use Terminology

Above Ground Level (AGL): *Altitude expressed in feet measured above the ground surface.*

Mean Sea Level (MSL): *Altitude expressed in feet measured above average (mean) sea level.*

Flight Level (FL): *Manner in which altitudes at 18,000 feet MSL and above are expressed, as measured by a standard altimeter setting of 29.92.*

Visual Flight Rules (VFR): *A standard set of rules that all pilots, both civilian and military, must follow when not operating under instrument flight rules and in visual meteorological conditions. These rules require that pilots remain clear of clouds and avoid other aircraft.*

Instrument Flight Rules (IFR): *A standard set of rules that all pilots, civilian and military, must follow when operating under flight conditions that are more stringent than visual flight rules. These conditions include operating an aircraft in clouds, operating above certain altitudes prescribed by Federal Aviation Administration (FAA) regulations, and operating in some locations such as major civilian airports. Air Traffic Control (ATC) agencies ensure separation of all aircraft operating under IFR.*

Source: FAA 2004

3.1.3.4 Civil Airspace Usage

Civil aircraft consist primarily of commercial aircraft and general aviation. Civil aircraft operations can occur anywhere within the airspace described in Section 3.1.3.1 if and when permitted. Civilian aircraft often fly VFR using topographic or highway features and/or using GPS for direct routing. There are also specified routes and areas which have been identified to facilitate air transportation and airspace management. This section describes these routes and areas.

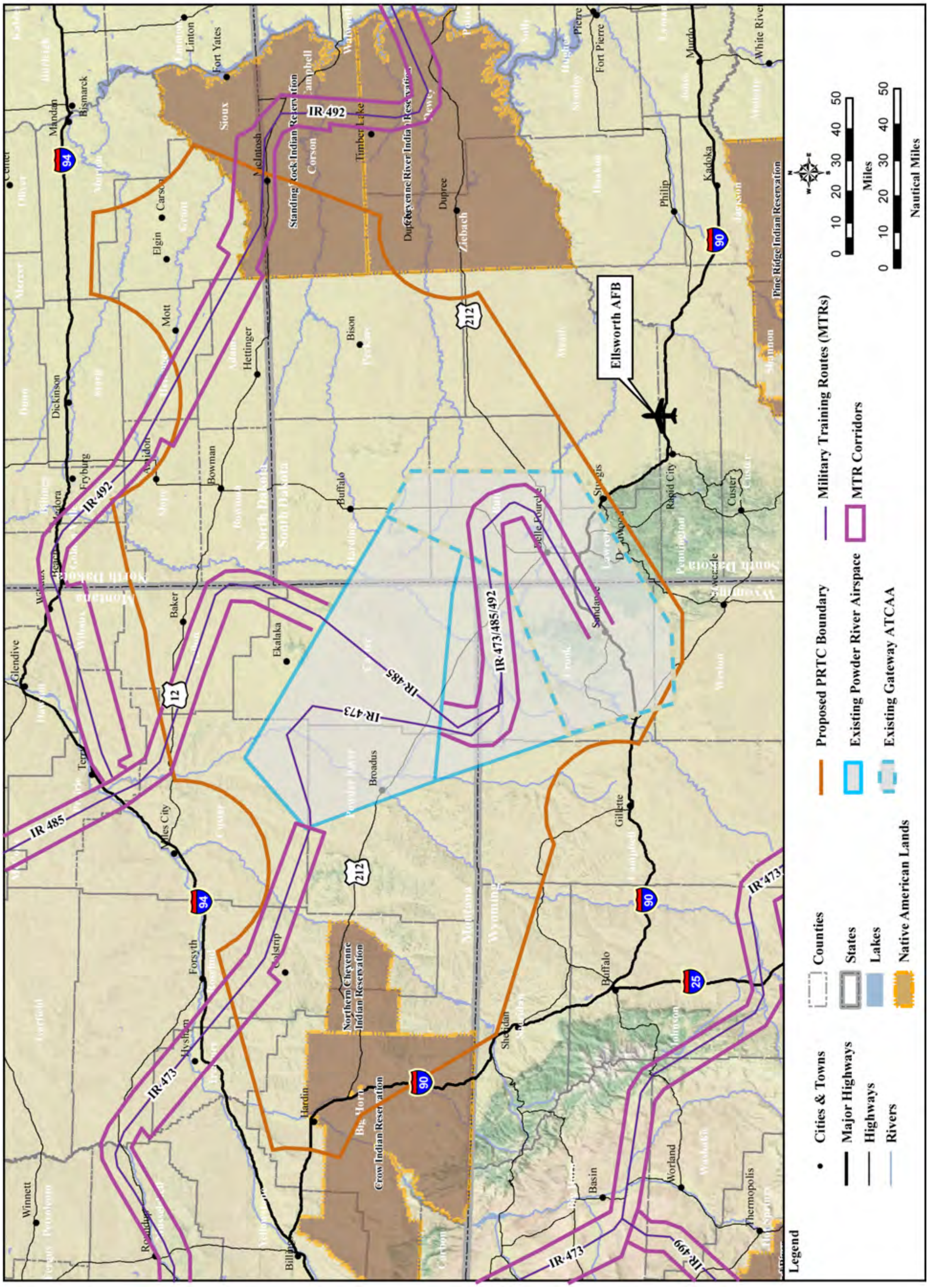


Figure 3.1-4. MTRs Associated with the Proposed PRTC

3.1.3.4.1 VICTOR AIRWAYS

Victor Airways are "highways in the sky" and are used by aircraft to transit between navigational aids. Victor Airways are designated on aeronautical charts with the letter "V" (hence Victor). Victor Airways, sometimes referred to as Victor Routes, are Class E airspace extending typically from 1,200 feet AGL to FL180. The width of the victor corridor depends on the distance from the navigational aids (such as VHF omnidirectional radio range [VOR's]). When VOR's are less than 102NM from each other, the Victor airway extends 4NM on either side of the center line (8nm total width). When VOR's are more than 102NM from each other, the width of the airway in the middle increases. The width of the airway beyond 51NM from a navigational aid (navaid) is 4.5 degrees on either side of the center line between the two navaids (at 51NM from a navaid, 4.5 degrees from the centerline of a radial is equivalent to 4NM). The maximum width of the airway is at the middle point between the two navaids. This is when 4.5 degrees from the center radial results in a maximum distance for both navaids. Victor Airways and Jet Routes are presented on Figure 3.1-5.

The PRTC MOAs are designed to avoid most Victor Airways during day-to-day training operations. Three Victor Airways are coincident with the proposed Gap MOAs. The Gap MOAs are proposed for use during LFEs for 1 to 3 days a maximum of once a quarter. The three Victor Airway/Gap MOA routes and the Victor Airway within the proposed PRTC are:

- V-247, between Sheridan, WY and Billings, Montana (MT), traverses south outside of the proposed PR-1B MOA where the proposed MOA was adjusted to not impact V-247. V-247 has en route obstacles which reach 9,600 feet MSL. Traffic on V-247 is approximately three to four flights per day (personal communication, Payne 2008).
- V-254, between Gillette, WY and Miles City, MT, is the proposed Gap A MOA. V-254 has en route obstacles which reach 4,800 feet MSL. V-254 has a traffic count of approximately three flights per day (Table 3.1-2).
- V-86, between Billings, MT and Rapid City, South Dakota (SD), traverses the southern border of the proposed PR-1B MOA and crosses under the Gateway West ATCAA. V-86 has en route obstacles which reach 4,500 feet MSL. V-86 has a daily traffic count of 12 to 18 flights.
- V-491, between Dickinson, North Dakota (ND) and Rapid City, SD, is the proposed Gap C MOA. V-491 has en route obstacles which reach 3,700 feet MSL. V-491 has a traffic count of approximately one flight every four days (Table 3.1-2).
- V-120, between Miles City, MT and Dupree, SD, is the proposed Gap B MOA. V-120 has a minimum en route altitude of 9,000 feet MSL. V-120 is a primary route running from Minneapolis westward and is utilized by pilots seeking to fly below Class A airspace; the route has a lower minimum en route altitude across the northern Rockies (personal communication, Payne 2008). V-120 has a traffic count of approximately two to three flights per day (Table 3.1-2).

Section 3.1.3.5 suggests that one explanation for the relatively low Victor Route traffic counts is the limited radar coverage, and, in some cases, limited radio coverage in portions of the ROI. Civil pilots in the region typically use direct routing with Global Positioning System (GPS) instead of flying on Victor Routes.

As previously indicated, the proposed PRTC was laid out to avoid as many Victor Airways as possible. This places a series of additional Victor Airway segments outside the proposed PRTC. These segments include V--465 between Billings and Miles City, V-2 between Miles City and Dickerson, V-169 between Bismarck and Rapid City, V-536 between Gillette and Sheridan, and V86-611 between Sheridan and Billings.

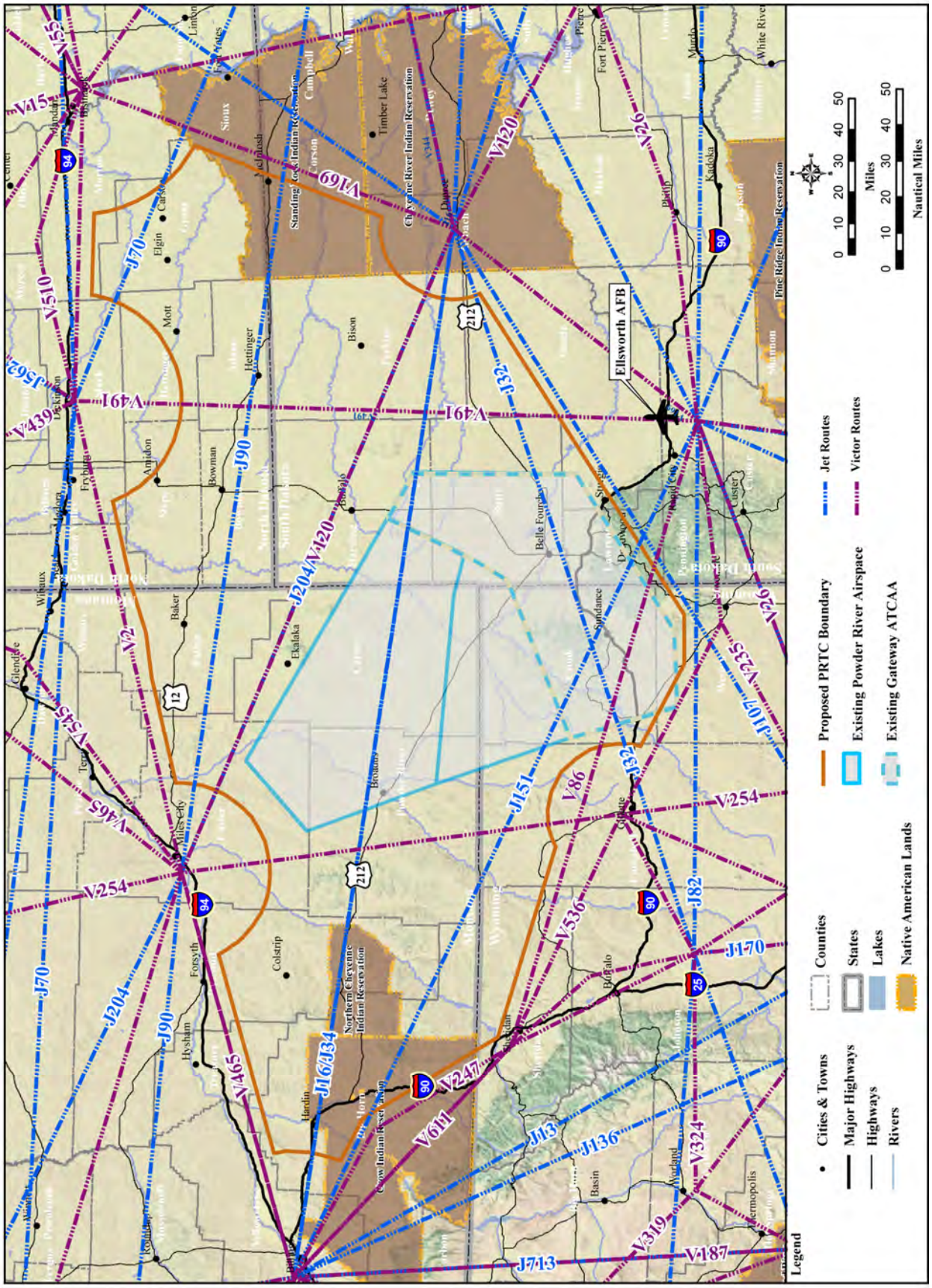


Figure 3.1-5. Victor and Jet Routes Associated with the Proposed PRTC

3.1.3.3.2 JET ROUTES

Jet routes are designated highways in Class A airspace for high altitude traffic above FL180. These routes are used by commercial aviation that fly under IFR control by the three FAA ARTCC centers (Minneapolis, Salt Lake City, or Denver). Figure 3.1-3 demonstrates the three ARTCC areas as they relate to the proposed PRTC.

Jet routes are established under Federal Aviation Regulation Part 71 in Class A airspace above FL180 to designate frequently used routings. Jet routes have no specified width; width varies depending on many aeronautical factors (FAA 2004). Jet routes 151 (J-151), J-32, and J-16/34 cross Gateway, Powder River 1A (PR-1A), PR-1B, and Powder River 2 (PR-2) ATCAAs; while J-90 passes through PR-3 and PR-4 ATCAAs.

J-32 crosses Gateway ATCAA and passes near Belle Fourche. J-90 and J-151 traverse southeast/northwest and generally handle commercial traffic transiting east and west across the country. The Gap B ATCAA follows J-204 from Miles City, MT to Dupree, SD. J-32 and J-151 traverse the Gateway ATCAAs. J-70 traverses the airspace from southeast to northwest across the northern portions of the PR-4 ATCAA and handles between 121 and 144 flights on a typical day.

The proposed PRTC airspace is traversed by designated severe weather avoidance routes which provide access between the San Francisco Bay area and the Pacific Northwest, and airports in the northeast. These weather avoidance routes include Canadian airspace and are referred to as Canadian (CAN) routes. Weather avoidance routes are the most common commercial aircraft routes used to avoid thunderstorms in the Great Plains and the Ohio Valley. These severe weather avoidance routes are typically used between 80 and 100 days per year to support traffic flow into the New York region, as well as into Minneapolis, Chicago O'Hare, and Detroit metro airports.

While the minimum en route altitude for many of these routes is FL180, the majority of flight activity on these routes is at altitudes above FL260 and up to FL450. Table 3.1-2 presents average traffic counts for the jet routes during two representative eight-day time periods. A comparison of Figure 3.1-5 with the jet routes and the jet route traffic counts from Table 3.1-2 demonstrate that some Victor Routes are infrequently used and some jet routes are used by a substantial number of aircraft.

Table 3.1-2. Victor Airways and Jet Route Traffic

	DATA RANGE			
	12/01/2008 – 12/08/2008		5/05/2009 – 5/12/2009	
Victor Routes	***Total***	***Daily Average***	***Total***	***Daily Average***
V-247	25	3.2	22	2.8
V-254	22	2.8	23	2.9
V-86	144	18	89	11.2
V-491	2	.25	2	.25
V-120	11	1.4	22	2.8
J-151	248	31	253	31.7
J-32	852	106.5	1,003	125.4
J-16	1,006	125.8	1,002	125.3
J-204	102	12.8	77	9.7
J-90	337	42.2	408	51
J-70	967	120.9	1,150	143.8

Source: FAA 2009

3.1.3.3.3 Airports and Airfields

Multiple public airports and private airfields are located under the proposed PRTC. Figure 3.1-6 presents the public airports. Table 3.1-3 lists the public airports and based aircraft under (U) or near (N) each of the proposed PRTC MOAs as of February 2010. Table 3.1-4 provides comparable information for the identified private airfields under (U) or near (N) each of the proposed PRTC MOAs. Table 3.1-5 summarizes the number of public airports and private airfields associated with, and those under, the proposed PRTC MOAs and associated Gap MOAs. Table 3.1-6 provides both elevation and operation information for public airports under (U) or near (N) each proposed PRTC MOA. The operations are further broken down by aircraft type.

Table 3.1-7 presents data for private airfields with elevations and estimated annual operations based on extrapolations from public airport operations per based aircraft. Annual operations for private airfields under the proposed airspace are estimated by calculating the reported total based aircraft on public airports under the proposed airspace, calculating the reported annual operations for the public airports, and dividing the annual operations by the number of based aircraft. This produces an annual estimate of 440 operations per private airfield based aircraft. The estimated private airfield annual operations in Table 3.1-7 are the regions annual average operations per based aircraft at public airports multiplied by the number of based aircraft reported at the private airfield.

Two small public airports underlie the proposed PR-1A MOA airspace: Fairgrounds and Colstrip. The St. Labre, MT private airfield underlies the PR-1B MOA. Colstrip has controlled airspace above 700 feet AGL associated with its operation. Table 3.1-8 presents the instrument approaches for Colstrip Airport during the first four months of 2009. These data demonstrate that a typical month would average one to two instrument flights per day into Colstrip Airport. Assuming each instrument approach represented two airfield operations (one landing and one take-off), the estimated 345 annual IFR approaches represent 690 annual airfield operations or 6.0 percent of the reported existing annual operations from Table 3.1-6. Private airfields under the airspace are shown in Table 3.1-4 with their total estimated annual operations shown in Table 3.1-7.

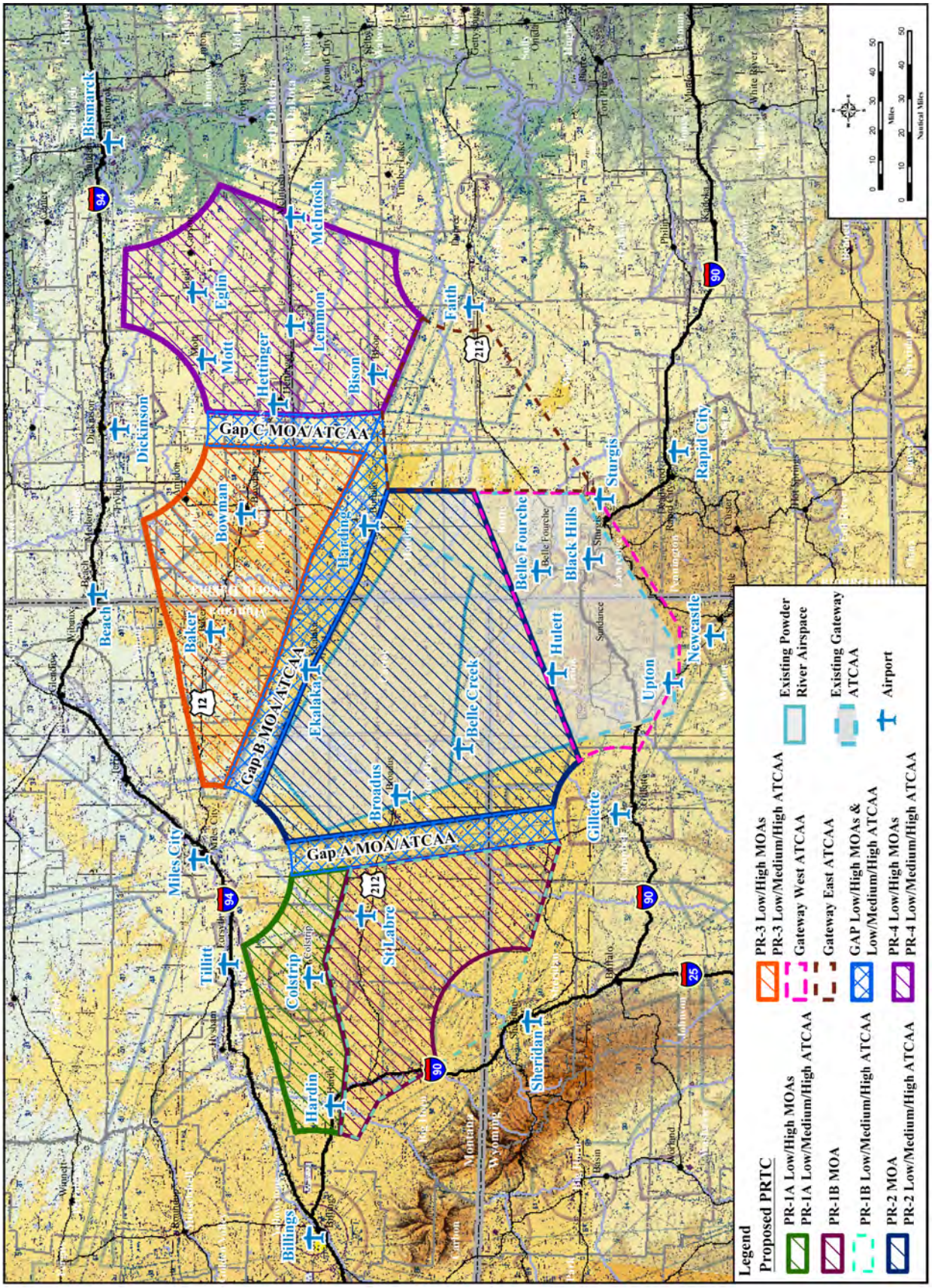


Figure 3.1-6. Public Airports under and Near the Proposed PRTC Airspace

Table 3.1-3. Public Airports and Based Aircraft (Page 1 of 2)

Location[1]	*Airport (Proposed MOA)*	*State*	*Airport Designation*	*Elevation*	*Tower*	*Fixed Base Operator*	*Total Based Aircraft*[2]	AIRCRAFT TYPE					
								Single Engine	*Multi Engine*	*Jet*	*Helicopter*	*Military*	*Glider/ Ultralight*
Proposed PR-1A or PR-1B[3] MOAs Associated Public Airports and Based Aircraft													
N	Billings (1A)	MT	BIL	3,652	Yes	Yes	173	94	63	9	7		
U	Colstrip (1A)	MT	M46	3,426	No	No	14	12	2				
N	Fort Smith (1A)	MT	5U7	3,242	No	No	0						
U	Hardin(1A)	MT	F02	2,911	No	No	7	7					
N	Sheridan (1B)	WY	SHR	4,021	No	Yes	93	62	22	3	4		2
N	Tillitt-Forsyth (1A)	MT	1S3	2,727	No	Yes	25	24	1				
Total Under and Near Proposed PR-1A/B MOAs							312	199	88	12	11	0	2
Total Under Proposed PR-1A/B MOAs							21	19	2	0	0	0	0
Proposed PR-2 MOA Associated Public Airports and Based Aircraft													
U	Belle Creek[4]	MT	3V7	3,678	No	No	4	3					1
U	Broadus	MT	00F	3,280	No	No	1	1					
N	Gillette	WY	GCC	4,365	Yes	Yes	50	43	6	1			
Total Under and Near Proposed PR-2 MOA							55	47	6	1	0	0	0
Total Under Proposed PR-2 MOA							5	4	0	0	0	0	1
Proposed PR-3[5] MOA Associated Public Airports and Based Aircraft													
U	Baker	MT	BHK	2,975	No	Yes	28	24	2	1	1		
N	Beach	ND	20U	2,756	No	No	9	9					
U	Bowman	ND	BPP	2,958	No	Yes	16	14	2				
U	Ekalaka[6]	MT	97M	3,503	No	No	3	3					
U	Harding-Buffalo	SD	9D2	2,889	No	No	4	4					
N	Miles City	MT	MLS	2,630	N	N	22	20	2				
Total Under and Near Proposed PR-3 MOA							82	74	6	1	1	0	0
Total Under Proposed PR-3 MOA							51	45	4	1	1	0	0

Table 3.1-3. Public Airports and Based Aircraft (Page 2 of 2)

Location[1]	*Airport (Proposed MOA)*	*State*	*Airport Designation*	*Elevation*	*Tower*	*Fixed Base Operator*	*Total Based Aircraft*[2]	AIRCRAFT TYPE					
								Single Engine	*Multi Engine*	*Jet*	*Helicopter*	*Military*	*Glider/ Ultralight*
Proposed PR-4[7] MOA Associated Public Airports and Based Aircraft													
N	Bismarck	ND	BIS	1,661	Yes	Yes	95	51	19	8		17	
U	Bison	SD	6V5	2,785	No	No	10	10					
N	Dickinson	ND	DIK	2,592	No	Yes	18	16	2				
U	Elgin[6]	ND	Y71	2,355	No	No	2	2					
N	Faith	SD	D07	2,582	No	Yes	7	6			1		
N	Glen Ullin	ND	D57	2,089	No	No	8	7					1
U	Hettinger	ND	HEI	2,705	No	Yes	25	24	1				
U	Lemmon	SD	LEM	2,571	No	Yes	11	10	1				
N	Mandan	ND	Y19	1,944	No	Yes	53	50	3				
U	McIntosh[6]	SD	8D6	2,251	No	No	NR						
U	Mott	ND	3P3	2,411	No	No	9	8			1		
Total Under and Near Proposed PR-4 MOA							238	184	26	8	2	17	1
Total Under Proposed PR-4 MOA							57	54	2	0	1	0	0
Proposed Gateway East and West ATCAAs Associated Public Airports and Based Aircraft													
U	Belle Fourche	SD	EFC	3,190	No	Yes	30	25	1				4
U	Black Hills	SD	SPF	3,931	No	Yes	64	56	5				3
U	Hulett	WY	W43	4,264	No	No	1	1					
N	Newcastle	WY	ECS	4,174	No	No	9	7	1				1
N	Rapid City	SD	RAP	3,204	Yes	Yes	125	80	27	4	4	10	
U	Sturgis	SD	49B	3,243	No	Yes	26	24	2				
U	Upton[6]	WY	83V	4,290	No	No	NR						
Total Under and Near Proposed Gateway ATCAA							255	193	36	4	4	10	8
Total Under Proposed Gateway ATCAA							121	106	8	0	0	0	7

Notes:
1. U = Under; N = Near
2. NR = none reported.
3. Proposed PR-1B includes Gap A data.
4. Database effective date: 2 July 2009 from fltplan.com
5. Proposed PR-3 includes Gap B data.
6. FAA information effective 11 February 2010 from airnav.com
7. Proposed PR-4 includes Gap C data.

Source: Source material (2008) from fltplan.com with exception of footnoted airports from airnav.com

Table 3.1-4. Private Airfields and Based Aircraft (Page 1 of 3)

Location[1]	*Airfield*	*State*	*Designation*	*Elevation*	*Tower*	*Fixed Base Operator*	*Total Based Aircraft*[2]	Aircraft Type					
								Single Engine	*Multi Engine*	*Jet*	*Helicopter*	*Military*	*Glider/ Ultralight*
Proposed PR-1A or PR-1B MOAs[3] Associated Private Airfield and Based Aircraft													
N	Ruff (Custer) (1A)	MT	MT34	2,740	No	No	1	1					
U	St. Labre (Ashland) (1B)	MT	3U4	2,909	No	No	NR						
N	Xingu (Dayton) (1B)	WY	99WY	4,340	No	No	NR						
Total Under and Near Proposed PR-1A/B MOAs							1	1	0	0	0	0	0
Total Under Proposed PR-1A/B MOAs							NR						
Proposed PR-2 MOA Associated Private Airfield and Based Aircraft													
U	Lanning (Alzada)	MT	MT50	3,995	No	No	1	1					
N	Madsen (Gillette)	WY	WY65	4,500	No	No	3	3					
Total Under and Near Proposed PR-2 MOA							4	4	0	0	0	0	0
Total Under Proposed PR-2 MOA							1	1	0	0	0	0	0
Proposed PR-3 MOA[4] Associated Private Airfield and Based Aircraft													
N	Boyd (Golva)	ND	0NA9	2,750	No	No	1	1					
U	Castleberry (Ekalaka)	MT	MT45	3,373	No	No	1	1					
U	Dilse (Scranton)	ND	NA98	2,878	No	No	3	2					1
U	Hagen (Reeder)	ND	14ND	2,810	No	No	1	1					
N	Hollstein (Wilbaux)	MT	MT20	2,778	No	No	2	2					
U	Laird Ranch (Ekalaka)	MT	MT05	3,462	No	No	3	2	1				
U	Sikorski Ranch (Ekalaka)	MT	MT74	3,330	No	No	2	2					
U	Sky Ranch (Camp Crook)	SD	SD33	3,200	No	No	3	2	1				
N	Sunday Creek (Miles City)	MT	MT29	2,490	No	Yes	6	6					

Table 3.1-4. Private Airfields and Based Aircraft (Page 2 of 3)

Location[1]	*Airfield*	*State*	*Designation*	*Elevation*	*Tower*	*Fixed Base Operator*	*Total Based Aircraft*[2]	AIRCRAFT TYPE					
								Single Engine	*Multi Engine*	*Jet*	*Helicopter*	*Military*	*Glider/ Ultralight*
with Proposed PR-3 MOA[4] Associated Private Airfield and Based Aircraft (continued)													
U	Swenson (Belfield)	ND	ND29	2,900	No	No	1	1					
U	Tennant Ranch (Camp Crook)	SD	SD76	3,090	No	No	1	1					
Total Under and Near Proposed PR-3 MOA							24	21	2	0	0	0	1
Total Under Proposed PR-3 MOA							15	12	2	0	0	0	1
Proposed PR-4 MOA[5] Associated Private Airfield and Based Aircraft													
N	Chase (Hebron)	ND	6NA5	2,140	No	No	3	3					
U	Dorsey (Glad Valley)	SD	1SD0	2,350	No	No	2	2					
N	Fitterer (Glen Ullin)	ND	06ND	2,180	No	No	NR						
N	Jurgens	ND	75ND	2,370	No	No	1	1					
U	VIG Limousin (Faith)	SD	1SD4	2,552	No	No	1	1					
Total Under and Near Proposed PR-4 MOA							7	7	0	0	0	0	0
Total Under Proposed PR-4 MOA							3	3	0	0	0	0	0
Proposed East and West Gateway ATCAAs Associated Private Airfield and Based Aircraft													
U	Barber (Enning)	SD	SD98	2,655	No	No	1	1					
U	Bruch Airfield (Sturgis)	SD	SD35	2,980	No	No	1	1					
U	Bruch Ranch (Sturgis)	SD	SD24	3,070	No	No	3	1					2
U	Ipy Ranch (Hulett)	WY	WY14	3,960	No	No	1	1					
U	Keyhole (Moorcroft)	WY	01WY	4,250	No	No	1	1					

Table 3.1-4. Private Airfields and Based Aircraft (Page 3 of 3)

Location[1]	*Airfield*	*State*	*Designation*	*Elevation*	*Tower*	*Fixed Base Operator*	*Total Based Aircraft*[2]	AIRCRAFT TYPE					
								Single Engine	*Multi Engine*	*Jet*	*Helicopter*	*Military*	*Glider/ Ultralight*
Proposed East and West Gateway ATCAAs Associated Private Airfield and Based Aircraft (continued)													
N	Paradise Valley (Nemo)	SD	2SD0	4,500	No	No	3	3					
U	Running Colors (Rapid City)	SD	3SD6	2,920	No	No	1	1					
U	Taylor Field (Sundance)	WY	WY55	4,950	No	No	1	1					
U	VIG (Opal)	SD	SD72	2,600	No	No	2	2					
Total Under and Near Proposed Gateway ATCAA							14	12	0	0	0	0	2
Total Under Proposed Gateway ATCAA							11	9	0	0	0	0	2

Notes:
1. U = Under; N = Near
2. NR = None reported.
3. Proposed PR-1B includes Gap A.
4. Proposed PR-3 includes Gap B.
5. Proposed PR-4 includes Gap C.

Source: Source material from airnav.com FAA information effective 11 Feb 2010

Table 3.1-5. Summary of Public Airports, Private Airfields, and Based Aircraft (Page 1 of 2)

Proposed Airspace	*Total Airports and Airfields*	*Total Based Aircraft*[1]	AIRCRAFT TYPE					
			Single Engine	*Multi Engine*	*Jet*	*Helicopter*	*Military*	*Glider/ Ultralight*
PR-1A MOA/ATCAA[2]								
Public Airport Totals Under and Near PR-1A	5	219	137	66	9	7	0	0
Public Airport Totals Under PR-1A	2	21	19	2	0	0	0	0
Private Airfield Totals Under and Near PR-1A	1	1	1	0	0	0	0	0
Private Airfield Totals Under PR-1A	0							
PR-1B MOA/ATCAA								
Public Airport Totals Under and Near PR-1B	1	93	62	22	3	4	0	2
Public Airport Totals Under PR-1B	0							
Private Airfield Totals Under and Near PR-1B	2							
Private Airfield Totals Under PR-1B	1							
PR-2 MOA/ATCAA								
Public Airport Totals Under and Near PR-2	3	55	47	6	1	0	0	1
Public Airport Totals Under PR-2	2	5	4	0	0	0	0	1
Private Airfield Totals Under and Near PR-2	2	4	4	0	0	0	0	0
Private Airfield Totals Under PR-2	1	1	1	0	0	0	0	0
PR-3 MOA/ATCAA[3]								
Public Airport Totals Under and Near PR-3	6	82	74	6	1	1	0	0
Public Airport Totals Under PR-3	4	51	45	4	1	1	0	0
Private Airfield Totals Under and Near PR-3	11	24	21	2	0	0	0	1
Private Airfield Totals Under PR-3	8	15	12	2	0	0	0	1
PR-4 MOA/ATCAA[4]								
Public Airport Totals Under and Near PR-4	11	238	184	26	8	2	17	1
Public Airport Totals Under PR-4	6	57	54	2	0	1	0	0
Private Airfield Totals Under and Near PR-4	5	7	7	0	0	0	0	0
Private Airfield Totals Under PR-4	2	3	3	0	0	0	0	

Table 3.1-5. Summary of Public Airports, Private Airfields, and Based Aircraft (Page 2 of 2)

Proposed Airspace	*Total Airports and Airfields*	*Total Based Aircraft*[2]	AIRCRAFT TYPE					
			Single Engine	*Multi Engine*	*Jet*	*Helicopter*	*Military*	*Glider/ Ultralight*
Proposed Gateway ATCAAs (included in Alternatives A, B, C)								
Public Airport Totals Under and Near Proposed Gateway ATCAAs	7	255	193	36	4	4	10	8
Public Airport Totals Under Proposed Gateway ATCAAs	5	121	106	8	0	0	0	7
Private Airfield Totals Under and Near Proposed Gateway ATCAAs	9	14	12	0	0	0	0	2
Private Airfield Totals Under Proposed Gateway ATCAAs	8	11	9	0	0	0	0	2
Totals								
Total Airports, Airfields, and Based Aircraft Under and Near the Proposed MOA/ATCAA Airspace	47	723	537	128	22	14	17	5
Total Airports, Airfields, and Based Aircraft Under the Proposed MOA/ATCAAs	26	153	138	10	1	2	0	2
Total Airports, Airfields, and Based Aircraft Under and Near Gateway ATCAAs	16	269	205	36	4	4	10	10
Total Airports, Airfields, and Based Aircraft Under Gateway ATCAAs	13	132	115	8	0	0	0	9
Total Airports, Airfields, and Based Aircraft Under and Near the Proposed Airspace	63	992	742	164	26	18	27	15
Total Airports, Airfields, and Based Aircraft Under Proposed Airspace	39	285	253	18	1	2	0	11

Notes: 1. Blank = None reported.
2. PR-1A includes Gap A.
3. PR-3 includes Gap B.
4. PR-4 includes Gap C.
Source: From Tables 3.1-3 and 3.1-4

Table 3.1-6. Public Airports and Annual Operations Associated with the Proposed PRTC (Page 1 of 2)

Location[1]	*Airport*	*State*	*Designation*	*Elevation*	*Total Annual Operations*	Annual Operations By Type				
						Transient	*Local*	*Air Taxi*	*Commercial*	*Military*
PR-1A MOA/ATCAA										
N	Billings	MT	BIL	3,652	92,319	31,608	20,016	26,805	13,453	437
U	Colstrip	MT	M46	3,426	5,750	3,000	2,000	750		
N	Fort Smith	MT	5U7	3,242	3,100	2,750	225	125		
U	Hardin	MT	F02	2,911	6,600	2,650	3,725	225		
N	Tillitt-Forsyth	MT	1S3	2,727	9,170	3,995	4,825	325		25
Totals					116,939	44,003	30,791	28,230	13,453	462
PR-1B MOA/ATCAA[2]										
N	Sheridan	WY	SHR	4,021	41,832	20,597	15,538	2,555	2,992	150
Totals					41,832	20,597	15,538	2,555	2,992	150
PR-2										
U	Belle Creek[3]	MT	3V7	3,678	550	200	350			
U	Broadus	MT	00F	3,280	5,350	500	4,750	100		
N	Gillette	WY	GCC	4,365	22,218	9,680	5,640	6,819	35	44
Totals					28,118	10,380	10,740	6,919	35	44
PR-3 MOA/ATCAA[4]										
U	Baker	MT	BHK	2,975	7,000	1,400	5,300	300		
N	Beach	ND	20U	2,756	1,170	300	800	60		10
U	Bowman	ND	BPP	2,958	4,140	2,000	1,500	600		40
U (Gap B)	Ekalaka[5]	MT	97M	3,503	2,028	1,500	487	41		
U (Gap B)	Harding-Buffalo	SD	9D2	2,889	2,300	400	1,900			
N	Miles City	MT	MLS	2,630	11,200	4,800	3,200	3,200		
Totals					27,838	10,400	13,187	4,201	0	50
PR-4 MOA/ATCAA[6]										
N	Bismarck	ND	BIS	1,661	46,472	19,438	10,208	8,926	2,973	4,927
U	Bison	SD	6V5	2,785	5,500	500	5,000			
N	Dickinson	ND	DIK	2,592	8,673	3,000	2,852	1,528	1,191	102
U	Elgin[7]	ND	Y71	2,355	160	101	40	19		
N	Faith	SD	D07	2,582	2,700	1,200	1,500			

Table 3.1-6. Public Airports and Annual Operations Associated with the Proposed PRTC (Page 2 of 2)

Location[1]	*Airport*	*State*	*Designation*	*Elevation*	*Total Annual Operations*	*Transient*	*Local*	*Air Taxi*	*Commercial*	*Military*
PR-4 MOA/ATCAA[6] **(continued)**										
N	Glen Ullin	ND	D57	2,089	860	500	300	50		10
U	Hettinger	ND	HEI	2,705	4,450	1,500	2,500	400		50
U	Lemmon	SD	LEM	2,571	12,500	2,500	10,000			
N	Mandan	ND	Y19	1,944	24,740	8,000	15,000	1,140		600
U	McIntosh[8]	SD	8D6	2,251	70	50	20			
U	Mott	ND	3P3	2,411	1,690	600	1,000	50		40
Totals					107,815	37,389	48,420	12,113	4,164	5,729
Proposed Gateway ATCAAs										
U	Belle Fourche	SD	EFC	3,191	12,112	2,100	10,000			12
U	Black Hills[9]	SD	SPF	3,931	27,600	10,000	16,000	1,500		100
U	Hulett	WY	W43	4,264	400	100	300			
N	Newcastle	WY	ECS	4,174	4,500	2,200	2,100	100		100
N	Rapid City	SD	RAP	3,204	40,896	7,223	15,912	10,878	4,479	2,404
U	Sturgis	SD	49B	3,243	23,000	7,800	15,000	200		
U	Upton[10]	WY	83V	4,290	8		8			
Totals					108,516	29,423	59,320	12,678	4,479	2,616
Grand Totals					431,058	152,192	177,996	66,696	25,123	9,051

Notes:
1. U = Under; N = Near
2. PR-1B includes Gap A data.
3. Database effective date: 02 July 2009 from fltplan.com
4. PR-3 includes Gap B data.
5. FAA information effective 11 February 2010 from airnav.com; operations for 12-month period ending 12 July 2006.
6. PR-4 includes Gap C data.
7. FAA information effective 11 February 2010 from airnav.com; operations for 12-month period ending 06 December 1999.
8. FAA information effective 11 February 2010 from airnav.com; operations for 12-month period ending 08 September 2008.
9. Period covered 20 May 2007 to 20 May 2008.
10. FAA information effective 11 February 2010 from airnav.com; operations for 12-month period ending 31 July 2008.

Table 3.1-7. Private Airfields and Estimated Annual Operations Associated with the Proposed PRTC

Location[1]	*Airport*	*State*	*Designation*	*Elevation*	*Total*[2] *Annual Operations*
PR-1A					
N	Ruff (Custer) (1A)	MT	MT34	2,740	440
PR-1B					
U	St. Labre[3] (Ashland) (1B)	MT	3U4	2,909	600
N	Xingu (Dayton) (1B)	WY	99WY	4,340	440
PR-2					
U	Lanning (Alzada)	MT	MT50	3,995	440
N	Madsen (Gillette)	WY	WY65	4,500	1320
PR-3					
N	Boyd (Golva)	ND	0NA9	2,750	440
U	Castleberry (Ekalaka)	MT	MT45	3,373	440
U	Dilse (Scranton)	ND	NA98	2,878	1320
U	Hagen (Reeder)	ND	14ND	2,810	440
N	Hollstein (Wilbaux)	MT	MT20	2,778	880
U	Laird Ranch (Ekalaka)	MT	MT05	3,462	1320
U	Sikorski Ranch (Ekalaka)	MT	MT74	3,330	880
U	Sky Ranch (Camp Crook)	SD	SD33	3,200	1320
N	Sunday Creek (Miles City)	MT	MT29	2,490	2640
U	Swenson (Belfield)	ND	ND29	2,900	440
U	Tennant Ranch (Camp Crook)	SD	SD76	3,090	440
PR-4					
N	Chase (Hebron)	ND	6NA5	2,140	1320
U	Dorsey (Glad Valley)	SD	1SD0	2,350	880
N	Fitterer (Glen Ullin)	ND	06ND	2,180	440
N	Jurgens (Taylor)	ND	75ND	2,370	440
U	VIG Limousin (Faith)	SD	1SD4	2,552	440
Gateway ATCAAs					
U	Barber (Enning)	SD	SD98	2,655	440
U	Bruch Airfield (Sturgis)	SD	SD35	2,980	440
U	Bruch Ranch (Sturgis)	SD	SD24	3,070	1320
U	Ipy Ranch (Hulett)	WY	WY14	3,960	440
U	Keyhole (Moorcroft)[4]	WY	01WY	4,250	1,612
N	Paradise Valley (Nemo)	SD	2SD0	4,500	1320
U	Running Colors (Rapid City)	SD	3SD6	2,920	440
U	Taylor Field (Sundance)	WY	WY55	4,950	440
U	VIG (Opal)	SD	SD72	2,600	880

Notes: 1. U = Under; N = Near
2. Estimated based on average of 440 annual operations per based aircraft reported at public airports under the proposed airspace.
3. For 12-month period ending 11 July 2006
4. For 12-month period ending 24 June 1984

Source material: FAA information effective 11 February 2010 from airnav.com

Table 3.1-8. Instrument Approaches Into Colstrip Airport

	Commercial	*Air Taxi*	*General Aviation*	*Military*	*Total Monthly*
April 2009	0	35	5	2	42
March 2009	0	14	2	2	18
February 2009	0	16	4	1	21
January 2009	0	25	5	4	34

Two public airports underlie the existing Powder River A/B MOAs and the proposed PR-2 MOAs: Broadus and Belle Creek, MT. Private airfields Laird, Castleberry, Sikorski, and Lanning, MT; and Camp Crook and Sky, SD, are also located under the PR-2 MOA. There is no controlled airspace associated with any of these public or private operations. Aeronautical charts reflect that the floor of the MOA is restricted to 1,500 feet AGL in the vicinity of these airports. Average daily traffic within the proposed PR-2 MOA from 500 feet AGL to 17,999 feet MSL is approximately 6 flights (Table 3.1-9). The combined average daily operations reported from public airports under the existing Powder River A and B MOAs is approximately 17 operations (Table 3.1-6) at 365 days per year.

The Broadus Airport is on the edge of the existing Powder River A MOA.

The proposed PR-3 MOA overlies two public airports with associated controlled airspace above 700 feet AGL: Baker, MT and Bowman, ND. Four private airfields underlie the proposed PR-3 MOA: Dilse, Folske, McGee, and Swenson, ND. Average daily traffic count transiting the proposed PR-3 MOA from 500 feet AGL to 17,999 feet MSL is 3 (Table 3.1-9). Assuming 365 flying days per year, the combined average daily operations reported from public airports under the proposed PR-3 MOA is approximately 3 operations (Table 3.1-6).

There are two public airports beneath the proposed PR-4 MOA with controlled airspace above 700 feet AGL: Lemmon and Hettinger, ND. Smaller public airports which underlie the airspace include Bison and McIntosh, SD; and Mott and Elgin, ND. Average traffic transiting the proposed MOA from 500 feet AGL to 17,999 feet MSL is approximately 12 (Table 3.1-9). Assuming 365 flying days per year, the combined average daily operations reported from public airports under the proposed PR-4 MOA is 67 operations (Table 3.1-6).

The proposed Gap B MOA overlies the Ekalaka, MT and Harding County, SD public airports. The proposed Gap C MOA overlies the two private airfields of Carr, SD, and Hagen, ND.

Public airports and private airfields under the proposed PRTC generally support small communities, ranches, agricultural applications, medical services, cloud seeding (where permitted), oil and gas exploration, and recreation, including hunting. The larger regional airports outside the proposed PRTC include regularly scheduled airline service at Billings, MT; Bismarck, ND; and Rapid City, SD. Other airports on the periphery of the proposed PRTC have had intermittent commercial flight services.

Public airports and private airfields under and near to the proposed MOAs had approximately 723 based aircraft reported in February 2010 (see Tables 3.1-3 and 3.1-4). Of these based aircraft, 153 were reported at public airports or private airfields under the proposed PRTC MOAs. There were 5 reported aircraft based at public airports under the existing Powder River A or B MOAs (Table 3.1-3).

Glider operations occur infrequently at the Belle Fourche, SD airport, but no soaring club or organized group utilizes the airport. The Black Hills Soaring Club previously operated out of the airport on a regular basis, but has recently moved operations south to the Hot Springs airport. Gliders prefer to fly in Class E airspace. Techniques for seeing and avoiding other aircraft are a required practice, especially when joining, soaring, and ridge soaring. Gliders that are not transponder equipped generally monitor applicable frequencies to allow others to know of their location and intentions while in-flight. Sky diving operations occur infrequently at a few of the small airports under the proposed airspace; no organized groups maintain a club or regularly schedule sky diving events.

3.1.3.5 Other Civil Operations

Commercial and general aviation throughout the ROI is diversified. Flight activities include airline operations, cargo, aerial agricultural application, air charter, flight instruction, air ambulance, flying doctors, recreational flying, law enforcement, wildlife aerial surveillance, predator control, aerial photographic mapping, fire surveillance, fire suppression, and tourism.

This section identifies representative users of the airspace in the area potentially affected by the Proposed Action or any alternative. These examples are not all-inclusive but demonstrate the level and diversity of flight activity in southeastern MT, southwestern ND, northwestern SD, and northeastern WY.

3.1.3.4.1 Commercial Carriers in the ROI

Section 3.1.3.3.2 describes the high-altitude and jet route users of the airspace either transiting the airspace en route or as commercial carrier destinations. Section 3.1.3.3.3 summarizes airport activities. This section describes the activity of commercial carriers within the ROI. Table 3.1-6 presents the annual commercial operations by public airports associated with the proposed PRTC within the ROI. There are no public airports with scheduled commercial flights under the proposed PRTC airspace.

Other Commerce

Regional air cargo service is provided by United Parcel Service and Federal Express. Typical cargo is time sensitive and related to farm parts, medical supplies, or legal documents.

Utility companies have aviation departments which fly power line and pipeline patrols monthly to quarterly at low altitudes below 6,000 feet MSL (approximately 2,000 feet AGL). Contractor and engineering firms and states perform aerial county mapping at low altitudes. Weather modification flights, such as those in ND, have to rapidly respond to appropriate meteorological conditions to fulfill rainfall enhancement contracts. Fixed Base Operators are businesses on airports which provide one or more aeronautical services. These services can be aircraft maintenance, flight instruction, aerial surveillance, aircraft fuel sales, aerial photo, aircraft rental, flight information, and other related services. Fixed Base Operators are listed by airport under each proposed PRTC MOA in Tables 3.1-3 and 3.1-4. Aircraft based at airports in the ROI which do not have Fixed Base Operators typically transit to Fixed Base Operator airports for routine service.

Air taxi and air charter services operate throughout the ROI. Air taxi firms provide charters for businesses, hunters, fishermen, medical staff and others. Most charter aircraft are twin-engine propeller or medium business jet aircraft with GPS and very high frequency omni-directional radio range/instrument landing system (ILS) navigational equipment. These aircraft usually operate IFR. Regular air taxi services include student transport contracts with, for example, the ND School for Deaf, to take students to and from home for weekends. Transient charter companies use regional airports for fuel stops and other servicing.

3.1.3.4.2 Agriculture, Game Management, and Recreation

Farm operation flights typically use VFR and fly direct routes and altitudes for efficiency. Agricultural flight activities with aircraft and helicopters support farming operations with aerial application of herbicide, insecticide, fungicide, and other crop protection. An estimated 40 aerial application private and commercial firms are located on both public airports and private airfields within the ROI. Aerial application firms operate aircraft within the ROI with an estimated annual total of 10,000 annual aircraft operations. The trade area for spraying is typically 80 to 100 miles from the spraying aircraft base location. Applicator flights are below 500 feet AGL. Applications typically fly 500 feet AGL during transit although weather conditions could require transit flights up to 2,000 feet AGL. Public commentors during scoping expressed concerns that application aircraft flying to fields are low to the ground, at very near gross weight, and have little ability to maneuver or adjust to a random flight or wake turbulence of a large military aircraft.

State Game and Fish and U.S. Fish and Wildlife (USFWS) flight operations include aerial surveillance, wetland surveys, predator control, and game counting patrols for operations. Activities such as wetland surveys can only be conducted at specified weather and at altitudes to ensure year-to-year consistency of survey data. Most game management flights are in the 1,000 to 3,000 feet AGL range; although cross country flights and aerial surveillance can occur day or night to 10,000 feet MSL. Digital aerial photography of cities, towns, and highways are often flown at established altitudes at or above 2,000 feet AGL or 6,000 feet MSL.

Pleasure flying, proficiency training, and agriculture-related flights occur throughout the ROI. Farmers and ranchers conduct aerial observation of farms, cattle, fences, and predator control at altitudes below 3,000 feet AGL. Recreational hunting is a substantial regional industry and essentially constitutes a "cash crop" for ranchers, local service industries, and aircraft operating out of private airfields and public airports. Flight transport of hunters before and during hunting season is a regionally important economic activity.

3.1.3.4.3 Emergency and Related Services

Air ambulance and life flight services support rural health care facilities throughout the ROI. Most ROI hospitals have access to airfields to support air emergency transport of critical patients. Ground ambulances can connect with air ambulances at rural airports and transfer critical patients to regional medical facilities. Air ambulance services in the region can be fixed-wing aircraft or helicopters.

Hospitals which are part of the regional air ambulance service are normally connected to airports with GPS or IFR approach procedures. Medical services include flights to transport medical personnel between urban and rural hospitals. Flying doctors provide rural health care to small towns in portions of the ROI. Medical specialists fly from large cities to rural community hospitals usually between 8 a.m. and 6 p.m. Flight operations are scheduled by the day and normally operate on IFR about 10,000 feet MSL, depending on weather conditions. Aircraft are normally in the light, twin-engine class with IFR equipment.

Emergency flight activities also include firefighting. Fires from lightning or other causes can result in potentially damaging range fires. In such situations, aerial spotter aircraft, aerial tankers, and helicopters may be employed to support ground firefighting equipment. Ellsworth AFB and the Montana Bureau of Land Management have a Memorandum of Understanding establishing training temporary flight restrictions to support firefighting activity (BLM-MOU-MT925-1001 approved 7 October 2009)

3.1.3.6 FAA Airspace Usage Data

This section presents FAA data of existing airspace usage within the ROI. FAA traffic counts are for a representative winter period, December 1 through December 8, 2008, and for a representative spring to summer period, May 5 through May 12, 2009. The traffic counts provide data with eight day total and daily average flights for each of the potentially affected airspaces. For the purpose of this Environmental Impact Statement (EIS), the FAA traffic counts for the proposed PR-2 MOA represent baseline conditions for the Powder River A and B MOAs. Daily flight activity in Class A airspace can be the result of seasonal variation, convection and re-routing, and/or flow control as described in Section 3.1.3.3.2. The data in Table 3.1-9 represents primarily IFR flights in MOAs. Due to limitations on radar coverage, the data do not capture all flight activity.

The FAA representative day average civil flights by hour are listed by altitude segment for the proposed PRTC airspaces on Figures 3.1-7, 3.1-8, 3.1-9, 3.1-10, 3.1-11, and 3.1-12. The hourly data include all ATCAA flight activity and available MOA activity. The existing radar and communication infrastructure is not able to track most MOA flights at lower altitudes. All aircraft above FL180 can be tracked. Figures 3.1-10 and 3.1-11 demonstrate that the large majority of the commercial traffic on jet routes, as noted in Section 3.1.3.3.2, is above FL260. Figure 3.1-12 data demonstrate that the higher altitude commercial traffic above FL370 also traverses the proposed PRTC airspace particularly in the afternoon and evening.

Figures 3.1-13 through 3.1-16 and 3.1-19 through 3.1-21 demonstrate that much of the MOA traffic captured on FAA data represents traffic traversing the proposed MOA airspaces. This would suggest that civilian VFR traffic with an origin or destination within the airspace is not being tracked in Table 3.1-9. Table 3.1-6 presents the total reported operations for public airports. Table 3.1-10 compares that data with the FAA tracked aircraft for the respective airspaces. PR-1A and PR-1B have been grouped for Table 3.1-10.

Table 3.1-10 provides an estimate of MOA IFR and VFR traffic. IFR average daily traffic from the FAA data are rounded up from Table 3.1-9 and all annually reported operations from the public airports are also counted (see Table 3.1-6). Annual operations from private airfields are from Table 3.1-7.

Table 3.1-10 inherently assumes that the flights originating from or traveling to airports or airfields under the proposed airspace are not included in the FAA data. This conservative assumption has the potential to overstate the number of aircraft operations in the respective airspaces. Table 3.1-10 inherently also assumes that FAA data capture the MOA en route traffic. This assumption potentially underestimates the VFR traffic in the airspace. The use of average operations by based aircraft for the private airfield means that operations of some airfields are overestimated and at others are underestimated. The private airfield average is based on reported public airports under the airspace and it is likely that the public operations are reasonably representative.

The assumption of 365 flying days a year overstates the number of annual flying days but also overestimates the number of civilian flight operations during weekdays because it does not account for high-use on weekends and holidays. Public scoping comments referred to “Sunday fliers” or pilots who are generally out enjoying the country, especially on weekends with nice weather conditions. Table 3.1-10 distributes reported and estimated operations throughout the year and does not account for an increased proportion of civilian fliers during weekends or holidays when the proposed PRTC MOAs would typically not be activated for military training. This represents a potential overstatement of the civilian flight operations in a MOA on a typical military training day.

Table 3.1-11 presents FAA documented ATCAA traffic by airspace. As described in Section 3.1.3.1, Class A airspace is controlled airspace and the FAA data present the representative daily traffic in the respective low, medium, and high proposed ATCAAs. From Table 3.1-11, baseline traffic counts for the

PR-2 ATCAA represent baseline conditions for the Powder River ATCAA to FL260. FAA traffic counts for the Gateway ATCAA baseline conditions are reflected in Table 3.1-11 as the Gateway West and East ATCAAs to FL260. Baseline or existing condition FAA traffic counts for the Crossbow ATCAA are represented in Table 3.1-11 by flight activity in the proposed PR-2 ATCAA above FL260 and the proposed Gateway ATCAAs above FL260.

Table 3.1-9. FAA MOA Traffic Counts

		REPRESENTATIVE DAILY TRAFFIC			
		December 08		May 09	
Proposed MOA	***Altitude***	***8 Days***	***Average/ Day***	***8 Days***	***Average/ Day***
PR-1A Low	500 feet AGL to, but not including, 12,000 feet MSL	16	2.00	17	2.13
PR-1A High	12,000 feet MSL to, but not including, FL180	31	3.88	33	4.13
PR-1B	500 feet AGL to, but not including, FL180	82	10.25	84	10.50
PR-2	500 feet AGL to, but not including, FL180	47	5.88	39	4.88
PR-3 Low	500 feet AGL to, but not including, 12000 feet MSL	6	0.75	7	0.88
PR-3 High	12,000 feet MSL to, but not including, FL180	15	1.88	16	2.00
PR-4 Low	500 feet AGL to, but not including 12,000 feet MSL	28	3.5	17	2.13
PR-4 High	12,000 feet MSL to, but not including, FL180	63	7.88	78	9.75
Gap A Low	500 feet AGL to, but not including 12,000 feet MSL	10	1.25	16	2.00
Gap A High	12,000 feet MSL to, but not including, FL180	41	5.13	46	5.75
Gap B Low	500 feet AGL to, but not including, 12,000 feet MSL	6	0.75	6	0.75
Gap B High	12,000 feet MSL to, but not including, FL180	9	1.13	11	1.38
Gap C Low	500 feet AGL to, but not including, 12,000 feet MSL	26	3.25	17	2.13
Gap C High	12,000 feet MSL to, but not including, FL180	24	3.00	37	4.63

Source: FAA Performance Data Analysis and Reporting System (PDARS) data for 1-8 December 2008 and 5-12 May 2009.

Table 3.1-10. Estimated Daily Civilian Operations in the Proposed MOAs

	ESTIMATED DAILY CIVILIAN FLIGHT OPERATIONS			
Proposed MOA	***FAA IFR[1]***	***Public Airports Under Airspace Reported Operations [2]***	***Private Airfields Under Airspace Estimated Operations[3]***	***Estimated Total Daily Average Civilian Operations***
PR-1A/1B	17	34	2	53
PR-2	6	17	2	25
PR-3	3	31	18	52
PR-4	12	67	4	83
Gap A	8	0	0	8
Gap B	2	12	0	14
Gap C	7	0	0	7

Notes: 1. Data derived from Table 3.1-9, rounded up from highest daily average.
2. Data derived from Table 3.1-6, airports under airspace; annual (365 days) rounded up.
3 Data derived from Table 3.1-7, based on public airport operations per based aircraft; annual (365 days) rounded up.

Table 3.1-11. FAA ATCAA Traffic Counts

ATCAA	Altitude	Representative Daily IFR Traffic			
		December 08		May 09	
		8 Days	Average/ Day	8 Days	Average/ Day
PR-1A Low	FL180 to, but not including, FL260	34	4.25	32	4.00
PR-1A Medium	Above FL260, but not including, FL370	203	25.38	211	26.38
PR-1A High	Above FL370	175	21.88	209	26.13
PR-1B Low	FL180 to, but not including, FL260	48	6.00	46	5.75
PR-1B Medium	Above FL260, but not including, FL370	303	37.88	315	39.38
PR-1B High	Above FL370	261	32.63	312	39.00
PR-2 Low	FL180 to, but not including, FL260	100	12.50	75	9.38
PR-2 Medium	Above FL260, but not including, FL370	474	59.25	494	61.75
PR-3 High	Above FL370	266	33.25	384	48.00
PR-4 Low	FL180 to, but not including, FL260	67	8.38	76	9.50
PR-4 Medium	Above FL260, but not including, FL370	517	64.63	584	73.00
PR-4 High	Above FL370	437	54.63	562	70.25
Gap A Low	FL180 to, but not including, FL260	55	6.88	47	5.88
Gap A Medium	Above FL260, but not including, FL370	421	52.63	421	52.63
Gap A High	Above FL370	401	50.13	468	58.50
Gap B Low	FL180 to, but not including, FL260	83	10.38	81	10.13
Gap B Medium	Above FL260, but not including, FL370	229	28.63	224	28.00
Gap B High	Above FL370	188	23.50	219	27.38
Gap C Low	FL180 to, but not including, FL260	44	5.50	64	8.00
Gap C Medium	Above FL260, but not including, FL370	277	34.63	334	41.75
Gap C High	Above FL370	253	31.63	349	43.63
Gateway West Low	FL180 to, but not including, FL260	93	11.63	125	15.63
Gateway West Medium	Above FL260, but not including, FL370	373	46.63	373	46.63
Gateway West High	Above FL370	354	44.25	382	47.75
Gateway East Low	FL180 to, but not including, FL260	136	17.00	188	23.50
Gateway East Medium	Above FL260, but not including, FL370	587	73.38	655	81.88
Gateway East High	Above FL370	557	69.63	651	81.38

Source: FAA PDARS data for 1-8 December 2008 and 5-12 May 2009.

In general, the average daily IFR traffic for the FAA two representative time periods is within nine daily overflights of each other below FL370. Above FL370, the daily difference for the two periods can be up to 16 flights per day.

Lower altitude traffic on the Victor Airways and otherwise throughout the airspace is depicted on Figures 3.1-7 through 3.1-9. This lower altitude traffic frequently takes advantage of GPS capabilities to fly direct routing rather than use Victor Airways, as demonstrated on Figure 3.1-13, 3.1-14, and 3.1-15.

Figures 3.1-13 through 3.1-18 present the "spaghetti chart" mapping of flight operations during winter for traffic below 4,000 feet MSL (Figure 3.1-13) to above FL370 (Figure 3.1-18). The charted flight paths depict a 48 hour representative winter period from 20-22 February 2008. The flight paths show the maneuvering B-1 winter training loops in the existing Powder River MOAs and associated ATCAAs in Figures 3.1-14 through 3.1-16. The Powder River A and B MOAs essentially represent the proposed PR-2 MOA.

The FAA flight paths from Figures 3.1-13 through 3.1-18 demonstrate the relatively congested area around Billings International Airport on the west side of the proposed airspace and around Bismarck Airport on the east side of the proposed airspace. Figure 3.1-13 and Figure 3.1-14 show a concentration of flight paths from Billings airport to the east and a comparison with Figures 3.1-9 and 3.1-10 demonstrates that some Billings flights may be below FL180 until approximately 35 NM east of Billings. Some aircraft may not be above FL270 until nearly 50 NM east of Billings.

Figures 3.1-19 through 3.1-24 present the summer flight paths for the altitude below 4,000 feet MSL (Figure 3.1-19) to above FL370 (Figure 3.1-24). The charted flight paths depict a 48 hour representative winter period from 20-22 February 2008. Figures 3.1-20, 3.1-21, and 3.1-22 show the B-1 maneuvering summer training loop patterns within the existing Powder River MOAs. Figure 3.1-20 presents the existing B-1 training and maneuvering between 4,000 MSL and 10,000 MSL. Figure 3.1-21 presents the existing B-1 training and maneuvering between 10,000 feet MSL and FL180, and Figure 3.1-22 shows the B-1 training between FL180 and FL260. Commercial flights dominate the flight paths above FL260, with an apparent greater density of commercial and other high-altitude flights between FL260 and FL370 (Figure 3.1-23) than above FL370 (Figure 3.1-24).

The baseline traffic counts for the MOAs presented on Figures 3.1-7 through 3.1-9 represent the best available FAA documented MOA flight activity. These data do not represent the VFR traffic within the airspace. Public scoping commentors expressed concern that existing VFR traffic would not be adequately represented in the available data because VFR traffic could not be tracked with available FAA infrastructure. The number of based aircraft and reported operations for public airports and the reported number of based aircraft at private airfields suggests that lower altitude civilian flight operations below 10,000 feet MSL are underrepresented in the FAA data. A comparison of flight paths below 4,000 feet MSL in Figures 3.1-13 and 3.1-19 with civil flight operations reported in Table 3.1-6 and estimated in Table 3.1-7 supports the public scoping comments that lower altitude VFR flights are not captured in the FAA data. Table 3.1-10 presents estimated MOA traffic using reported operational data from airports and estimated operations from airfields under the respective airspaces. This approach aggregates all available information with the FAA data presented in Table 3.1-9 and in Figures 3.1-7 through 3.1-9. Table 3.1-10 adds the daily average FAA flight traffic data in the MOAs to the daily average flight traffic derived from the reported public airport operations on Table 3.1-6. Table 3.1-10 includes the estimated private airfield operations by applying the average public airport annual operations per based aircraft at the private airfields. These operations are derived from Table 3.1-7.

Table 3.1-10, with all the above inherent assumptions, does suggest that the FAA data captures an estimated 32 percent of the traffic in PR-1A/1B, 24 percent of the traffic in PR-2, 6 percent of the traffic in PR-3, and 15 percent of the traffic in PR-4.

The calculation distributes the estimated IFR and VFR daily traffic from Table 3.1-10 proportionate to the hourly data where FAA data are expected to be most complete in the proposed PR-1A/B MOAs. The PR-1A and PR-1B MOA data by altitude and by hour capture approximately 32 percent of the total traffic count estimated in Table 3.1-10. An estimate of the distribution of IFR and VFR by time of day and altitude can be made by applying the PR-1A/1B MOA hourly and altitude distribution percentages to the estimated IFR and VFR traffic by airspace from Table 3.1-10 and Figures 3.1-7, 3.1-8, and 3.1-9.

Existing airspace in the ROI is characterized by lower altitude flights, typically below FL180 and often below 10,000 feet MSL. These flights are conducted for a variety of activities ranging from chartered just in time delivery of machine parts or personnel to a large mining or ranching operation to weekend pleasure flying in the wide open spaces. Airspace use above FL180, and especially above FL260, consists of relatively heavily traveled commercial routes connecting coastal and inland airport hubs.

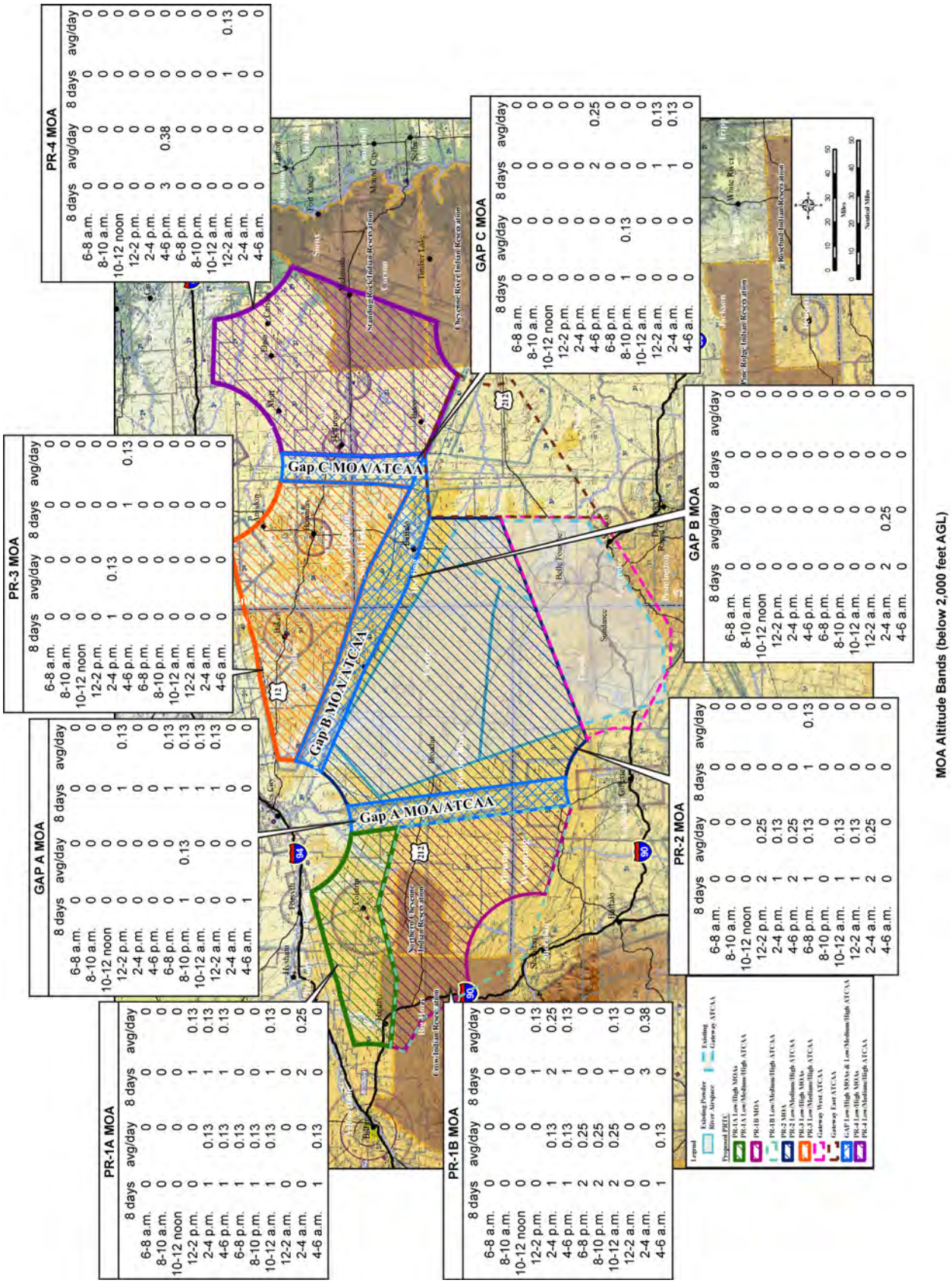


Figure 3.1-7.MOA Average Daily FAA Documented Aircraft Operations Below 2,000 Feet AGL

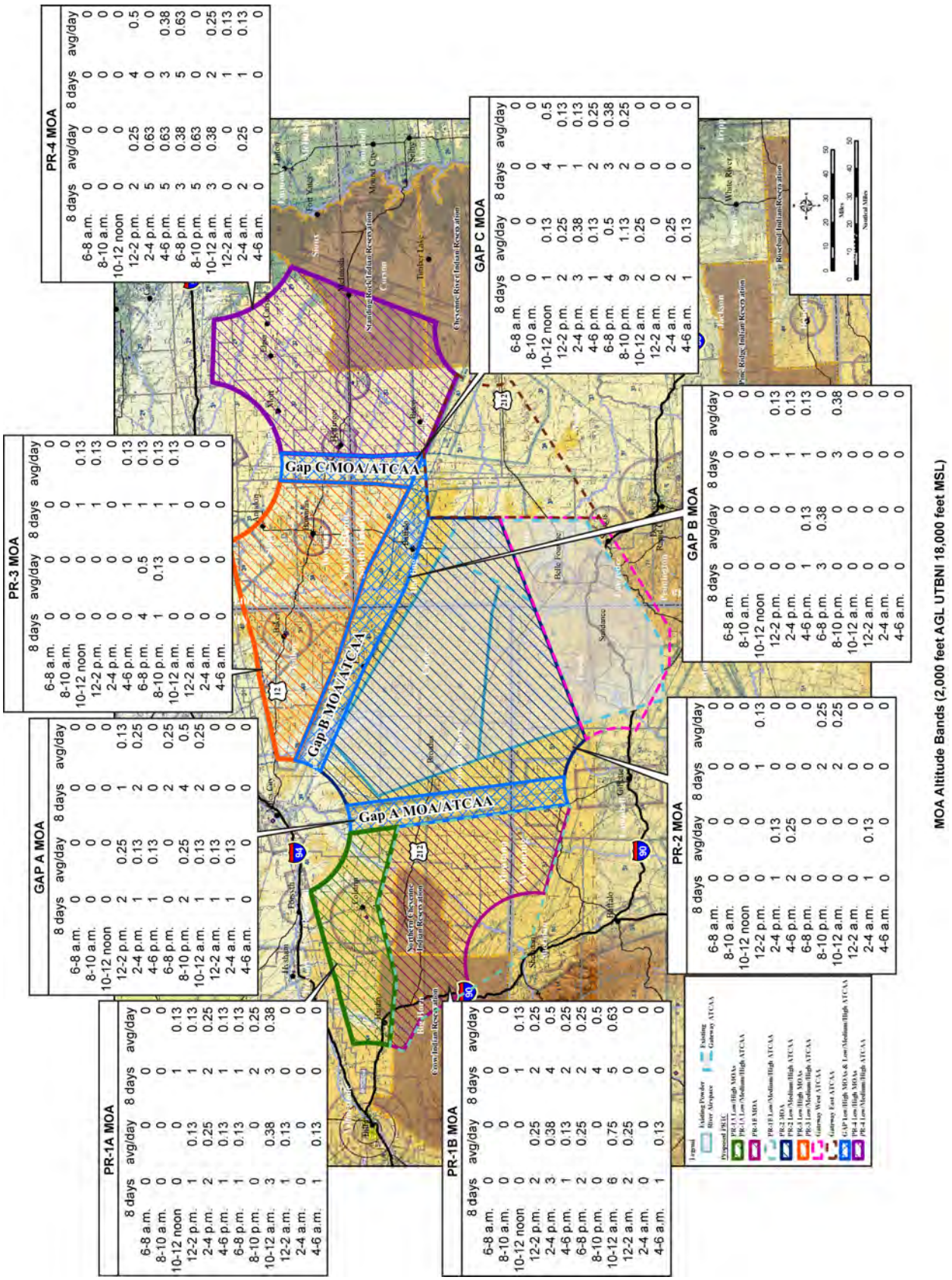


Figure 3.1-8. MOA Average Daily FAA Documented Aircraft Operations from 2,000 Feet AGL to, but not including, 12,000 Feet MSL

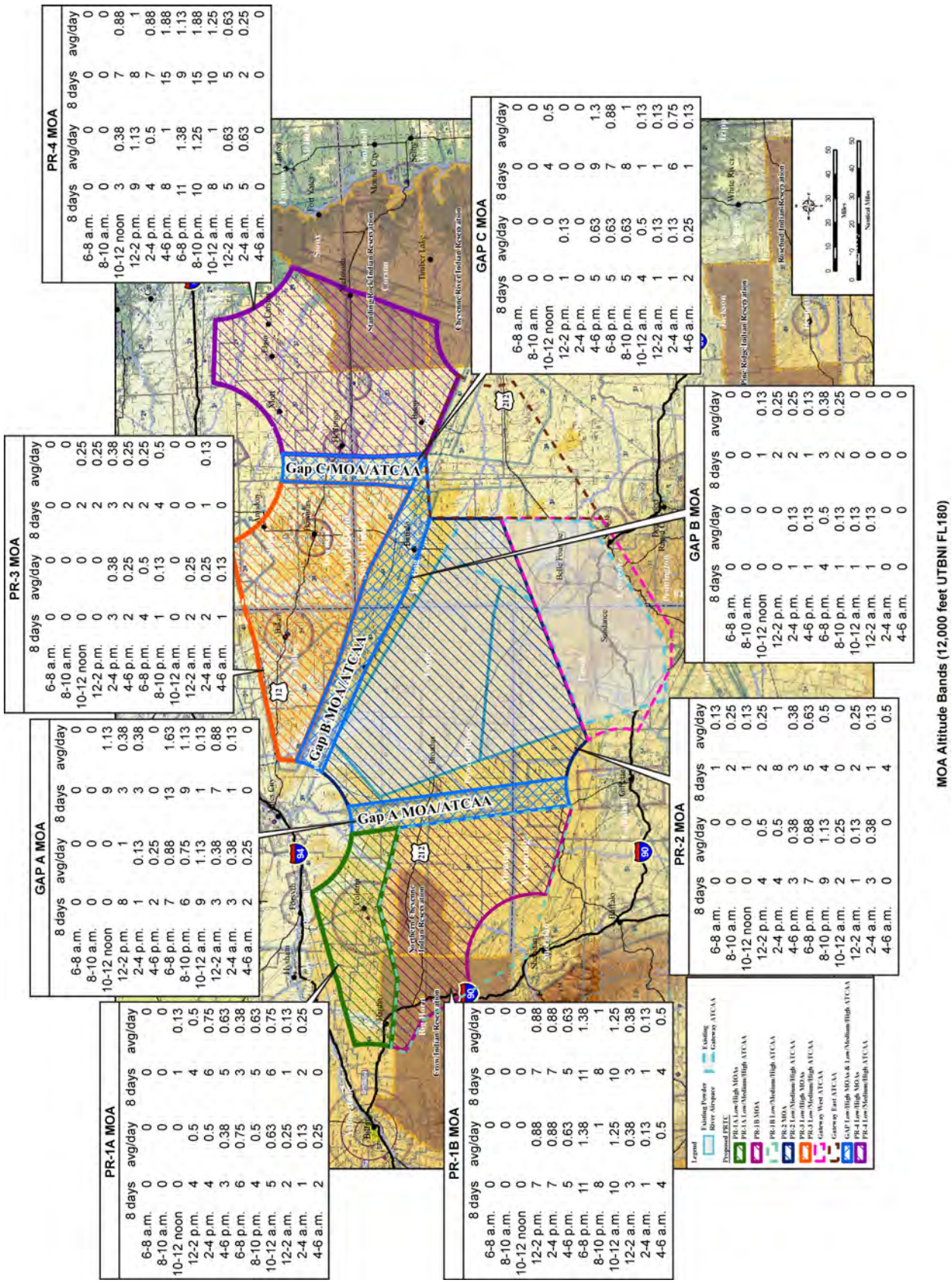
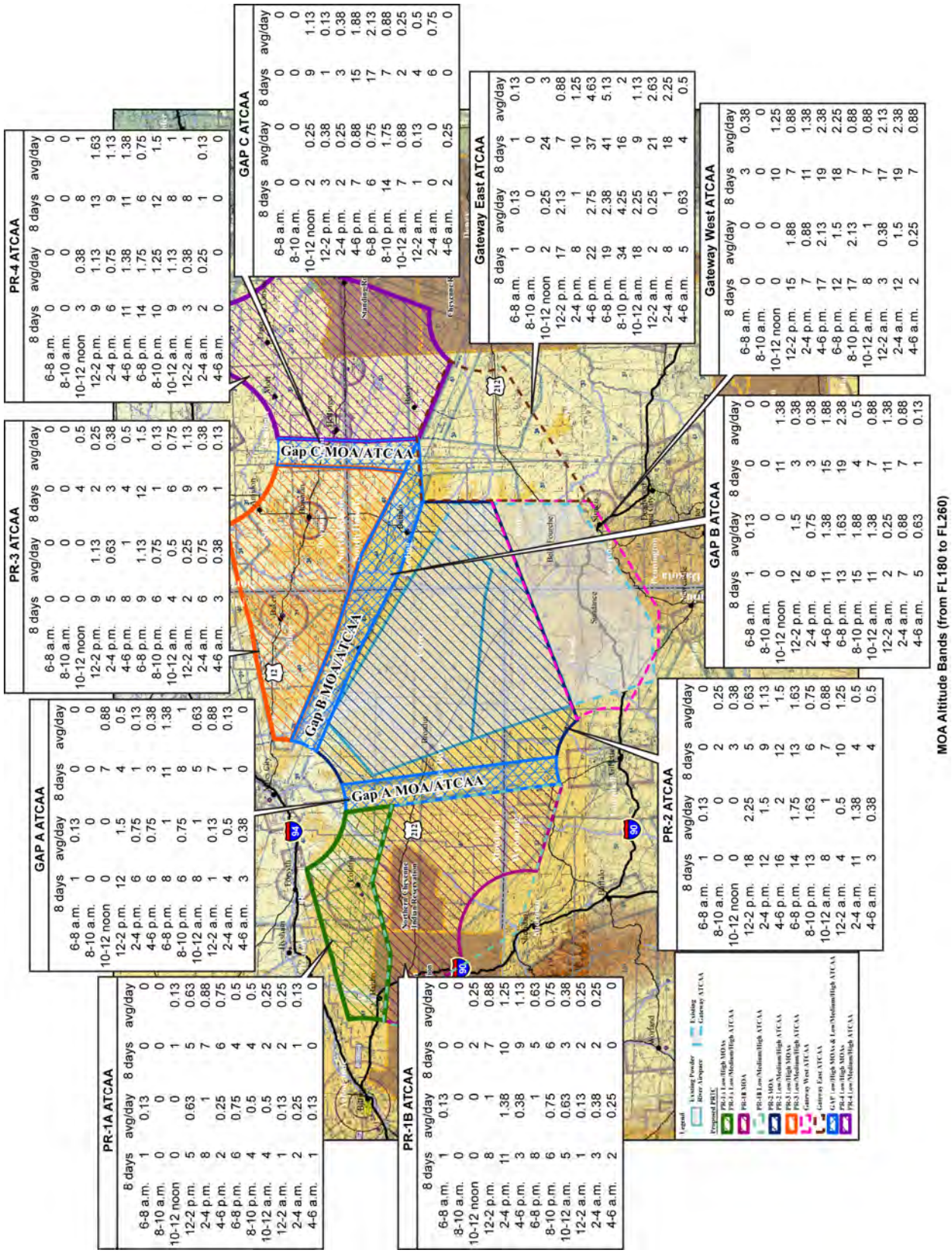


Figure 3.1-9. MOA Average Daily FAA Documented Aircraft Operations from 12,000 Feet MSL To, But Not Including, FL180.



PR-1A ATCAA																							
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	1	0.13	0	0	1	0.13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8-10 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-12 noon	0	0	1	0.13	6	0.75	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12-2 p.m.	5	0.63	5	0.63	8	1	6	0.75	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2-4 p.m.	8	1	7	0.88	2	0.25	6	0.75	5	0.63	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4-6 p.m.	2	0.25	6	0.75	6	0.75	8	1	7	0.88	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6-8 p.m.	6	0.75	4	0.5	4	0.5	8	1	1	0.13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8-10 p.m.	4	0.5	4	0.5	2	0.25	4	0.5	4	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-12 a.m.	4	0.5	2	0.25	2	0.25	2	0.25	2	0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12-2 a.m.	1	0.13	2	0.25	1	0.13	1	0.13	1	0.13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2-4 a.m.	2	0.25	1	0.13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4-6 a.m.	1	0.13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PR-1B ATCAA																								
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	1	0.13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8-10 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-12 noon	0	0	2	0.25	2	0.25	3	0.38	3	0.38	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25
12-2 p.m.	8	1	7	0.88	5	0.63	5	0.63	5	0.63	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13
2-4 p.m.	11	1.38	10	1.25	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5
4-6 p.m.	3	0.38	9	1.13	13	1.63	13	1.63	13	1.63	13	1.63	13	1.63	13	1.63	13	1.63	13	1.63	13	1.63	13	1.63
6-8 p.m.	8	1	5	0.63	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75
8-10 p.m.	6	0.75	6	0.75	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88
10-12 a.m.	5	0.63	3	0.38	10	1.25	10	1.25	10	1.25	10	1.25	10	1.25	10	1.25	10	1.25	10	1.25	10	1.25	10	1.25
12-2 a.m.	1	0.13	2	0.25	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5
2-4 a.m.	3	0.38	2	0.25	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5
4-6 a.m.	2	0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PR-2 ATCAA																								
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	1	0.13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8-10 a.m.	0	0	0	0	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25
10-12 noon	0	0	0	0	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38
12-2 p.m.	18	2.25	5	0.63	5	0.63	5	0.63	5	0.63	5	0.63	5	0.63	5	0.63	5	0.63	5	0.63	5	0.63	5	0.63
2-4 p.m.	12	1.5	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13
4-6 p.m.	16	2	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5
6-8 p.m.	14	1.75	13	1.63	13	1.63	13	1.63	13	1.63	13	1.63	13	1.63	13	1.63	13	1.63	13	1.63	13	1.63	13	1.63
8-10 p.m.	13	1.63	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75
10-12 a.m.	8	1	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88
12-2 a.m.	4	0.5	10	1.25	10	1.25	10	1.25	10	1.25	10	1.25	10	1.25	10	1.25	10	1.25	10	1.25	10	1.25	10	1.25
2-4 a.m.	11	1.38	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5
4-6 a.m.	3	0.38	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5

GAP A ATCAA																								
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	1	0.13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8-10 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-12 noon	0	0	0	0	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88
12-2 p.m.	12	1.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5
2-4 p.m.	6	0.75	1	0.13	3	0.38	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25
4-6 p.m.	6	0.75	1	0.13	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38
6-8 p.m.	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1
8-10 p.m.	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75
10-12 a.m.	8	1	5	0.63	5	0.63	5	0.63	5	0.63	5	0.63	5	0.63	5	0.63	5	0.63	5	0.63	5	0.63	5	0.63
12-2 a.m.	1	0.13	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88
2-4 a.m.	4	0.5	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13
4-6 a.m.	3	0.38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

GAP B ATCAA																								
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	1	0.13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8-10 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-12 noon	0	0	0	0	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38
12-2 p.m.	12	1.5	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38
2-4 p.m.	6	0.75	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38
4-6 p.m.	11	1.38	15	1.88	15	1.88	15	1.88	15	1.88	15	1.88	15	1.88	15	1.88	15	1.88	15	1.88	15	1.88	15	1.88
6-8 p.m.	13	1.63	19	2.38	19	2.38	19	2.38	19	2.38	19	2.38	19	2.38	19	2.38	19	2.38	19	2.38	19	2.38	19	2.38
8-10 p.m.	15	1.88	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5
10-12 a.m.	11	1.38	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88
12-2 a.m.	2	0.25	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38
2-4 a.m.	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88
4-6 a.m.	5	0.63	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13

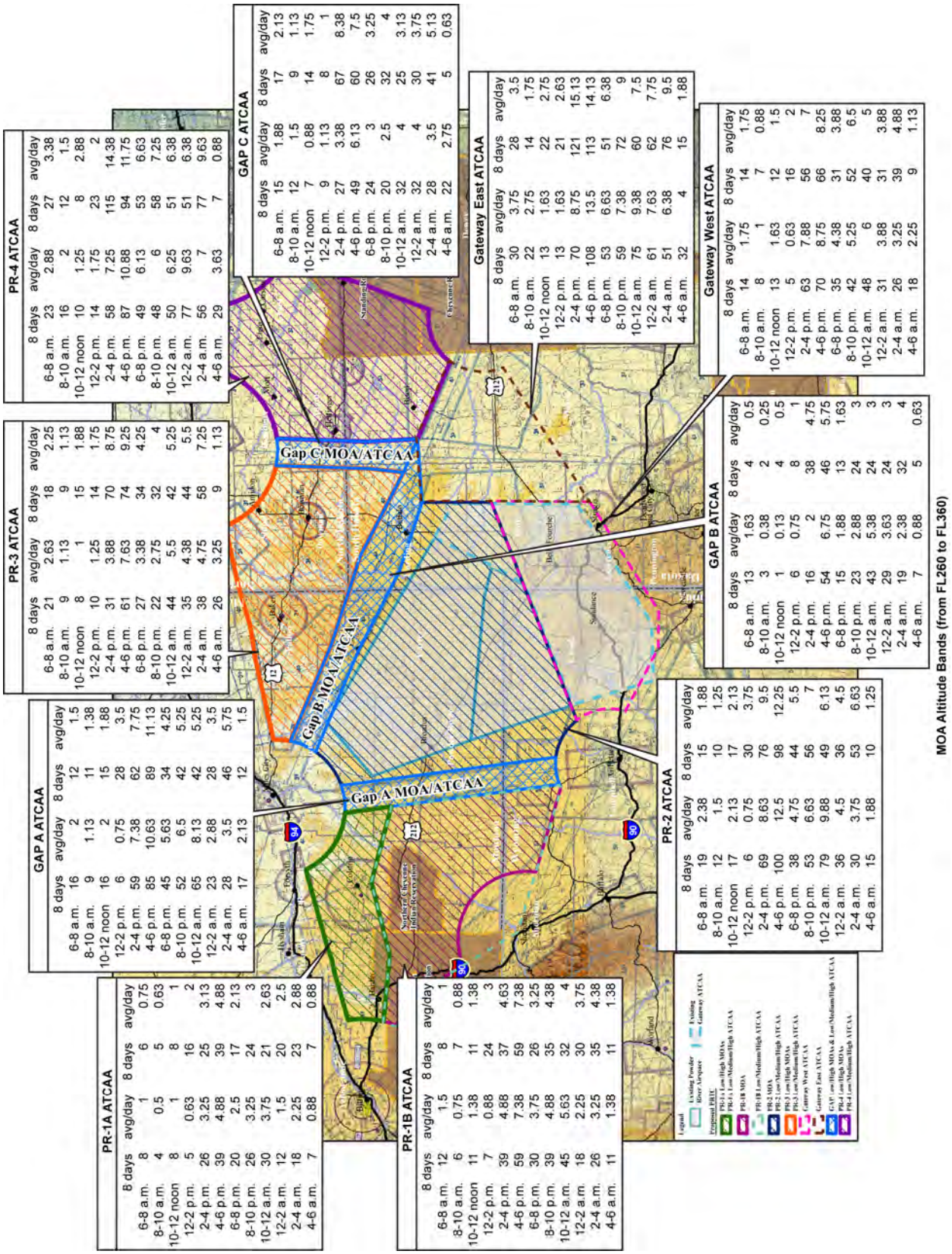
GAP C ATCAA																								
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8-10 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-12 noon	2	0.25	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13
12-2 p.m.	3	0.38	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13
2-4 p.m.	2	0.25	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38
4-6 p.m.	7	0.88	15	1.88	15	1.88	15	1.88	15	1.88	15	1.88	15	1.88	15	1.88	15	1.88	15	1.88	15	1.88	15	1.88
6-8 p.m.	6	0.75	17	2.13	17	2.13	17	2.13	17	2.13	17	2.13	17	2.13	17	2.13	17	2.13	17	2.13	17	2.13	17	2.13
8-10 p.m.	14	1.75	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88
10-12 a.m.	7	0.88	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25
12-2 a.m.	1	0.13	4	0.5	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75
2-4 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4-6 a.m.	2	0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PR-3 ATCAA																								
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8-10 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-12 noon	0	0	0	0	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5
12-2 p.m.	9	1.13	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25
2-4 p.m.	5	0.63	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38
4-6 p.m.	8	1	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5
6-8 p.m.	9	1.13	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5
8-10 p.m.	6	0.75	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13
10-12 a.m.	4	0.5	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75
12-2 a.m.	2	0.25	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13
2-4 a.m.	2	0.25	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75
4-6 a.m.	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38

PR-4 ATCAA																								
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8-10 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-12 noon	3	0.38	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1
12-2 p.m.	9	1.13	13	1.63	13	1.63	13	1.63	13	1.63	13	1.63	13	1.63	13	1.63	13	1.63	13	1.63	13	1.63	13	1.63
2-4 p.m.	6	0.75	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5
4-6 p.m.	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38
6-8 p.m.	14	1.75	14	1.75	14	1.75	14	1.75	14	1.75	14	1.75	14	1.75	14	1.75	14	1.75	14	1.75	14	1.75	14	1.75
8-10 p.m.	10	1.25	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5
10-12 a.m.	9	1.13	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1
12-2 a.m.	3	0.38	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1	8	1
2-4 a.m.	2	0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4-6 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Gateway East ATCAA																								
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	1	0.13	1	0.13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8-10 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-12 noon	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25
12-2 p.m.	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38
2-4 p.m.	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25
4-6 p.m.	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88
6-8 p.m.	17	2.13	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88
8-10 p.m.	8	1	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13	1	0.13
10-12 a.m.	18	2.25	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13
12-2 a.m.	2	0.25	21	2.63	21	2.63	21	2.63	21	2.63	21	2.63	21	2.63	21	2.63	21	2.63	21	2.63	21	2.63	21	2.63
2-4 a.m.	8	1	18	2.25	18	2.25	18	2.25	18	2.25	18	2.25	18	2.25	18	2.25	18	2.25	18	2.25	18	2.25	18	2.25
4-6 a.m.	5	0.63	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5

Gateway West ATCAA																								
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	0	0	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38



PR-1A ATCAA							
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	8	1	6	0.75	12	1	8	0.88
8-10 a.m.	4	0.5	5	0.63	5	0.63	7	0.88
10-12 noon	8	1	8	1	16	2	13	1.63
12-2 p.m.	5	0.63	16	2	25	3.13	20	2.5
2-4 p.m.	26	3.25	25	3.13	39	4.88	32	4
4-6 p.m.	39	4.88	39	4.88	17	2.13	25	3.13
6-8 p.m.	20	2.5	17	2.13	24	3	30	3.75
8-10 p.m.	26	3.25	24	3	21	2.63	41	5.13
10-12 a.m.	30	3.75	21	2.63	20	2.5	5	0.63
12-2 a.m.	12	1.5	20	2.5	23	2.88		
2-4 a.m.	18	2.25	23	2.88	7	0.88		
4-6 a.m.	7	0.88	7	0.88				

PR-1B ATCAA							
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	12	1.5	8	1	15	1.88	15	1.88
8-10 a.m.	6	0.75	7	0.88	10	1.25	10	1.25
10-12 noon	11	1.38	11	1.38	17	2.13	17	2.13
12-2 p.m.	7	0.88	24	3	30	3.75	30	3.75
2-4 p.m.	39	4.88	37	4.63	76	9.5	76	9.5
4-6 p.m.	59	7.38	59	7.38	98	12.25	98	12.25
6-8 p.m.	30	3.75	26	3.25	44	5.5	44	5.5
8-10 p.m.	39	4.88	35	4.38	56	7	56	7
10-12 a.m.	45	5.63	32	4	49	6.13	49	6.13
12-2 a.m.	18	2.25	30	3.75	76	9.5	76	9.5
2-4 a.m.	26	3.25	35	4.38	53	6.63	53	6.63
4-6 a.m.	11	1.38	11	1.38	10	1.25	10	1.25

GAP A ATCAA							
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	16	2	12	1.5	4	0.5	4	0.5
8-10 a.m.	9	1.13	11	1.38	2	0.25	2	0.25
10-12 noon	16	2	15	1.88	4	0.5	4	0.5
12-2 p.m.	6	0.75	28	3.5	8	1	8	1
2-4 p.m.	59	7.38	62	7.75	16	2	16	2
4-6 p.m.	85	10.63	89	11.13	38	4.75	38	4.75
6-8 p.m.	45	5.63	34	4.25	46	5.75	46	5.75
8-10 p.m.	52	6.5	42	5.25	13	1.63	13	1.63
10-12 a.m.	65	8.13	42	5.25	15	1.88	15	1.88
12-2 a.m.	23	2.88	28	3.5	23	2.88	23	2.88
2-4 a.m.	28	3.5	46	5.75	36	4.5	36	4.5
4-6 a.m.	17	2.13	12	1.5	30	3.75	53	6.63
					15	1.88	10	1.25

PR-3 ATCAA							
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	21	2.63	18	2.25	8	1	8	1
8-10 a.m.	9	1.13	9	1.13	12	1.5	12	1.5
10-12 noon	8	1	15	1.88	7	0.88	7	0.88
12-2 p.m.	10	1.25	14	1.75	9	1.13	9	1.13
2-4 p.m.	31	3.88	70	8.75	27	3.38	67	8.38
4-6 p.m.	61	7.63	74	9.25	49	6.13	60	7.5
6-8 p.m.	27	3.38	34	4.25	24	3	26	3.25
8-10 p.m.	22	2.75	32	4	20	2.5	32	4
10-12 a.m.	44	5.5	42	5.25	32	4	25	3.13
12-2 a.m.	35	4.38	44	5.5	32	4	30	3.75
2-4 a.m.	38	4.75	58	7.25	28	3.5	41	5.13
4-6 a.m.	26	3.25	9	1.13	22	2.75	5	0.63

PR-4 ATCAA							
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	23	2.88	27	3.38	15	1.88	17	2.13
8-10 a.m.	16	2	12	1.5	12	1.5	9	1.13
10-12 noon	10	1.25	8	1	7	0.88	14	1.75
12-2 p.m.	14	1.75	23	2	9	1.13	8	1
2-4 p.m.	58	7.25	115	14.38	27	3.38	67	8.38
4-6 p.m.	87	10.88	94	11.75	49	6.13	60	7.5
6-8 p.m.	49	6.13	53	6.63	24	3	26	3.25
8-10 p.m.	48	6	58	7.25	20	2.5	32	4
10-12 a.m.	50	6.25	51	6.38	32	4	25	3.13
12-2 a.m.	77	9.63	51	6.38	32	4	30	3.75
2-4 a.m.	56	7	77	9.63	28	3.5	41	5.13
4-6 a.m.	29	3.63	7	0.88	22	2.75	5	0.63

GAP C ATCAA							
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	15	1.88	17	2.13	30	3.75	28	3.5
8-10 a.m.	12	1.5	9	1.13	22	2.75	14	1.75
10-12 noon	7	0.88	14	1.75	13	1.63	22	2.75
12-2 p.m.	9	1.13	8	1	13	1.63	21	2.63
2-4 p.m.	27	3.38	67	8.38	70	8.75	121	15.13
4-6 p.m.	49	6.13	60	7.5	108	13.5	113	14.13
6-8 p.m.	24	3	26	3.25	53	6.63	51	6.38
8-10 p.m.	20	2.5	32	4	59	7.38	72	9
10-12 a.m.	32	4	25	3.13	75	9.38	60	7.5
12-2 a.m.	32	4	30	3.75	61	7.63	62	7.75
2-4 a.m.	28	3.5	41	5.13	51	6.38	76	9.5
4-6 a.m.	22	2.75	5	0.63	32	4	15	1.88

PR-2 ATCAA							
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	19	2.38	15	1.88	13	1.63	3	0.5
8-10 a.m.	12	1.5	10	1.25	3	0.38	2	0.25
10-12 noon	17	2.13	17	2.13	1	0.13	4	0.5
12-2 p.m.	6	0.75	30	3.75	6	0.75	8	1
2-4 p.m.	69	8.63	76	9.5	16	2	38	4.75
4-6 p.m.	100	12.5	98	12.25	54	6.75	46	5.75
6-8 p.m.	38	4.75	44	5.5	15	1.88	13	1.63
8-10 p.m.	53	6.63	56	7	23	2.88	24	3
10-12 a.m.	79	9.88	49	6.13	43	5.38	24	3
12-2 a.m.	36	4.5	36	4.5	29	3.63	24	3
2-4 a.m.	30	3.75	53	6.63	19	2.38	32	4
4-6 a.m.	15	1.88	10	1.25	7	0.88	5	0.63

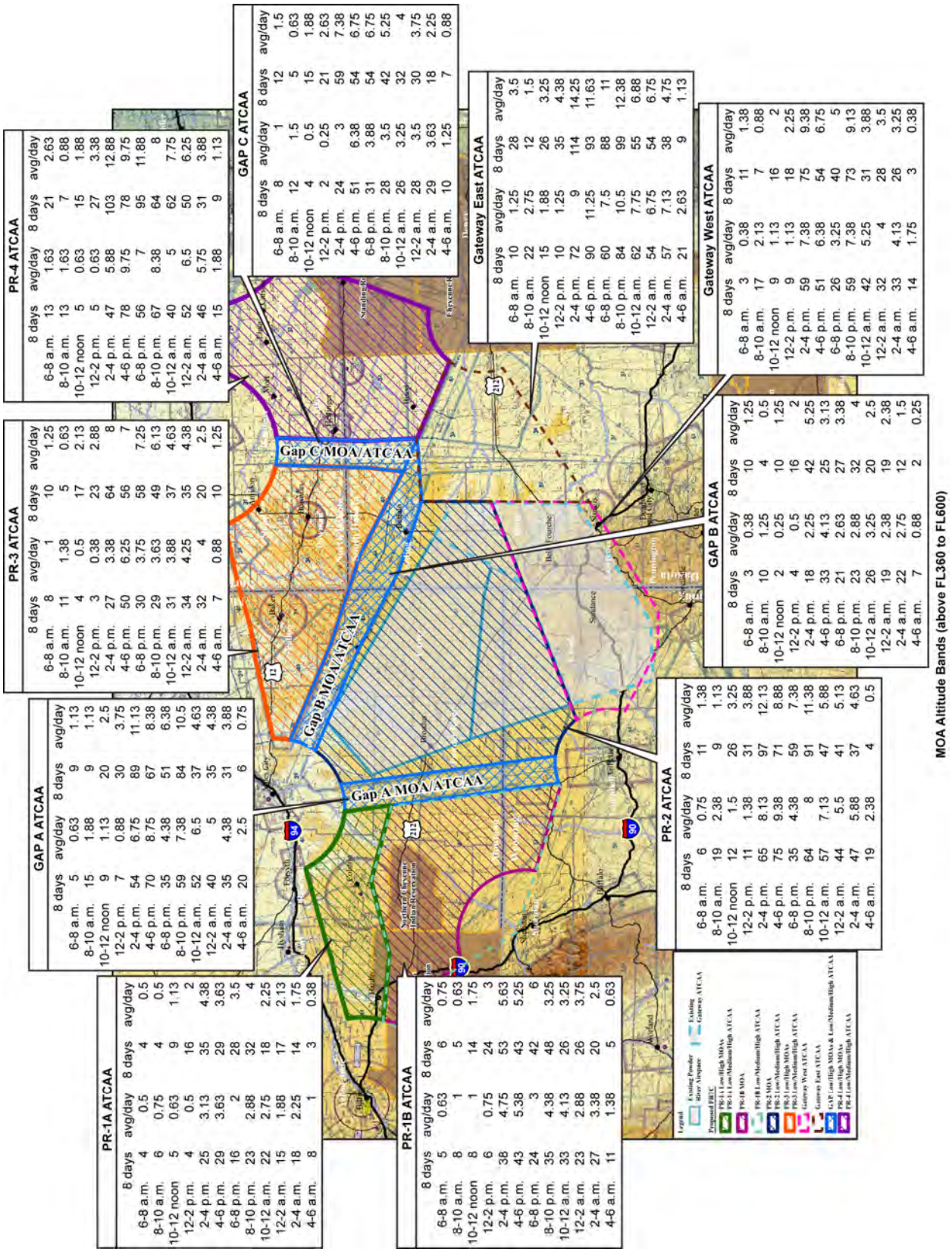
Gateway East ATCAA							
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	30	3.75	28	3.5	14	1.75	14	1.75
8-10 a.m.	22	2.75	14	1.75	8	1	7	0.88
10-12 noon	13	1.63	22	2.75	13	1.63	12	1.5
12-2 p.m.	13	1.63	21	2.63	5	0.63	16	2
2-4 p.m.	70	8.75	121	15.13	63	7.88	56	7
4-6 p.m.	108	13.5	113	14.13	70	8.75	66	8.25
6-8 p.m.	53	6.63	51	6.38	35	4.38	31	3.88
8-10 p.m.	59	7.38	72	9	42	5.25	52	6.5
10-12 a.m.	75	9.38	60	7.5	48	6	40	5
12-2 a.m.	61	7.63	62	7.75	31	3.88	31	3.88
2-4 a.m.	51	6.38	76	9.5	26	3.25	39	4.88
4-6 a.m.	32	4	15	1.88	18	2.25	9	1.13

GAP B ATCAA							
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	13	1.63	4	0.5	14	1.75	14	1.75
8-10 a.m.	3	0.38	2	0.25	8	1	7	0.88
10-12 noon	1	0.13	4	0.5	13	1.63	12	1.5
12-2 p.m.	6	0.75	8	1	5	0.63	16	2
2-4 p.m.	16	2	38	4.75	63	7.88	56	7
4-6 p.m.	54	6.75	46	5.75	70	8.75	66	8.25
6-8 p.m.	15	1.88	13	1.63	35	4.38	31	3.88
8-10 p.m.	23	2.88	24	3	42	5.25	52	6.5
10-12 a.m.	43	5.38	24	3	48	6	40	5
12-2 a.m.	29	3.63	24	3	31	3.88	31	3.88
2-4 a.m.	19	2.38	32	4	26	3.25	39	4.88
4-6 a.m.	7	0.88	5	0.63	18	2.25	9	1.13

Gateway West ATCAA							
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	14	1.75	14	1.75	17	2.13	17	2.13
8-10 a.m.	8	1	7	0.88	9	1.13	9	1.13
10-12 noon	13	1.63	12	1.5	14	1.75	14	1.75
12-2 p.m.	5	0.63	16	2	8	1	8	1
2-4 p.m.	63	7.88	56	7	67	8.38	67	8.38
4-6 p.m.	70	8.75	66	8.25	60	7.5	60	7.5
6-8 p.m.	35	4.38	31	3.88	26	3.25	26	3.25
8-10 p.m.	42	5.25	52	6.5	32	4	32	4
10-12 a.m.	48	6	40	5	25	3.13	25	3.13
12-2 a.m.	31	3.88	31	3.88	30	3.75	30	3.75
2-4 a.m.	26	3.25	39	4.88	41	5.13	41	5.13
4-6 a.m.	18	2.25	9	1.13	5	0.63	5	0.63

MOA Altitude Bands (from FL260 to FL360)

Figure 3.1-11. ATCAA Average Daily FAA Documented Aircraft Operations From FL260 To FL360



PR-1A ATCAA											
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5
8-10 a.m.	6	0.75	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5
10-12 noon	5	0.63	9	1.13	16	2	9	1.13	9	1.13	9	1.13
12-2 p.m.	4	0.5	16	2	16	2	16	2	16	2	16	2
2-4 p.m.	25	3.13	35	4.38	35	4.38	35	4.38	35	4.38	35	4.38
4-6 p.m.	29	3.63	29	3.63	29	3.63	29	3.63	29	3.63	29	3.63
6-8 p.m.	16	2	28	3.5	28	3.5	28	3.5	28	3.5	28	3.5
8-10 p.m.	23	2.88	32	4	32	4	32	4	32	4	32	4
10-12 a.m.	22	2.75	18	2.25	18	2.25	18	2.25	18	2.25	18	2.25
12-2 a.m.	15	1.88	17	2.13	17	2.13	17	2.13	17	2.13	17	2.13
2-4 a.m.	18	2.25	14	1.75	14	1.75	14	1.75	14	1.75	14	1.75
4-6 a.m.	8	1	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38

PR-1B ATCAA											
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	5	0.63	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75
8-10 a.m.	8	1	5	0.63	5	0.63	5	0.63	5	0.63	5	0.63
10-12 noon	8	1	14	1.75	14	1.75	14	1.75	14	1.75	14	1.75
12-2 p.m.	6	0.75	24	3	24	3	24	3	24	3	24	3
2-4 p.m.	38	4.75	53	5.63	53	5.63	53	5.63	53	5.63	53	5.63
4-6 p.m.	43	5.38	43	5.25	43	5.25	43	5.25	43	5.25	43	5.25
6-8 p.m.	24	3	42	6	42	6	42	6	42	6	42	6
8-10 p.m.	35	4.38	48	3.25	48	3.25	48	3.25	48	3.25	48	3.25
10-12 a.m.	33	4.13	26	3.25	26	3.25	26	3.25	26	3.25	26	3.25
12-2 a.m.	23	2.88	26	3.75	26	3.75	26	3.75	26	3.75	26	3.75
2-4 a.m.	27	3.38	20	2.5	20	2.5	20	2.5	20	2.5	20	2.5
4-6 a.m.	11	1.38	5	0.63	5	0.63	5	0.63	5	0.63	5	0.63

GAP A ATCAA											
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	5	0.63	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13
8-10 a.m.	15	1.88	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13
10-12 noon	9	1.13	20	2.5	20	2.5	20	2.5	20	2.5	20	2.5
12-2 p.m.	7	0.88	30	3.75	30	3.75	30	3.75	30	3.75	30	3.75
2-4 p.m.	54	6.75	89	11.13	89	11.13	89	11.13	89	11.13	89	11.13
4-6 p.m.	70	8.75	67	8.38	67	8.38	67	8.38	67	8.38	67	8.38
6-8 p.m.	35	4.38	51	6.38	51	6.38	51	6.38	51	6.38	51	6.38
8-10 p.m.	59	7.38	84	10.5	84	10.5	84	10.5	84	10.5	84	10.5
10-12 a.m.	52	6.5	37	4.63	37	4.63	37	4.63	37	4.63	37	4.63
12-2 a.m.	40	5	35	4.38	35	4.38	35	4.38	35	4.38	35	4.38
2-4 a.m.	35	4.38	31	3.88	31	3.88	31	3.88	31	3.88	31	3.88
4-6 a.m.	20	2.5	6	0.75	6	0.75	6	0.75	6	0.75	6	0.75

PR-3 ATCAA											
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	8	1	10	1.25	10	1.25	10	1.25	10	1.25	10	1.25
8-10 a.m.	11	1.38	5	0.63	5	0.63	5	0.63	5	0.63	5	0.63
10-12 noon	4	0.5	17	2.13	17	2.13	17	2.13	17	2.13	17	2.13
12-2 p.m.	3	0.38	23	2.88	23	2.88	23	2.88	23	2.88	23	2.88
2-4 p.m.	27	3.38	64	8	64	8	64	8	64	8	64	8
4-6 p.m.	50	6.25	56	7	56	7	56	7	56	7	56	7
6-8 p.m.	30	3.75	58	7.25	58	7.25	58	7.25	58	7.25	58	7.25
8-10 p.m.	29	3.63	49	6.13	49	6.13	49	6.13	49	6.13	49	6.13
10-12 a.m.	31	3.88	37	4.63	37	4.63	37	4.63	37	4.63	37	4.63
12-2 a.m.	34	4.25	35	4.38	35	4.38	35	4.38	35	4.38	35	4.38
2-4 a.m.	32	4	20	2.5	20	2.5	20	2.5	20	2.5	20	2.5
4-6 a.m.	7	0.88	10	1.25	10	1.25	10	1.25	10	1.25	10	1.25

PR-4 ATCAA											
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	13	1.63	21	2.63	21	2.63	21	2.63	21	2.63	21	2.63
8-10 a.m.	13	1.63	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88
10-12 noon	5	0.63	15	1.88	15	1.88	15	1.88	15	1.88	15	1.88
12-2 p.m.	5	0.63	27	3.38	27	3.38	27	3.38	27	3.38	27	3.38
2-4 p.m.	47	5.88	103	12.88	103	12.88	103	12.88	103	12.88	103	12.88
4-6 p.m.	78	9.75	78	9.75	78	9.75	78	9.75	78	9.75	78	9.75
6-8 p.m.	56	7	95	11.88	95	11.88	95	11.88	95	11.88	95	11.88
8-10 p.m.	67	8.38	64	8	64	8	64	8	64	8	64	8
10-12 a.m.	40	5	62	7.75	62	7.75	62	7.75	62	7.75	62	7.75
12-2 a.m.	52	6.5	50	6.25	50	6.25	50	6.25	50	6.25	50	6.25
2-4 a.m.	46	5.75	31	3.88	31	3.88	31	3.88	31	3.88	31	3.88
4-6 a.m.	15	1.88	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13

GAP C ATCAA											
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	8	1	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5
8-10 a.m.	12	1.5	5	0.63	5	0.63	5	0.63	5	0.63	5	0.63
10-12 noon	4	0.5	15	1.88	15	1.88	15	1.88	15	1.88	15	1.88
12-2 p.m.	2	0.25	21	2.63	21	2.63	21	2.63	21	2.63	21	2.63
2-4 p.m.	24	3	59	7.38	59	7.38	59	7.38	59	7.38	59	7.38
4-6 p.m.	51	6.38	54	6.75	54	6.75	54	6.75	54	6.75	54	6.75
6-8 p.m.	31	3.88	54	6.75	54	6.75	54	6.75	54	6.75	54	6.75
8-10 p.m.	28	3.5	42	5.25	42	5.25	42	5.25	42	5.25	42	5.25
10-12 a.m.	26	3.25	32	4	32	4	32	4	32	4	32	4
12-2 a.m.	28	3.5	30	3.75	30	3.75	30	3.75	30	3.75	30	3.75
2-4 a.m.	29	3.63	18	2.25	18	2.25	18	2.25	18	2.25	18	2.25
4-6 a.m.	10	1.25	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88

Gateway East ATCAA											
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	10	1.25	28	3.5	28	3.5	28	3.5	28	3.5	28	3.5
8-10 a.m.	22	2.75	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5
10-12 noon	15	1.88	26	3.25	26	3.25	26	3.25	26	3.25	26	3.25
12-2 p.m.	10	1.25	35	4.38	35	4.38	35	4.38	35	4.38	35	4.38
2-4 p.m.	72	9	114	14.25	114	14.25	114	14.25	114	14.25	114	14.25
4-6 p.m.	90	11.25	93	11.63	93	11.63	93	11.63	93	11.63	93	11.63
6-8 p.m.	60	7.5	88	11	88	11	88	11	88	11	88	11
8-10 p.m.	84	10.5	99	12.38	99	12.38	99	12.38	99	12.38	99	12.38
10-12 a.m.	62	7.75	55	6.88	55	6.88	55	6.88	55	6.88	55	6.88
12-2 a.m.	54	6.75	54	6.75	54	6.75	54	6.75	54	6.75	54	6.75
2-4 a.m.	57	7.13	38	4.75	38	4.75	38	4.75	38	4.75	38	4.75
4-6 a.m.	21	2.63	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13

Gateway West ATCAA											
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	3	0.38	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38
8-10 a.m.	17	2.13	7	0.88	7	0.88	7	0.88	7	0.88	7	0.88
10-12 noon	9	1.13	16	2	16	2	16	2	16	2	16	2
12-2 p.m.	9	1.13	18	2.25	18	2.25	18	2.25	18	2.25	18	2.25
2-4 p.m.	59	7.38	75	9.38	75	9.38	75	9.38	75	9.38	75	9.38
4-6 p.m.	51	6.38	54	6.75	54	6.75	54	6.75	54	6.75	54	6.75
6-8 p.m.	26	3.25	40	5	40	5	40	5	40	5	40	5
8-10 p.m.	59	7.38	73	9.13	73	9.13	73	9.13	73	9.13	73	9.13
10-12 a.m.	42	5.25	31	3.88	31	3.88	31	3.88	31	3.88	31	3.88
12-2 a.m.	32	4	28	3.5	28	3.5	28	3.5	28	3.5	28	3.5
2-4 a.m.	33	4.13	26	3.25	26	3.25	26	3.25	26	3.25	26	3.25
4-6 a.m.	14	1.75	3	0.38	3	0.38	3	0.38	3	0.38	3	0.38

GAP B ATCAA											
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	3	0.38	10	1.25	10	1.25	10	1.25	10	1.25	10	1.25
8-10 a.m.	10	1.25	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5
10-12 noon	2	0.25	10	1.25	10	1.25	10	1.25	10	1.25	10	1.25
12-2 p.m.	4	0.5	16	2	16	2	16	2	16	2	16	2
2-4 p.m.	18	2.25	42	5.25	42	5.25	42	5.25	42	5.25	42	5.25
4-6 p.m.	33	4.13	25	3.13	25	3.13	25	3.13	25	3.13	25	3.13
6-8 p.m.	21	2.63	27	3.38	27	3.38	27	3.38	27	3.38	27	3.38
8-10 p.m.	23	2.88	32	4	32	4	32	4	32	4	32	4
10-12 a.m.	26	3.25	20	2.5	20	2.5	20	2.5	20	2.5	20	2.5
12-2 a.m.	19	2.38	19	2.38	19	2.38	19	2.38	19	2.38	19	2.38
2-4 a.m.	22	2.75	12	1.5	12	1.5	12	1.5	12	1.5	12	1.5
4-6 a.m.	7	0.88	2	0.25	2	0.25	2	0.25	2	0.25	2	0.25

PR-2 ATCAA											
	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day	8 days	avg/day
6-8 a.m.	6	0.75	11	1.38	11	1.38	11	1.38	11	1.38	11	1.38
8-10 a.m.	19	2.38	9	1.13	9	1.13	9	1.13	9	1.13	9	1.13
10-12 noon	12	1.5	26	3.25	26	3.25	26	3.25	26	3.25	26	3.25
12-2 p.m.	11	1.38	31	3.88	31	3.88	31	3.88	31	3.88	31	3.88
2-4 p.m.	65	8.13	97	12.13	97	12.13	97	12.13	97	12.13	97	12.13
4-6 p.m.	75	9.38	71	8.88	71	8.88	71	8.88	71	8.88	71	8.88
6-8 p.m.	35	4.38	59	7.38	59	7.38	59	7.38	59	7.38	59	7.38
8-10 p.m.	64	8	91	11.38	91	11.38	91	11.38	91	11.38	91	11.38
10-12 a.m.	57	7.13	47	5.88	47	5.88	47	5.88	47	5.88	47	5.88
12-2 a.m.	44	5.5	41	5.13	41	5.13	41	5.13	41	5.13	41	5.13
2-4 a.m.	47	5.88	37	4.63	37	4.63	37	4.63	37	4.63	37	4.63
4-6 a.m.	19	2.38	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5

Figure 3.1-12. ATCAA Average Daily FAA Documented Aircraft Operations Above FL360 To FL600

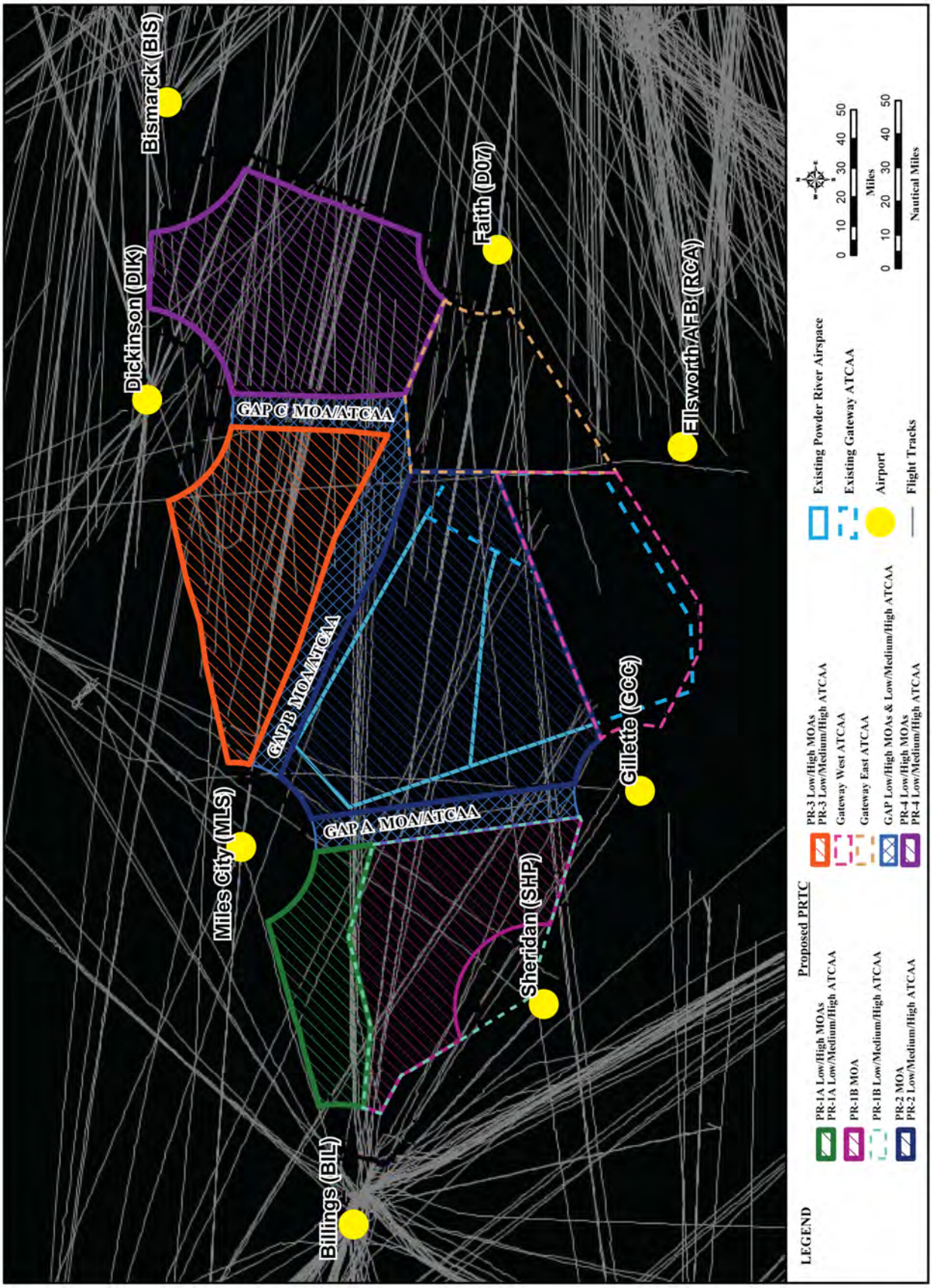


Figure 3.1-13. Winter below 4,000 feet MSL

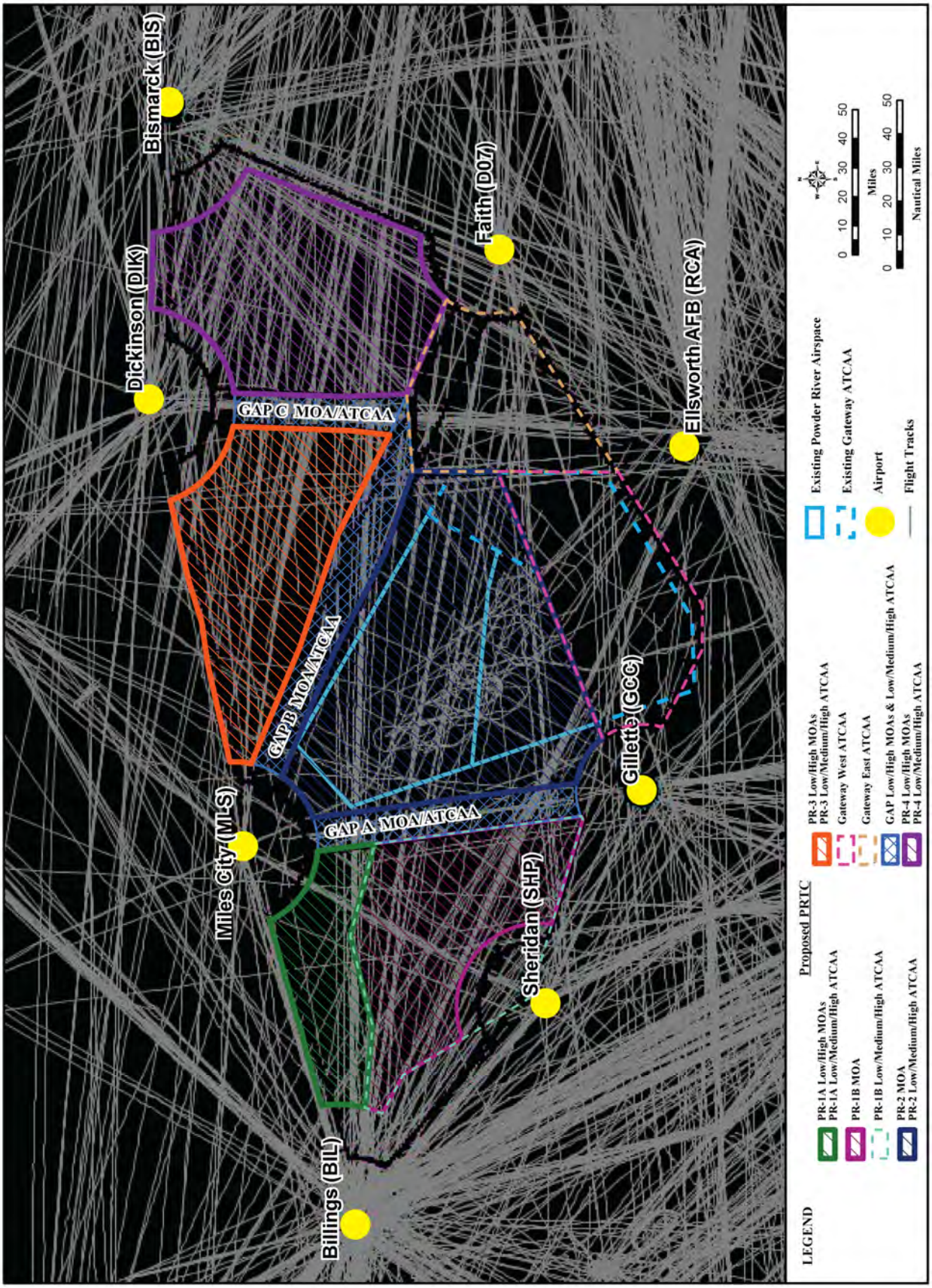


Figure 3.1-14. Winter from 4,000 feet MSL to, but not including, 10,000 feet MSL

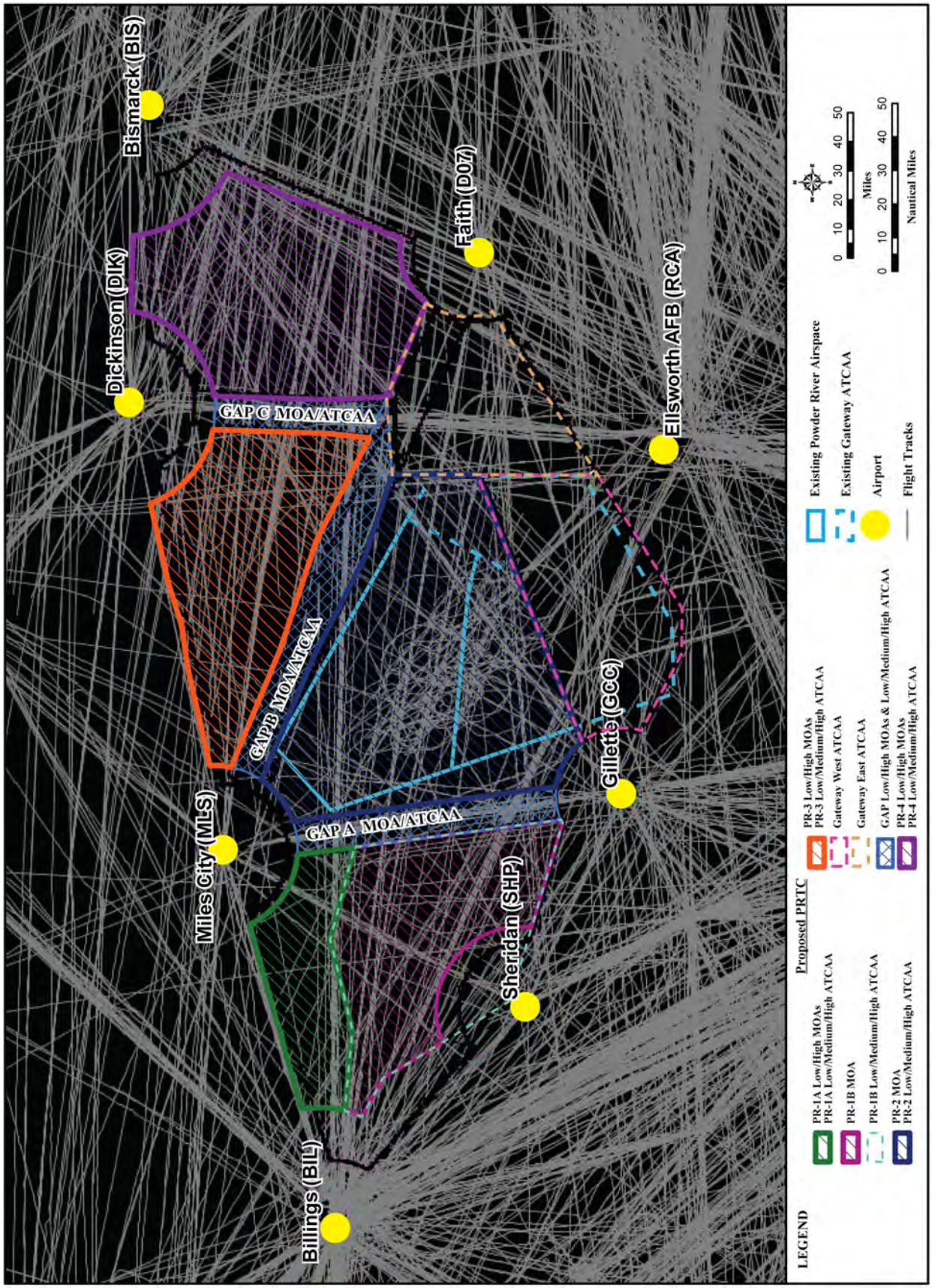


Figure 3.1-15. Winter from 10,000 feet MSL to, but not including, FL180

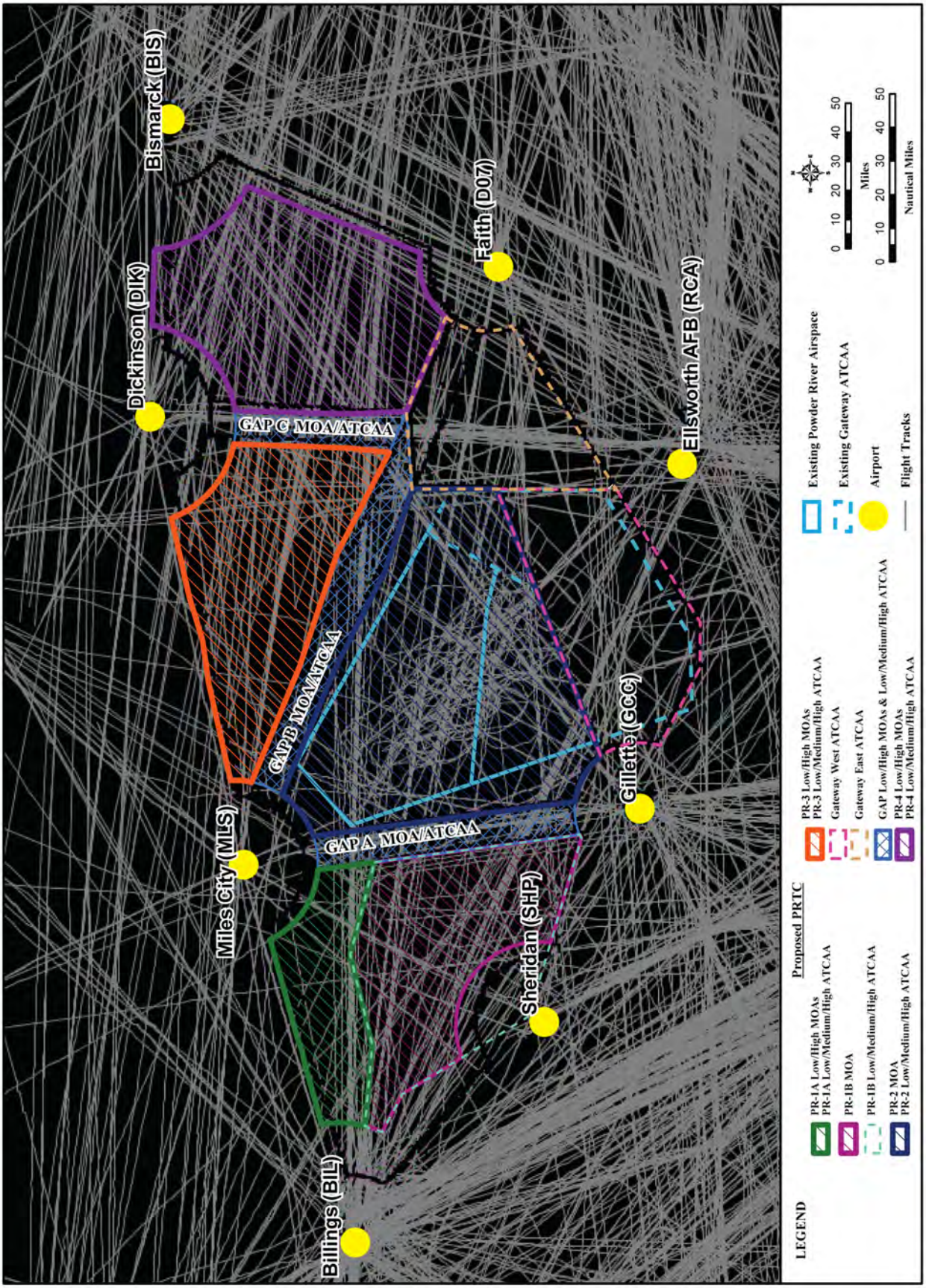


Figure 3.1-16. Winter Low ATCAA from FL180 to FL260

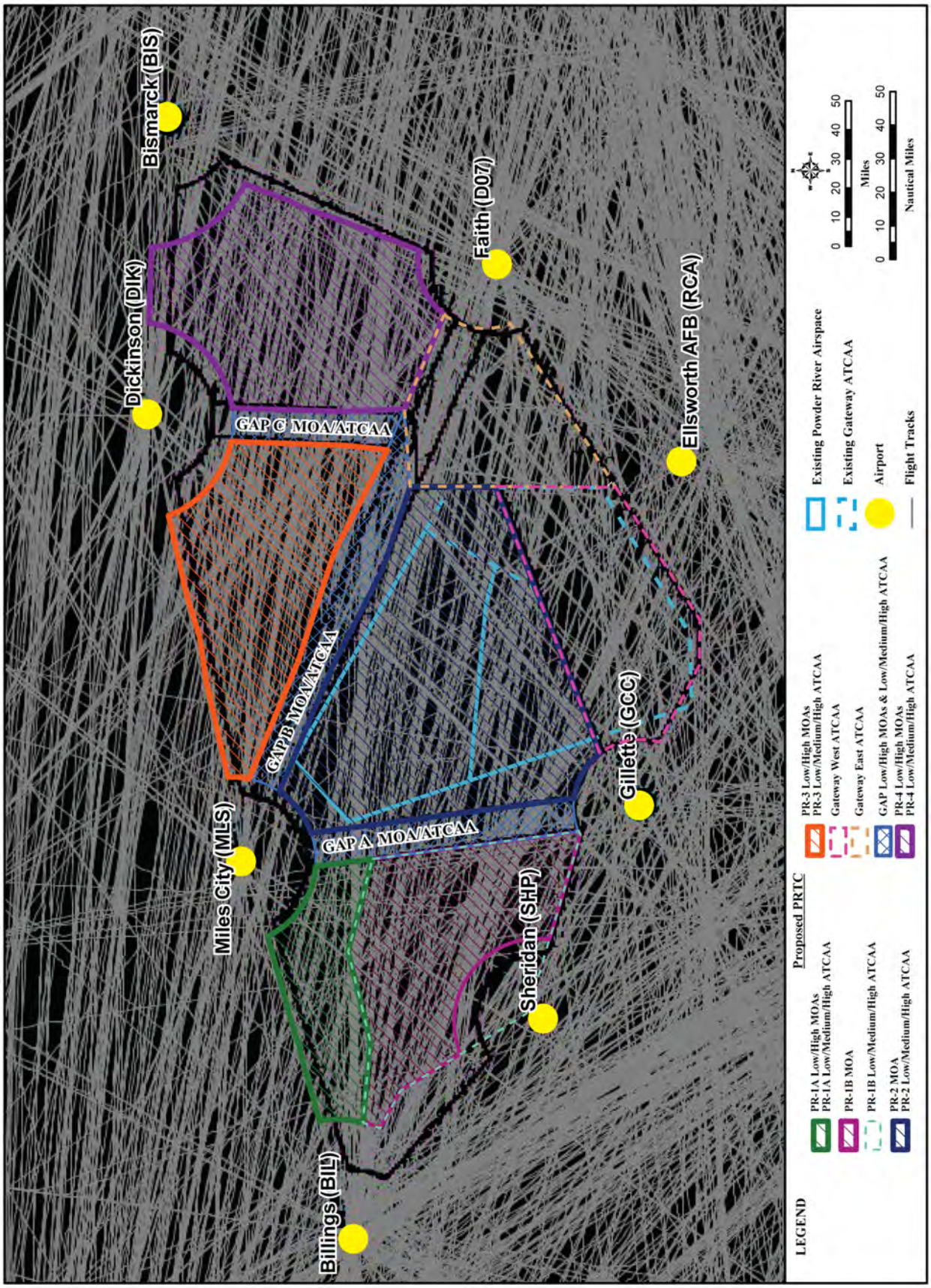


Figure 3.1-17. Winter Medium ATCAA from FL260 to FL370

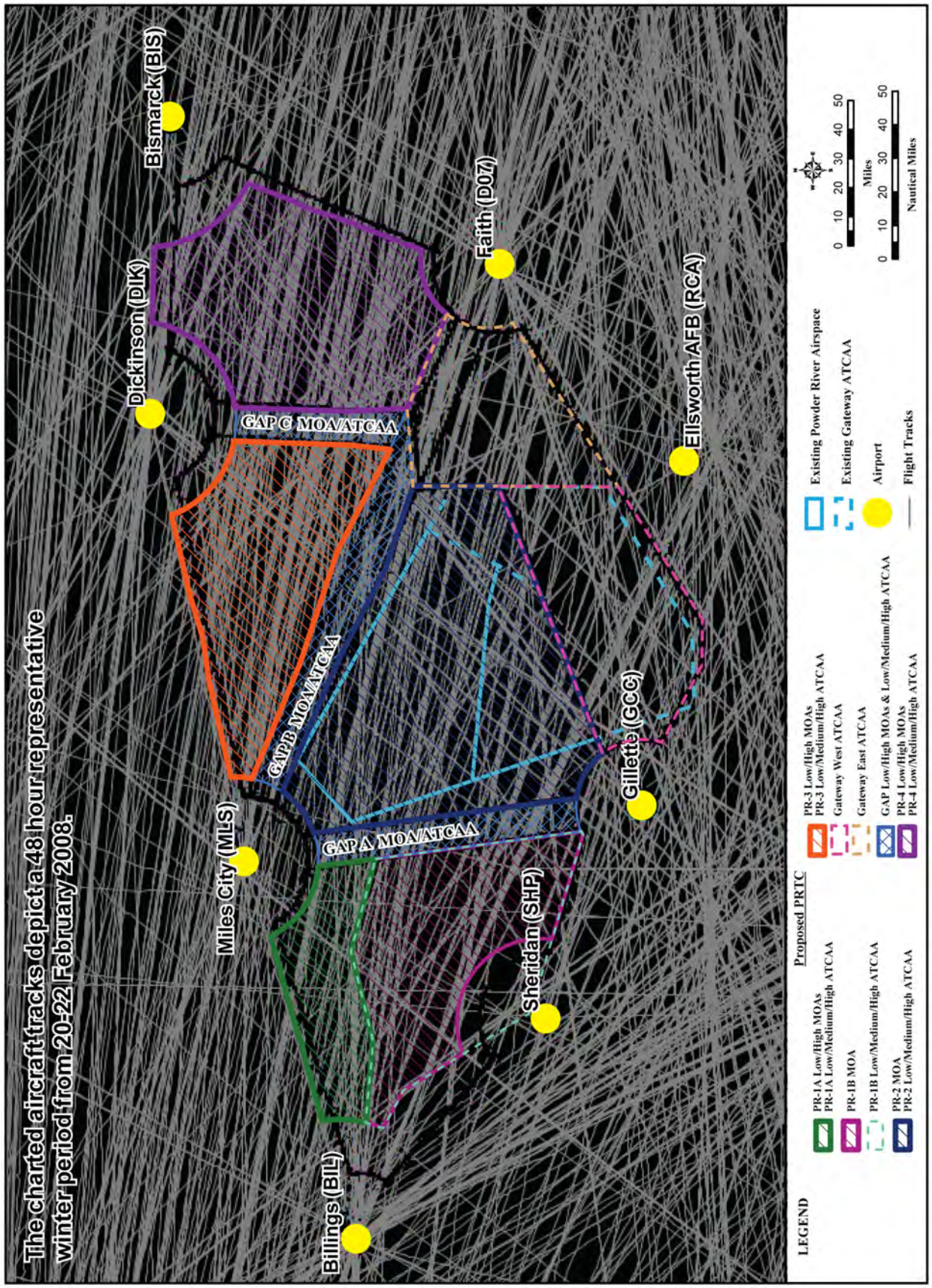


Figure 3.1-18. Winter High ATCAA above FL370 to FL600

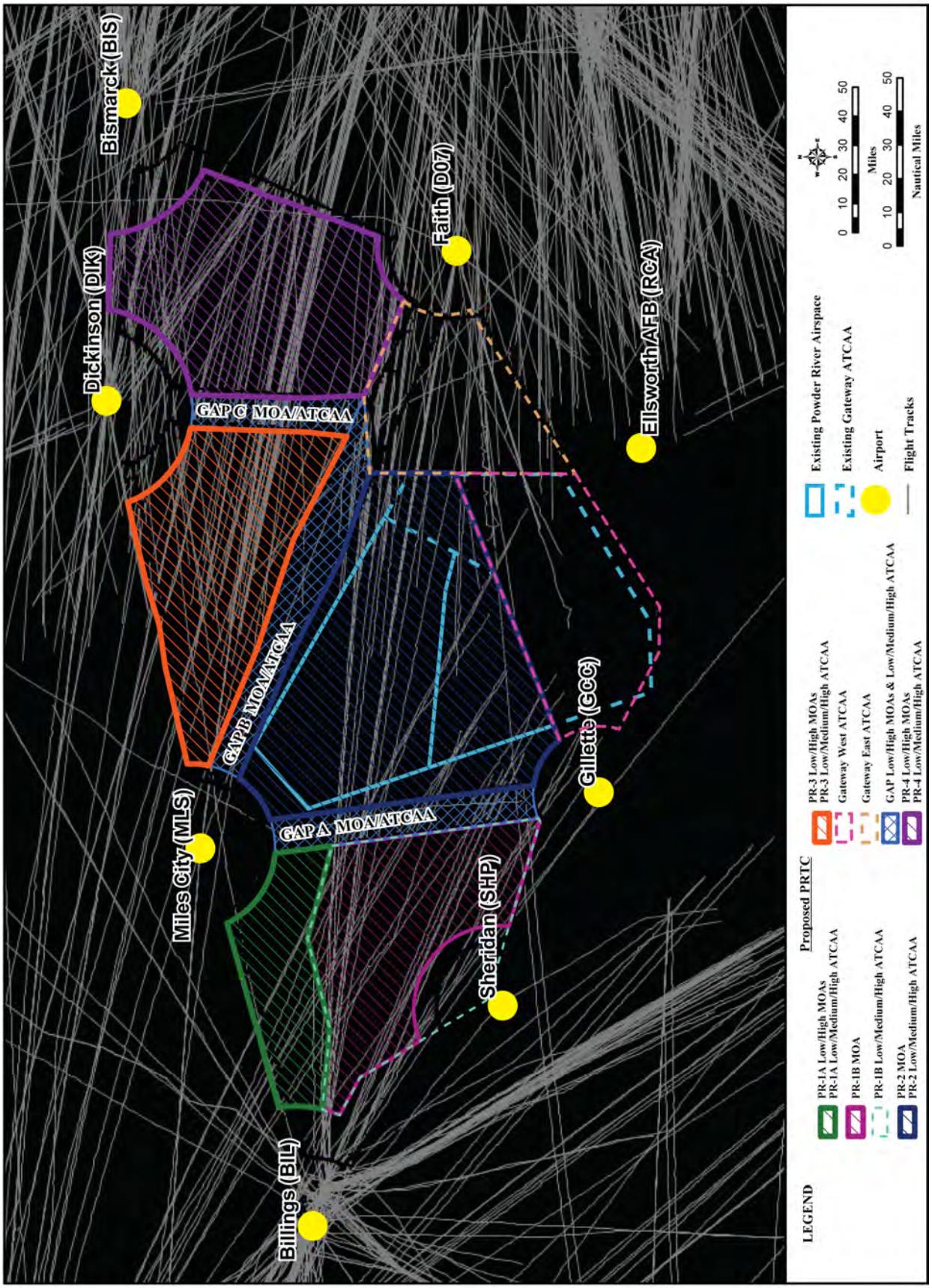


Figure 3.1-19. Summer below 4,000 feet MSL

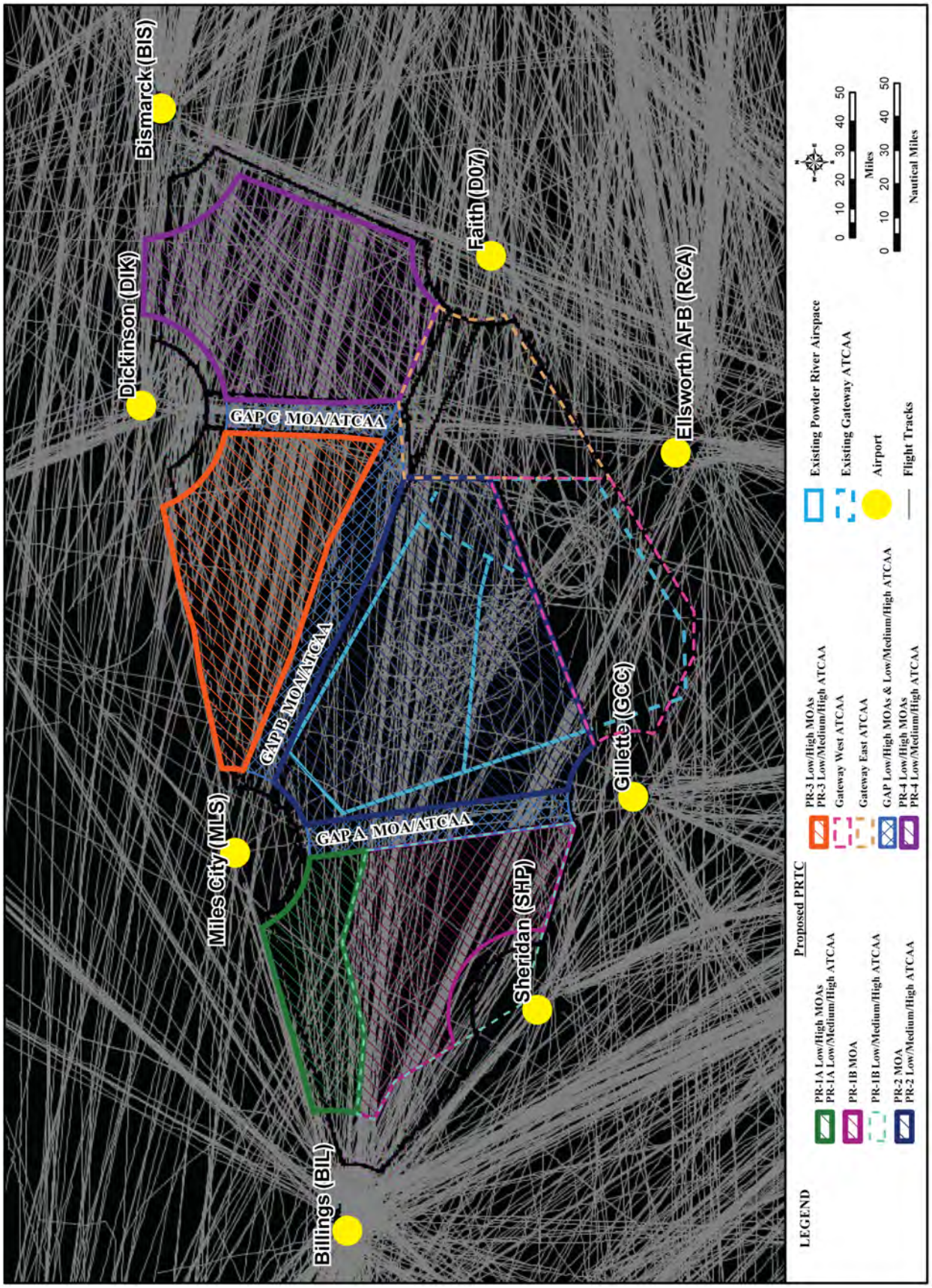


Figure 3.1-20. Summer from 4,000 feet MSL to, but not including 10,000 feet MSL

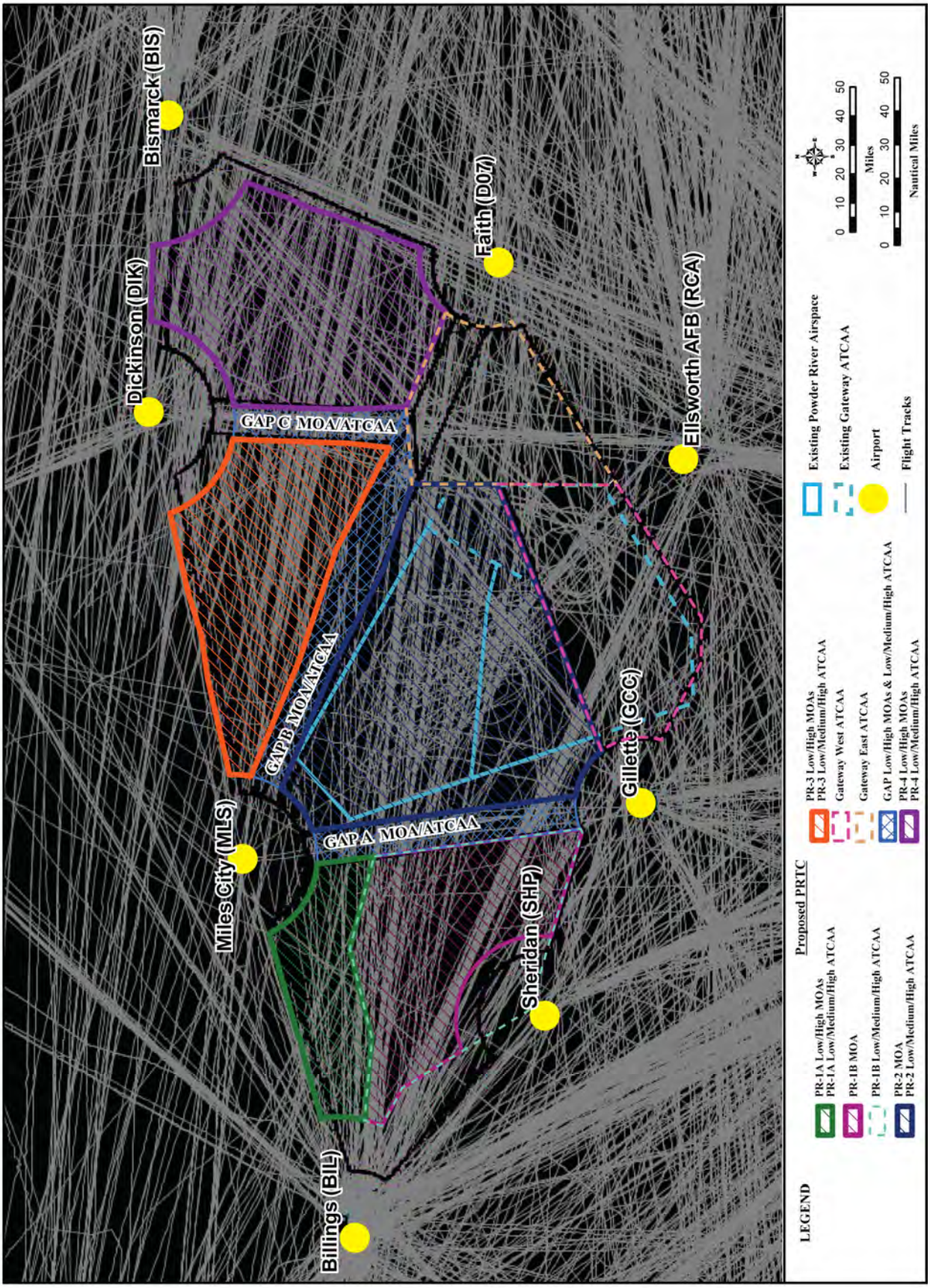


Figure 3.1-21. Summer from 10,000 feet MSL to, but not including FL180

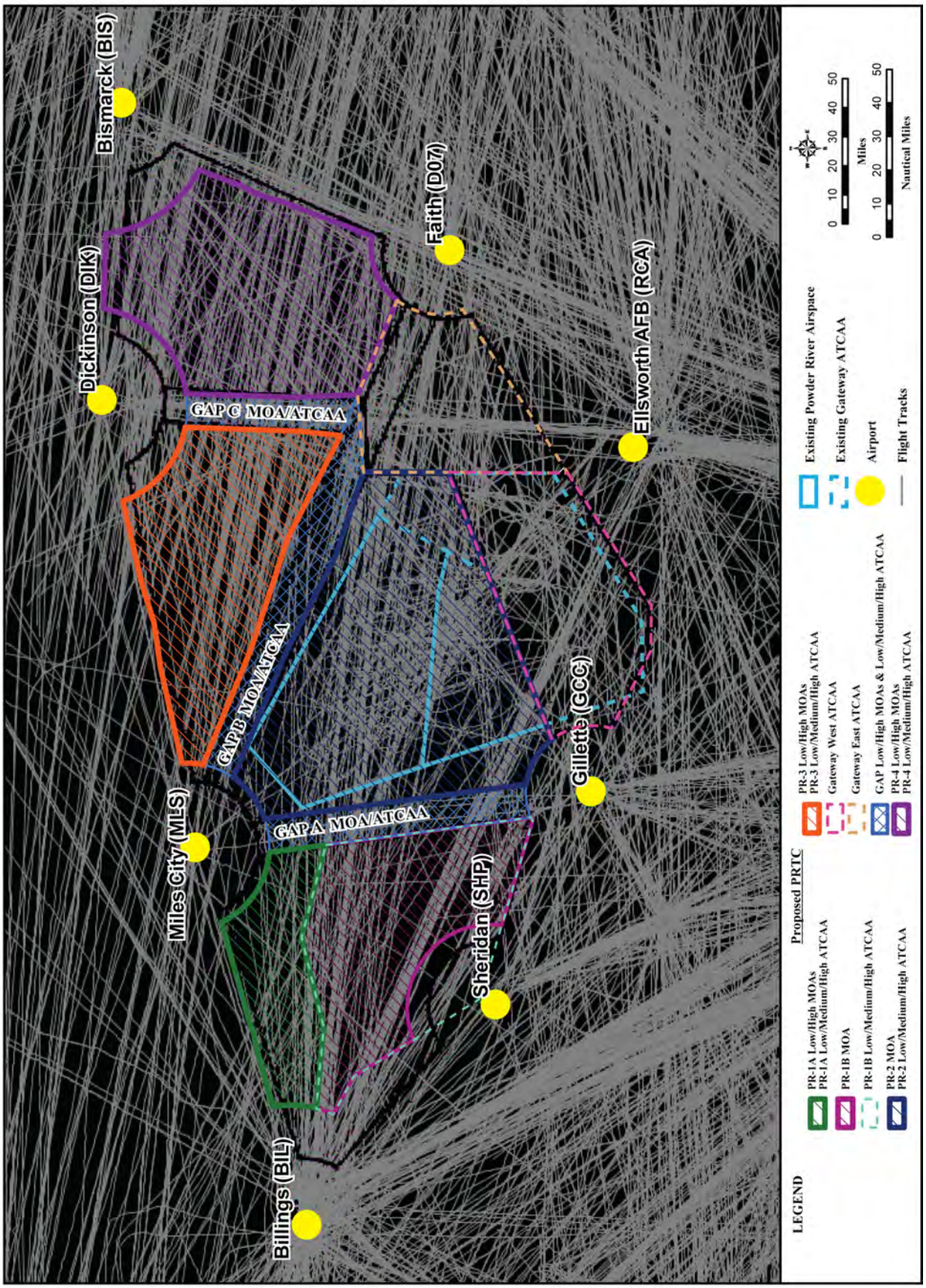


Figure 3.1-22. Summer Low ATCAA from FL180 to FL260

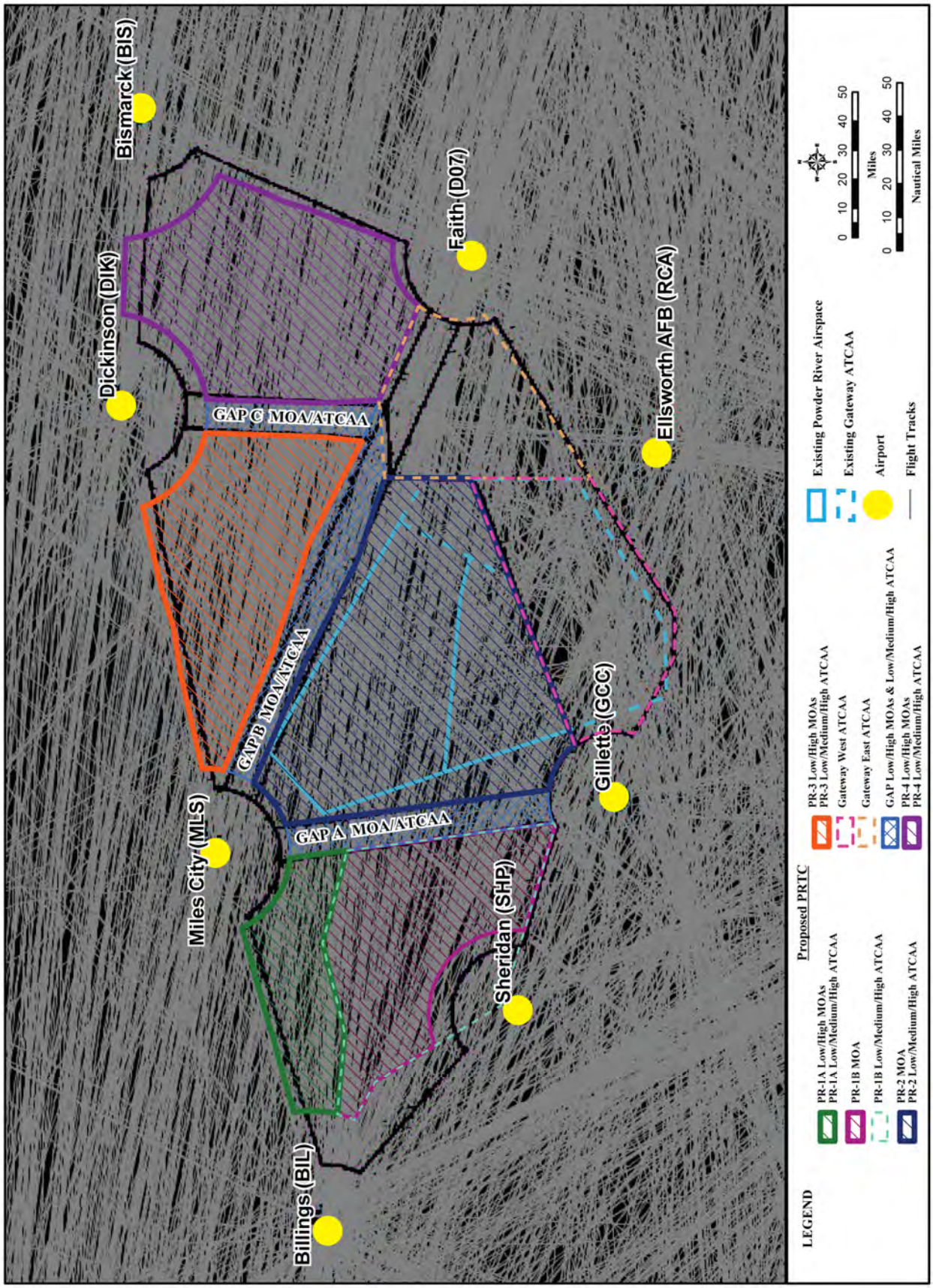


Figure 3.1-23. Summer from FL260 to FL370

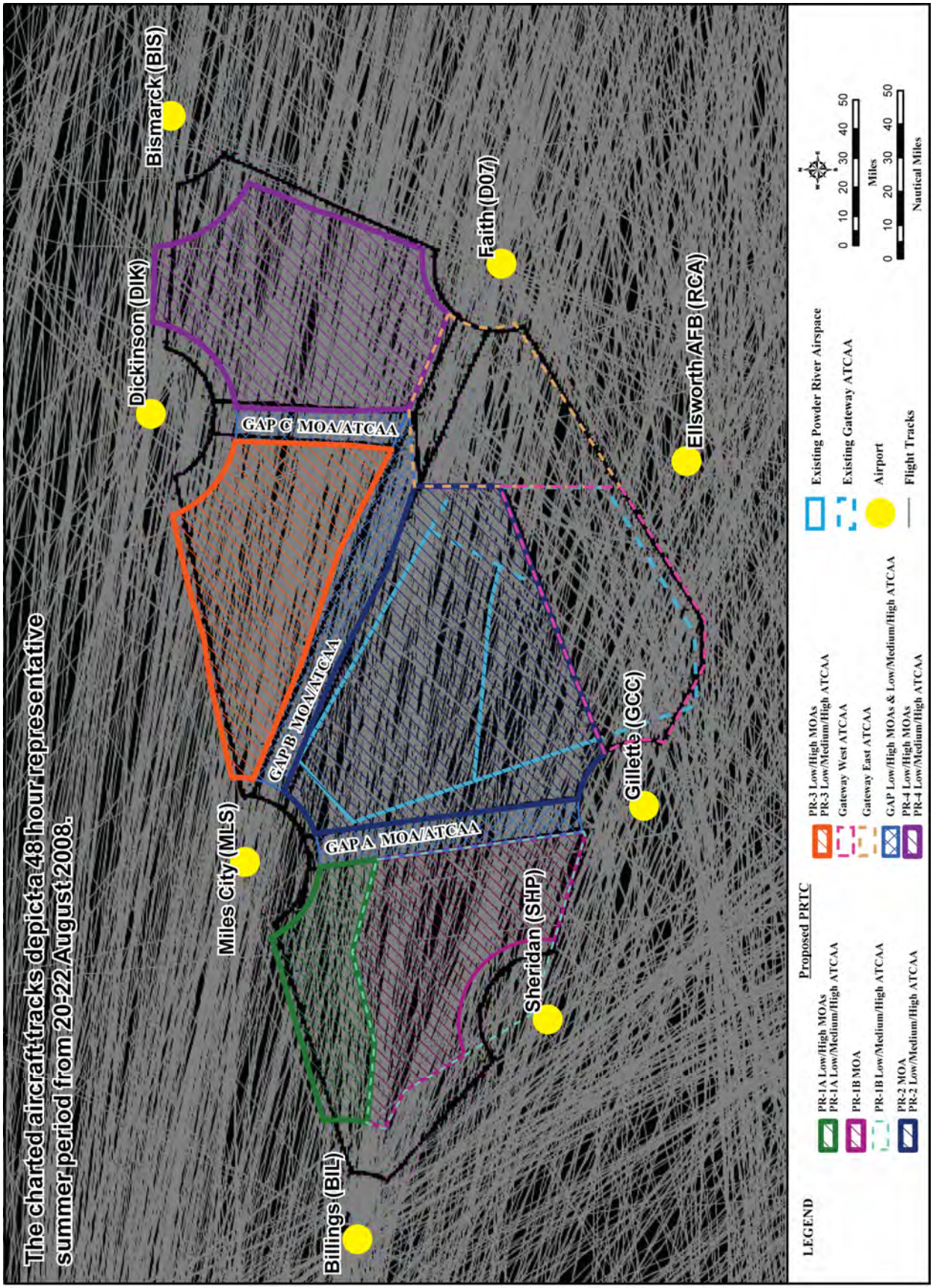


Figure 3.1-24. Summer High ATCAA above FL370 to FL600

3.2 Noise

3.2.1 Definition of the Resource

The definition of noise is simply unwanted sound. Noise is considered to be unwanted sound that interferes with normal activities or otherwise diminishes the quality of the environment. Noise has the potential to impact several environmental resource areas. This noise section will describe baseline noise conditions and noise effects on human annoyance, health and structures. Noise impacts on biological, land use, socioeconomics, and cultural resources are discussed in separate sections dealing with those environmental resources. The ROI for noise consists of lands beneath current and proposed airspace.

Noise can be of several different types, each of which has its own characteristics. Continuous noise sources include machinery, such as an air-conditioning unit. Transient noise sources are those which move through the environment, either along established paths (e.g., highways or railroads) or randomly (e.g., training in a MOA). Some noise sources are impulsive (e.g., thunder clap or sonic boom). The response of a receptor (e.g., person, animal, or structure) to a noise depends on the characteristics of the noise itself as well as the sensitivity of the receptor at the time the noise is heard.

The physical characteristics of sound include its intensity, frequency, and duration. These characteristics are discussed briefly below, and discussed in more detail in Appendix H

Intensity – Sound consists of minute pressure waves which travel from the sound source to the ear. These waves can be compared to ripples spreading outward from a stone dropped in still water. Larger waves are interpreted by the ear as more intense sounds. Sound intensities are expressed using the logarithmic unit, the decibel. Using the decibel (dB) scale, a sound level that is 3 dB louder than another will be perceived as being noticeably louder while a sound that is 10 dB higher than another will be perceived as twice as loud. A whisper is typically 20 dB or lower while a thunderclap can be 120 dB or louder.

Frequency – The frequency of a sound, as measured with the unit Hertz (Hz) is the number of sound waves that pass a point in a second. A person with healthy hearing can detect sounds ranging from 20 Hz to 15,000 Hz but detects sounds in the middle frequencies of this range most strongly. Sound measurements are refined using "A-weighting" which emphasizes frequencies best heard by the human ear. In this EIS, dB is A-weighted unless otherwise noted. For impulsive sounds (e.g., sonic booms, thunder, or clapping), which have the potential to induce vibrations in objects, the "C-weighting" scale is used. The C-weighting scale does not de-emphasize high and low-frequency sounds to the extent that A-weighting does.

Duration – The duration of a noise event is the time between initially hearing the sound and the sound no longer being heard. From the ground, the sound level of an aircraft flying overhead changes continuously, starting at the ambient (background) level, increasing to a maximum as the aircraft passes closest to the receiver, and then decreasing to ambient as the aircraft flies into the distance.

Noise analysts use several "metrics," which describe complex and variable sets of noise events. These metrics are designed to represent noise in such a way that noise impacts can be predicted. Noise metrics used in this analysis include the following:

- L_{max} (Maximum Sound Level) is the highest sound level measured during an event such as a single aircraft overflight.
- SEL (Sound Exposure Level) accounts for the maximum sound level and the length of time a sound lasts. SEL does not directly represent the sound level heard at any given time. Rather, it provides

a measure of the total sound exposure for an entire event. For many types of noise impacts, SEL provides a better measure of intrusiveness of the sound than L_{max}. When military aircraft fly low and fast, the sound can rise from ambient to its maximum very quickly. This rapid onset-rate carries a "surprise" effect that can make noise seem louder than its measured SEL would suggest. The calculation for SEL_r (Onset Rate-Adjusted Sound Exposure Level) has an additional noise penalty programmed into the calculation of up to 11 dB to account for this effect.

- DNL (Day-Night Average Sound Level [mathematically denoted as L_{dn}]) is a noise metric combining the levels and durations of noise events and the number of events over a 24-hour period. DNL also accounts for more intrusive night time noise, adding a 10 dB penalty for sounds after 10 p.m. and before 7 a.m. The FAA has determined that DNL is the appropriate measure to account for total noise exposure around airfields and airports. Depending on the regularity of operations, DNL is computed either as an annual average or for operations representing an average busy day.
- DNLmr (Onset Rate-Adjusted Day-Night Average Sound Level [mathematically denoted as L_{dnmr}]) is the measure used for subsonic aircraft noise in such training airspace as MOAs and MTRs. DNLmr accounts for the surprise effect of aircraft overflights and the sudden onset of the aircraft noise event on humans. The penalty ranges from 0 to 11 dB and is added to the normal SEL based on the altitude and airspeed of an approaching aircraft. DNLmr is computed for the busiest month of the year to account for the variation in the seasonal use of some airspace units. DNLmr is interpreted by the same criteria as used for DNL.
- CDNL (C-Weighted Day-Night Average Sound Level) is a day-night average sound level computed for areas subject to impulsive noise such as sonic booms. Areas subjected to supersonic noise are typically also subjected to subsonic noise which is assessed based on the DNLmr metric.
- Peak overpressure, pounds per square foot (psf) is used to characterize the strength of impulsive noise such as sonic booms. A decibel version of this, L_{pk}, is used when relating boom amplitude to human or animal response, although the direct physical pressure is most commonly used when assessing effects on structures.

Please see Appendix H for additional details on noise.

The ROI for the noise assessments includes the area underlying the proposed PRTC that is exposed to noise levels caused by aviation-related noise such as military training.

3.2.2 Regulatory Setting

The FAA has special expertise and authority in the area of aviation-related noise. See, e.g., 49 USC 47501-47507 (Aviation Safety and Noise Abatement Act of 1979, as amended); 49 USC 44715 (Noise Control Act of 1972). FAA Order 1050.1E Section 14, available online at www.faa.gov, describes policies and procedures for assessing noise impacts of FAA actions, including approval of SUA, that are subject to NEPA. DNL is the FAA's primary metric for establishing the cumulative exposure of individuals to noise resulting from aviation activities. The FAA generally requires the use of specific models for aviation noise analysis. FAA's Office of Environment and Energy has approved the DoD computer models MRNMAP, PC BOOM, and BOOMAP for use in this noise analysis related to SUA.

FAA has defined a significant noise impact as one which would occur if analysis shows that the Proposed Action will cause noise sensitive areas to experience an increase in noise of DNL 1.5 dB or more at or above DNL 65 dB noise exposure when compared to the No-Action Alternative for the same timeframe. For example, FAA would consider an increase from DNL 63.5 dB to DNL 65 dB a significant impact.

Special consideration needs to be given to the evaluation of the significance of noise impacts on noise sensitive areas within national parks, national wildlife refuges and historic sites, including traditional cultural properties. An area is defined by the FAA as noise-sensitive if noise interferes with normal activities associated with the area's use. Examples of noise-sensitive areas include residential, educational, health, and religious structures and sites, and parks, recreation areas (including areas with wilderness characteristics), wildlife refuges, and cultural and historic sites where a quiet setting is a generally recognized feature or attribute.

3.2.3 Existing Conditions

This section establishes current noise levels and discusses sources of noise with the potential to cause environmental impacts where aircraft dominate noise levels heard on the ground. Noise modeling DNL values are calculated based on military activity in the airspace.

3.2.3.1 Subsonic Noise

Subsonic noise in military airspace has been studied by measurement and analysis of operations and noise in airspaces (Frampton *et al.* 1993; Lucas *et al.* 1995), and by computer modeling of those analyses (Lucas and Calamia 1996). The computer program MR_NMAP (MOA-Range NOISEMAP) was used to calculate subsonic aircraft noise beneath the existing Powder River airspace.

Figure 3.2-1 is a close-up of the Powder River A/B MOAs from Figure 3.1-15 showing the B-1 maneuvers as silver lined loops and curves within the Powder River A/B MOAs. These maneuvering flights can be seen on Figures 3.1-14, 3.1-15, 3.1-16, 3.1-20, 3.1-21, and 3.1-22.

In existing Powder River airspace, flights are typically widely dispersed within the airspace, although not along the airspace edges, and, over the long-term, are randomly located as depicted in Figure 3.2-1. Such non-predetermined or random flights are an important part of training. Military aircrews must learn to be flexible, and cannot become accustomed to particular landmarks, although visual reference points may be used as part of individual training missions. Over a period of time with several training missions, no one location under a training airspace is expected to experience substantially different flight activity from another, as depicted in Figure 3.2-1, locations around the edge of an airspace unit could be overflown less frequently than locations deeper within the airspace. The appropriateness of modeling MOA flight paths and noise as random has been recently affirmed by analysis of specially-collected radar data in Idaho airspace (Bradley *et al*. 2003) and noise monitoring in that same airspace (Fidell *et al*. 2003). As a result of this wide distribution of flights, noise events heard on the ground are sporadic. On some days, no aircraft would be heard, and on other days, one or more aircraft at different altitudes and distances could be heard.

The airspace ROI does not segment the MOAs or ATCAAs to calculate DNL values. For noise analysis, several altitude ranges, with different altitude bands, are used as appropriate for each mission flown (see Tables 2-15, 2-19, and 2-23). An aircraft at low altitude generates high noise levels directly under the flight path, but has a relatively short duration and a relatively narrow ground area affected. A B-1 aircraft at 500 feet AGL may not be heard a mile to the side, particularly if terrain is between the aircraft and the receptor. Estimates of noise levels in this document do not account for effects of terrain on noise propagation. Aircraft at high altitudes generate lower maximum noise levels, but the noise exposure, or noise footprint, is larger than at low levels (Figure 3.2-2). The noise generated by aircraft flying at high altitudes may last for over a minute and may be heard several miles to either side of the flight path. As noted in Section 3.2.1, the duration of a noise is important in determining its impacts. Table 3.2-1 lists SEL values for several aircraft types at various altitudes.

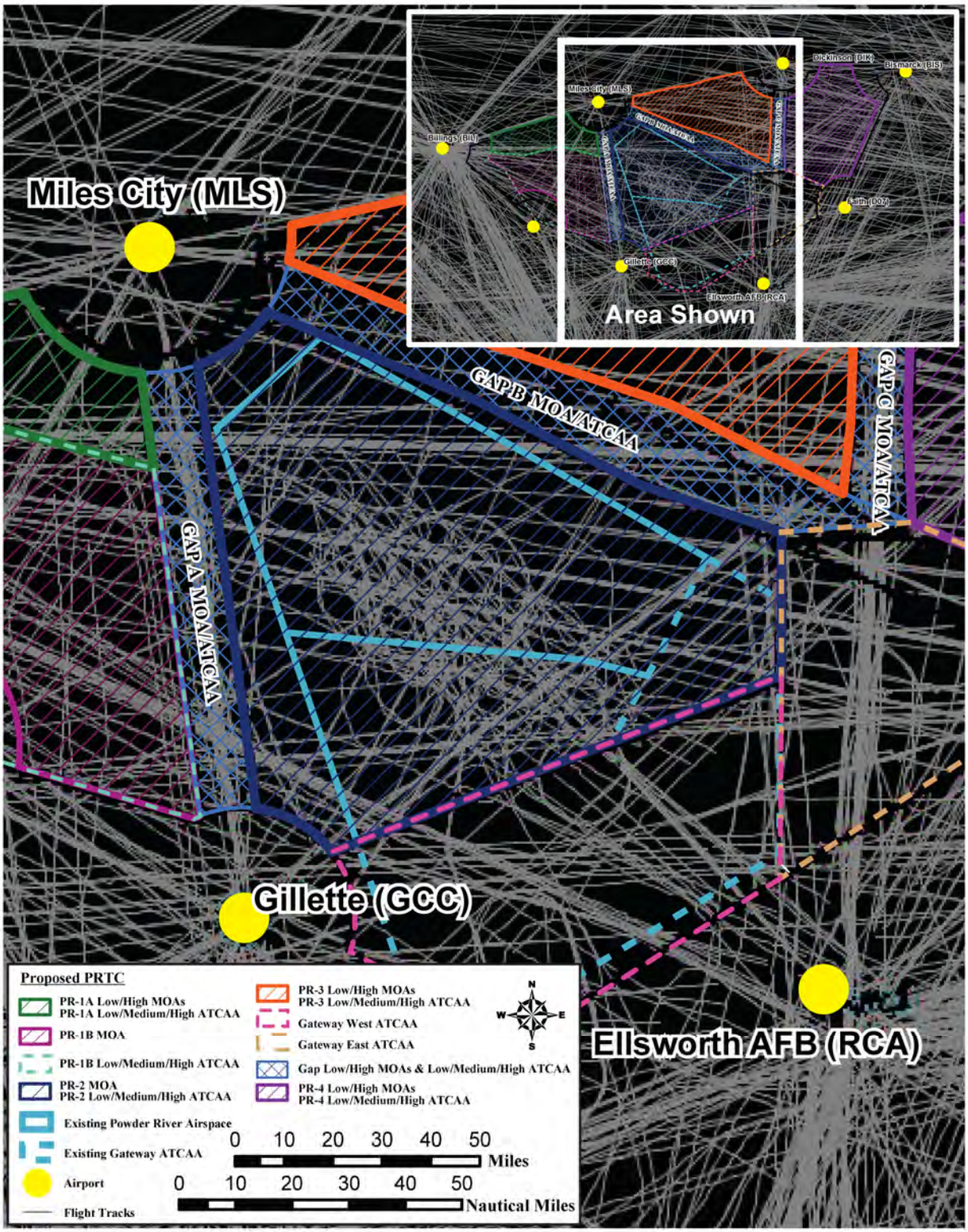


Figure 3.2-1. B-1 Random Flight Paths on Powder River A/B MOAs

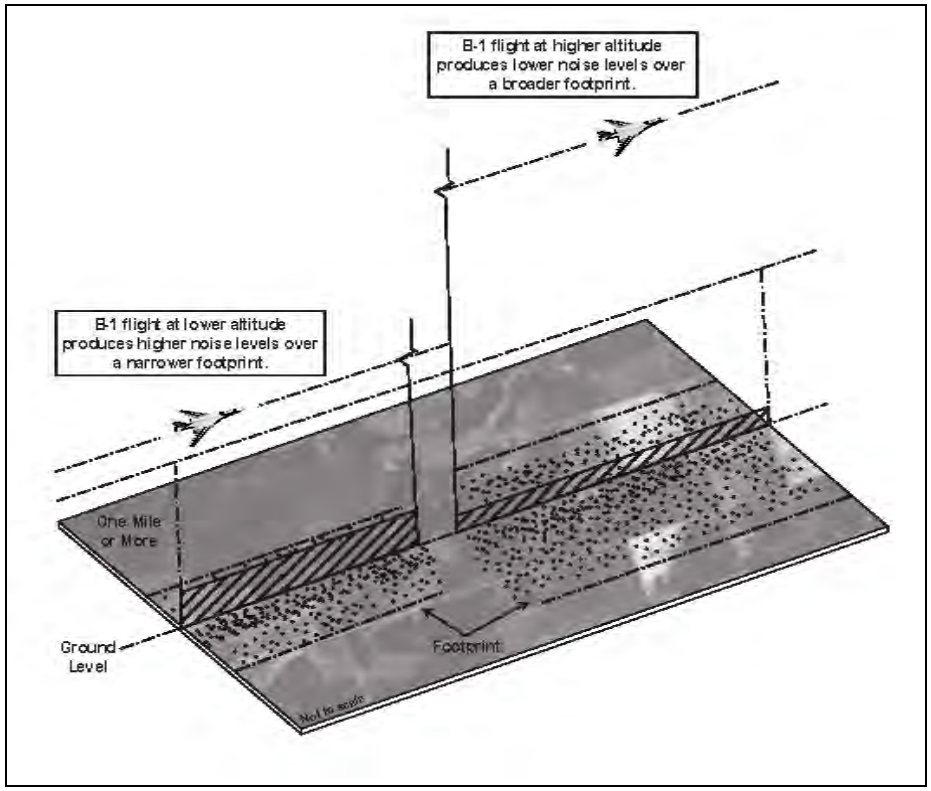


Figure 3.2-2. Depiction of B-1 Noise Footprint at Lower and Higher Flight Paths

Aircraft power settings and airspeeds vary during training missions as the aircrews adjust aircraft configuration to carry out training maneuvers. For example, when a B-1 aircrew encounters a simulated threat, the aircrew may engage in an evasive maneuver, which typically consists of a sharp turn at high power settings followed by a speedy egress from the area. During such maneuvers, the afterburner may be used.

Table 3.2-1 lists separate noise levels for the afterburner power setting because noise levels are much higher than they are without afterburner. Aircrews exercise strict discipline when using the afterburner to conserve fuel and to avoid unintentional supersonic flight.

Afterburners are used during B-1 "fly-ups" procedures which simulates malfunction of the aircraft's automatic terrain following systems and consists of the aircraft climbing very quickly to an altitude at which terrain no longer poses a collision threat. This procedure is carried out once per sortie on average. Known sensitive noise receptors such as people, animals, or structures are avoided where possible, because any such receptors located behind the aircraft when it starts its climb experience high noise and vibration levels.

B-1 afterburner fly-ups, typically conducted once per mission, simulate malfunctions of the aircraft automatic terrain following system. Photo courtesy of A.S. Elliott

Table 3.2-1. Representative Onset Rate-Adjusted Sound Exposure Levels (SEL_r) Under the Flight Path for Various Aircraft Types and Flight Altitudes

Aircraft Type	*Airspeed (knots)*	*Power Setting*	ALTITUDE (FEET AGL)					
			500	*1,000*	*2,000*	*5,000*	*10,000*	*20,000*
B-1B	550	101% RPM	117	107	101	92	82	69
B-1B	449	A/B - 97.5% RPM	133	122	115	106	98	89
B-52H	350	4,500 LBS/HR	N/A	100[1]	92	82	68	56
F-16C[2]	450	99% NC	113	104	98	88	80	69
KC-135R	300	65% NF	N/A	88[1]	82	75	64	54
Twin Engine[3]	160	600 LBS	81	75	70	63	53	43
Single-Engine[4]	160	70% RPM	77	72	67	59	53	46

Notes: SEL was calculated under standard acoustic atmospheric conditions (70°F and 59 percent relative humidity)
1. B-52s and KC-135s do not fly lower than 1,000 feet AGL in Powder River MOA airspace.
2. F-16C with F110-GE-100 engine.
3. Cessna 500 "Citation."
4. Single-Engine Fixed-Pitch Propeller-Driven

NC = Core Engine Fan Speed; RPM = Revolutions Per Minute; LBS/HR = Pounds Per Hour; LBS = Pounds of thrust A/B= afterburner

Military aircraft are not the only source of sound in an ROI and where new airspace is proposed, noise from military aircraft over flights with background or "ambient" noise in addition to evaluating the military aircraft noise on an absolute basis. Ambient noise levels in metropolitan, urbanized areas typically range from 60 to 70 dB whereas in quiet suburban neighborhoods they range from approximately 45-50 dB DNL (USEPA 1978). The vast majority of the ROI for this proposed action consists of rural areas in which noise levels would be less than 45 dB DNL. For the purpose of this study, a DNL of 'less than 45 dB' was used as the ambient level for determining human annoyance effects. However, levels below 45 dB DNL are not specifically identified because 45 dB DNL represents the level at which social surveys resulted in a finding of less than 1 percent of the population which would be expected to become highly annoyed (Schultz, 1978; Finegold, et al., 1994).

Noise models were used to calculate aircraft-generated noise levels. Table 3.2-2 shows aircraft-generated noise levels under the MOAs and ATCAAs. The noise levels under the ATCAAs are less than 45 dB DNL. This means that aircraft noise under the ATCAAs would not be expected to quantitatively affect the ambient noise conditions.

DNLmr has been computed for aircraft noise in the areas under each current Powder River airspace unit and is presented in Table 3.2-2. The analysis incorporated operations of the Ellsworth-based B-1 and Minot-based B-52 aircraft, as well as transient fighter aircraft (see Section 2.8.2). The F-16C was the most common type of transient aircraft in the Powder River airspace and was used to represent other transient users of the airspace.

Where aircraft fly at different altitudes, the aircraft noise at ground level is the combination of all the flights above the ground. Table 3.2-2 and Figure 3.2-3 show the calculated total aircraft noise and estimated noise on the ground. For the purposes of noise analysis, it was assumed that B-52 training operations would occasionally occur in the MOAs. The noise levels reported reflect approximately 20 percent of total B-52 operations in the Powder River airspace occurring in MOAs and approximately 80 percent occurring in ATCAAs.

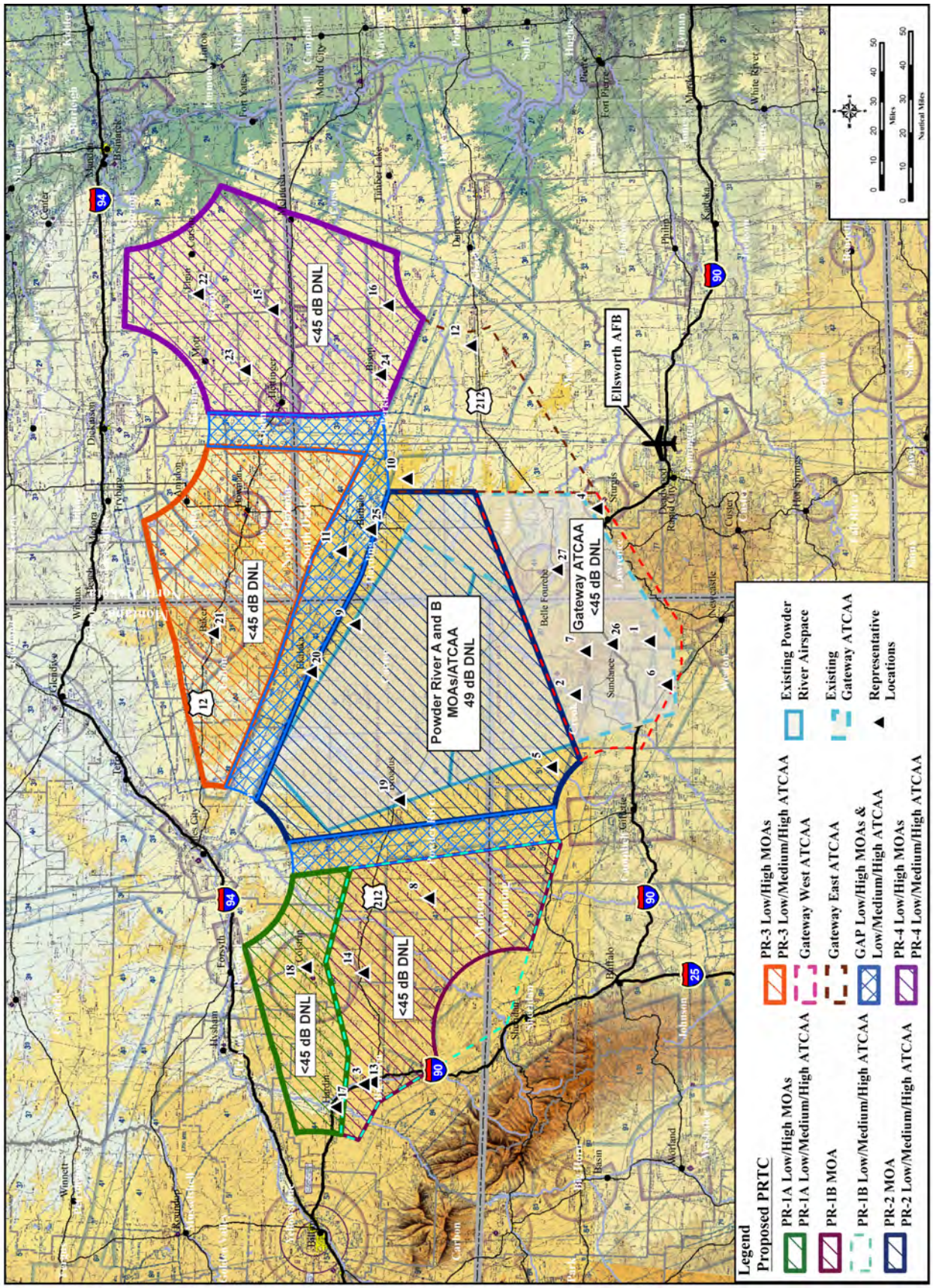


Figure 3.2-3. Estimated Baseline Noise Levels in DNL Under Existing and Proposed Airspace With Representative Locations

Table 3.2-2. Baseline Aircraft Noise Levels Under Existing Airspace

Airspace	*DNLmr*	NUMBER OF EVENTS/ DAY AT A REPRESENTATIVE LOCATION EXCEEDING		
		SEL 65 dB	*SEL 75 dB*	*SEL 85 dB*
Powder River A MOA	49	0.26	0.12	<0.0
Powder River B MOA	49	0.8	0.23	<0.1
Gateway ATCAA	<45	0.4	0.1	<0.1

Note: 1. Operations in the ATCAAs do not contribute to the cumulative noise levels on the ground, which are dominated by MOA noise. However, individual overflight events in the ATCAAs would be audible on the ground as reflected by the listed number of events exceeding 65, 75, and 85 dB SEL.
2. Information on baseline sorties by types of aircraft are provided in Section 2.8.2

The cumulative metric DNLmr is widely used to quantify sound levels which are subject to additional noise penalties for environmental night (10 PM to 7 AM) and sudden onset sounds in the proposed airspace (see Appendix H). Cumulative noise metrics represent the overall noise level in an area and not the noise heard at any given time. Table 3.2-2 shows, in addition to DNLmr, the average number of events per day with SEL_r above 65 and 90 dB that a person under each proposed airspace unit at any representative location is likely to hear. These quantities are computed by MRNMAP (Lucas and Calamia 1996).

The noise environments shown in Table 3.2-2 and Figure 3.2-3 fall into two categories:

- ATCAA airspace with operations above 18,000 feet MSL. DNLmr noise levels in these areas from aircraft are calculated to be below 35 dB DNLmr.
- MOA airspace with training flight operations from a floor of 500 feet AGL or 1,000 feet AGL to FL180. DNLmr in these MOAs from aircraft is approximately 49 dB.

It is important to note that the ambient noise in the ROI is typically below 45 dB DNL. Under the Gateway ATCAA, military aircraft overflights would not result in an increase in overall average noise level to greater than 45 dB DNLmr.

Broadus is typical of an established small community under the airspace. Broadus is under the edge of the existing Powder River A MOA and would have an estimated existing DNLmr of less than 45 dB.

The frequency of noise events exceeding an SEL of 65, 75, and 85 dB at several representative noise sensitive locations are presented in Table 3.2-3. Figure 3.2-3 shows the representative noise sensitive locations relative to the existing Powder River airspace and the proposed PRTC.

Ellsworth AFB has established avoidance areas under the Powder River A/B MOAs to reduce noise and overflight above communities, ranches, and other noise-sensitive locations. The number and location of noise avoidance areas limit defensive reaction maneuvering in low-altitude training and create patterns that constrain diversity in some training. Avoidance areas force more training to higher altitudes and reduce training quality. Pilots are instructed to avoid known noise-sensitive avoidance areas by a specified vertical and horizontal distance. Such avoidance areas include known seasonal ranching operations such as calf weaning and branding.

Table 3.2-3. Average Frequency of Military Aircraft Noise Events at Selected Noise-Sensitive Locations

ID#	General Description		Baseline # Events Per Day Exceeding		
		Baseline Airspace	65 dB SEL	75 dB SEL	85 dB SEL
1	Inya Kara Mountain	Gateway ATCAA	0.4	0.1	<0.1
2	Devils Tower [2]	Gateway ATCAA	0.4	0.1	<0.1
3	Little Bighorn Battlefield National Monument [3]	None	n/a	n/a	n/a
4	Bear Butte	None	n/a	n/a	n/a
5	Thunder Basin National Forest (northern section)	None	n/a	n/a	n/a
6	Thunder Basin National Forest (southern section)	Gateway ATCAA	0.4	0.1	<0.1
7	Black Hills National Forest	Gateway ATCAA	0.4	0.1	<0.1
8	Custer National Forest (western section)	None	n/a	n/a	n/a
9	Custer National Forest (central section)	Powder River A	0.6	0.2	<0.1
10	Custer National Forest (southeastern section)	none	n/a	n/a	n/a
11	Little Missouri National Grassland	none	n/a	n/a	n/a
12	Grand River National Grassland	none	n/a	n/a	n/a
13	Crow Native American Reservation (Crow Agency, MT)	none	n/a	n/a	n/a
14	Northern Cheyenne Native American Reservation (Lame Deer, MT)	none	n/a	n/a	n/a
15	Standing Rock Native American Reservation	none	n/a	n/a	n/a
16	Cheyenne River Native American Reservation	none	n/a	n/a	n/a
17	Hardin, MT	none	n/a	n/a	n/a
18	Colstrip, MT	none	n/a	n/a	n/a
19	Broadus, MT [4]	Powder River A MOA	0.6	0.2	0.1
20	Ekalaka, MT	none	n/a	n/a	n/a
21	Baker, MT	none	n/a	n/a	n/a
22	Elgin, ND	none	n/a	n/a	n/a
23	Bowman, ND	none	n/a	n/a	n/a
24	Bison, SD	none	n/a	n/a	n/a
25	Buffalo, SD	none	n/a	n/a	n/a
26	Sundance, WY	Gateway ATCAA	0.4	0.1	<0.1
27	Belle Fourche, SD	Gateway ATCAA	0.4	0.1	<0.1

Notes:

1. Because several of the listed noise-sensitive areas are very large, locations were selected from within the designated areas that are near the center of proposed airspace units.
2. Devils Tower published aircraft avoidance area is 5 NM horizontally and 18,000 feet AGL
3. Little Bighorn Battlefield published aircraft avoidance area is ¾ NM horizontally and 2,000 feet AGL.
4. Broadus, MT published aircraft avoidance area is 3 NM horizontally and 1,500 feet AGL

3.2.3.2 Supersonic Noise

Supersonic aircraft flight is not currently permitted in the Powder River airspace. Speed is an essential component to B-1 survivability in high-threat environments and airspeeds may come close to Mach 1

during certain portions of training events. In the extremely rare event that an aircraft inadvertently achieves supersonic speeds, actions are taken by the aircrew to decrease speed. Overall, supersonic flight and resulting sonic booms are rare under baseline conditions.

3.3 Safety

3.3.1 Definition of the Resource

This section addresses ground safety and flight safety associated with operations conducted within the ROI consisting of the existing Powder River airspace and proposed PRTC airspace. Training operations would be conducted in proposed military training airspace. The ROI for safety is the same as the ROI for airspace management.

3.3.2 Regulatory Setting

The Air Force defines four major categories of aircraft mishaps: Classes A, B, C, and E, which includes High Accident Potential. Class A mishaps are defined as those which result in one or more of the following: a loss of life, permanent total disability, a total cost in excess of $1 million, or destruction of an aircraft. Class B mishaps result in total costs of more than $200,000, but less than $1 million, result in permanent partial disability or inpatient hospitalization of three or more personnel. Class C mishaps involve reportable damage of more than $20,000, but less than $200,000; an injury resulting in any loss of time from work beyond the day or shift on which it occurred, or occupational illness that causes loss of time from work at any time; or an occupational injury or illness resulting in permanent change of job. High Accident Potential events are any hazardous occurrence that has a high potential for becoming a mishap. For the proposed PRTC, all categories of impacts below Class A impacts would be expected to occur on or in association with the base. Class C mishaps and High Accident Potential, the most common types of accidents, represent relatively unimportant incidents because they generally involve minor damage and injuries, and rarely affect property or the public.

During scoping, most concerns centered on the potential for Class A mishaps because of their potentially catastrophic results. Concerns included crashes into the ground or mid-air crashes. Other safety issues identified during scoping were the inability to have radio frequency communication to learn the training activity within a MOA, the inability to know when a B-1 could traverse an area at a low level and at a high rate of speed, and the safety risk from flare usage in an arid environment.

3.3.3 Existing Conditions

This section addresses communication, flight, ground, and bird-aircraft strike baseline safety conditions within the proposed PRTC airspace.

3.3.3.1 Communication within the Airspace

Public and agency comments during scoping noted the limited radar and radio frequency communication and tracking capabilities under the rural parts of the airspace. As noted in Section 3.1, the proposed PR-2 and PR-3 airspaces, especially, as well as the eastern PR-1A/1B airspace and western PR-4 airspace, have limited communication or tracking capabilities.

FAA reviewers noted that V-120 southeast of Miles City, MT, between the proposed PR-2 and PR-3 and beyond, does not have radar coverage below 13,000 feet MSL. Radar coverage is unavailable below 16,000 feet MSL along V-491 and, especially, south of V-120. During mechanical or severe weather problems, radar coverage from the two radar locations at Gettysburg or Watford City can be out of service. If either radar site is out of service, radar coverage in the proposed PR-2 to PR-3 and western PR-4 can be lost below 37,000 feet MSL. The 50-NM area between Dupree, SD and Miles City, MT does

not have radio frequency coverage below 18,000 feet MSL. This creates safety concerns with no radar coverage and limited or no communication.

The great distances between navigational aids in this region affect the route widths for low altitude en route traffic. With limited or no ability to communicate, the majority of low-altitude traffic flies direct routing. This can be seen as the straight lines crossing the MOAs in Figures 3.1-14, 3.1-15, 3.1-20, and 3.1-21. Navigational aids are inadequate for Victor Airways V-2/465 to the north, V-86 to the south, V-120 through the Gap B MOA, V-254 through the Gap A MOA, and V-491 through the Gap C MOA. The minimum en route altitude for IFR traffic for V-120 is 10,000 feet MSL due to the signal reception distance of 105 NM. The distance between navigational aids along V-120 is 196 NM. The minimum en route altitude along V-491 is 9,000 feet MSL due to the signal distance of 84 NM. The distance between navigational aids on V-491 is 173 NM.

Limited radio communication and radar tracking through much of the area results in general aviation pilots typically not flying on established Victor Airways, but rather flying much of the time direct using GPS coordinates. Figures 3.1-13 through 3.1-15 and 3.1-19 through 3.1-22 show the dispersed nature of flights below Class A airspace. This dispersed nature of flight patterns spreads aircraft out and creates a perception of improved safety with increased airspace volume per aircraft.

As described in Section 3.1, the commercial traffic, typically at altitudes above FL300, can be approximately 400 flights per day with up to approximately 80 flights per day in specific airspace segments. The jet routes which traverse the proposed PRTC airspace provide for commercial and other high flying aircraft to be safely directed by air traffic control services. During east coast congestion or Midwest weather conditions, the CAN routes which overfly this area are used to safety regulate traffic. Adequate communication exists to safety provide for these high-altitude commercial and other flights above FL300.

3.3.3.2 Flight Safety

One public concern during scoping with regard to flight safety was the potential for aircraft accidents. Such mishaps may occur as a result of weather-related accidents, mechanical failure, pilot error, mid-air collisions, collisions with manmade structures or terrain, or bird-aircraft collisions. Flight safety risks apply to all aircraft; they are not limited to the military. The Air Force defines four categories of aircraft mishaps described in Section 3.3.1.

It is impossible to predict the precise location of an aircraft accident, should one occur. Improved system awareness and sensing capabilities installed on B-1s for combat have the benefit of improved tracking and avoidance of light aircraft. Should a B-1 accident occur, the major consideration is loss of life followed by damage to property. The aircrew's ability to exit from a malfunctioning aircraft is dependent on the type of malfunction encountered. The probability of an aircraft crashing into a populated area is extremely low, but it cannot be totally discounted. Several factors are relevant to the existing Powder River MOAs and the proposed PRTC airspace complex. The area under the proposed airspace and the immediately surrounding areas have low population densities. During training in the existing Powder River airspace, pilots are instructed to avoid direct overflight of population centers at very low altitudes. The limited amount of time an aircraft is over any specific geographic area limits the probability of an impact of a disabled aircraft in a populated area.

Secondary effects of an aircraft crash include the potential for fire or environmental contamination. Again, because the extent of these secondary effects is dependent on the situation, they are difficult to quantify. A crash of any aircraft can cause damage and/or loss of life. The terrain overflown in the ROI is diverse. For example, should a mishap occur in highly vegetated areas during a hot, dry summer, such a mishap would have a higher risk of extensive fires than would a mishap in more barren and rocky

areas during the winter. When an aircraft crashes, it may release hydrocarbons. The petroleum, oils, and lubricants not consumed in a fire could contaminate soil and water. The potential for contamination is dependent on several factors. The porosity of the surface soils will determine how rapidly contaminants are absorbed. The specific geologic structure in the region will determine the extent and direction of the contamination plume. The locations and characteristics of surface and groundwater in the area will also affect the extent of contamination to those resources.

Based on historical data on mishaps at all installations, and under all conditions of flight, the military services calculate Class A mishap rates per 100,000 flying hours for each type of aircraft in the inventory. These mishap rates do not consider combat losses due to enemy action. B-1 aircraft have a lifetime Class A mishap rate of 4.32 over the approximately 3 to 5 million hours since the aircraft entered the Air Force inventory during Fiscal Year (FY) 1985. B-52 Aircraft have a rate of 1.27 with over 7 million flight hours since entering the inventory in 1955. Table 3.3-1 presents Class A mishap rates for aircraft flown in the Powder River MOA/ATCAA airspace. These mishap rates demonstrate that the B-1 and representative transient F-16 fighters have mishap rates greater than the B-52. There has been one aircraft crash reported in the Powder River airspace since 1978 (Ellsworth AFB 2010).

Table 3.3-1. Projected Class A Mishap Rates for Aircraft

Aircraft	*Lifetime Mishap Rates per 100,000 Flight Hours*[1]	*Baseline Annual Hours in Powder River airspace*	*Years Between Projected Mishaps*
B-52	1.27	218	361.2
B-1	4.32	1,060	21.8
F-16[2]	3.98	4	6,281.4

Note: 1. Lifetime thru FY07 B-52 Calendar Year(CY) 55-FY 08, B-1 CY84-FY07
2. Representative transient aircraft.
Source: Air Force Safety Center 2009

Aircrews at Ellsworth flew their first B-1 training sortie in CY 1984. Since then, Ellsworth-based B-1s have been involved in three engine-related Class A incidents and three other incidents, one on Ellsworth involving an engine, one in Power River airspace which resulted in loss of the aircraft and one aircraft loss during a non-local training mission. Since the value of the engines exceeded $1 million, they were recorded as a Class A mishaps. This Class A event within the Powder River Airspace was noted by public during scoping meetings on this EIS. Citizens incurring damage from Ellsworth AFB mishaps need to contact Ellsworth AFB directly to inquire about the damage claims process. The Air Force has an established claims process for citizens who have damages as a result of aircraft training activities. This process is initiated through contact with a base's Public Affairs Office.

The 28 BW maintains detailed emergency and mishap response plans to react to an aircraft accident, should one occur. These plans assign agency responsibilities and prescribe functional activities necessary to react to major mishaps, whether on or off base. Response would normally occur in two phases.

The initial response focuses on rescue, evacuation, fire suppression, safety, elimination of explosive devices, ensuring security of the area, and other actions immediately necessary to prevent loss of life or further property damage. The initial response element consists of those personnel and agencies primarily responsible to initiate the initial phase. This element will include the Fire Chief, who will normally be the first On-scene Commander, firefighting and crash rescue personnel, medical personnel, security police, and crash recovery personnel. A subsequent response team will be comprised of an array of organizations whose participation will be governed by the circumstances associated with the mishap and actions required to be performed.

The Air Force has no specific rights or jurisdiction just because a military aircraft is involved. Regardless of the agency initially responding to the accident, efforts are directed at stabilizing the situation and minimizing further damage. The second, or investigation phase, is accomplished next. If the accident has occurred on non-federal property, a National Defense Area will normally be established around the accident scene and the site will be secured for the investigation phase. The landowner or land managing agency would be informed of the incident. Should there be a potential for environmental contamination from fuels or other materials, base environmental and security personnel will work together, and with the owner or managing agency personnel to identify, isolate, and clean up any contaminating materials. After all required actions on the site are complete, the aircraft will be removed and the site cleaned up to the extent possible.

A Class A mishap can result in metal debris on the ground. The extent of the debris field depends upon the aircraft accident. The Air Force makes every effort to locate, document, and then clean up debris resulting from the accident. This cleanup is performed to reconstruct the cause of the accident and to restore the accident site as much as possible. Small pieces may be missed in any cleanup process and remain at the crash site.

Public scoping comments expressed concern that tall structures on the ground have the potential to create hazards to flight. The FAA provides detailed instructions for the marking of obstructions (i.e., paint schemes and lighting) to warn pilots of their presence. Appendix I provides the main text of the applicable FAA circular. Any temporary or permanent structure that exceeds an overall height of 200 feet (61 meters) AGL or exceeds any obstruction standard contained in 14 CFR Part 77, should normally be marked and/or lighted. The FAA may also recommend marking and/or lighting a structure that does not exceed 200 feet AGL or 14 CFR Part 77 standards because of its particular location (FAA 2000). The obstruction standards in 14 CFR Part 77 are primarily focused on structures in the immediate vicinity of airports and approach and departure corridors from airports (14 CFR Part 77 2008).

There are a variety of communication, transmission, and wind farms within, and on the periphery of, the proposed PRTC airspace. These towers or high structures are marked with lighting, as noted above, and are mapped on updated aeronautical charts.

During scoping, public and agency concern was expressed regarding local emergency activities which could occur during the time when the MOA was activated. As explained in Section 3.1, in cases of emergency, such as air ambulance, law enforcement, or firefighting, which required ATC clearance, the Air Force has agreed-to procedures for the existing Powder River airspace. The Air Force immediately responds to ATC direction and relocates the B-1 or other aircraft training from the emergency needed airspace. This means that if a B-1 were flying in proposed PR-1A MOA and an emergency flight were required, the training aircraft would either move to the PR-1A ATCAA, move to another already activated MOA, or return to base, depending upon the extent and duration of the emergency. The training aircraft would not be able to move to an unactivated, unscheduled MOA and begin training because there would be a two-hour advance NOTAM to activate a MOA "other times by NOTAM." There are not adequate communication capabilities in the area to safely notify a civil aircraft in the airspace that military training aircraft were now using the airspace. If adequate communication was possible, and a MOA were activated by NOTAM, communication would be required with any aircraft flying IFR or VFR in the airspace. IFR flight would not be possible in an activated MOA although VFR aircraft could transit the airspace using see-and-avoid.

Scoping comments expressed concern for wake vortices on light aircraft from low level flight of large aircraft, such as the B-1 or B-52. As a plane travels through the air, the trail of disturbed air that follows the aircraft as it passes through the atmosphere is called the wake vortex. Wake vortices can cause a brief period of unstable air which could affect other aircraft. Air traffic control at airports will typically

sequence aircraft using time or distance for departures or arrivals to avoid wake vortices. There have not been any reported incidents of pilots encountering wake vortices while traversing an active existing Powder River MOA. The relatively small number of training military aircraft would make it unlikely that a B-1 or B-52 undissipated wake vortex would be in the exact location traversed by a civil aircraft flying VFR in an active MOA.

3.3.3.3 Ground Safety

Day-to-day operations and maintenance activities conducted by the 28 BW are performed in accordance with applicable Air Force safety regulations, published Air Force Technical Orders, and standards prescribed by Air Force Occupational Safety and Health requirements.

Ellsworth AFB fire and emergency services meet all established Air Force staffing and equipment standards. Should extraordinary requirements occur, the Ellsworth AFB Fire Department has established mutual aid support agreements with the nearby community of Rapid City (Air Force 2001e).

During the Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) process and public scoping, the risk of fire was a ground safety issue noted by commentors. The surface environment under the proposed PRTC consists of high plains with range, farming, timber, mining, and other resource-dependent activities. These activities are very sensitive to wildfires. Fast moving range fires can result in substantial damage to rangeland, infrastructure such as fencing, water distribution systems, outbuildings, livestock, and wildlife. Fire risk throughout the area is ever present from natural lightning strikes and human activity. Aerial fire observation and fire suppression occurs throughout the four states under the proposed PRTC.

The National Fire Danger Rating System is a set of computer programs and algorithms that allow land management agencies to estimate fire danger for a given rating area. National Fire Danger Rating System characterizes fire danger by evaluating the approximate upper limit of fire behavior in a fire danger rating area during a 24-hour period. Calculations of fire behavior are based on fuels, topography, and weather. The National Fire Danger Rating System gives relative ratings of the potential growth and behavior of any wildfire. Fire danger ratings are guides for initiating pre-suppression activities and selecting the appropriate level of initial response to a reported wildfire. The National Fire Danger Rating System links an organization's readiness level (or pre-planned fire suppression actions) to the fire problems of the day (NOAA 2009).

Fire-danger ratings are relative, not absolute. In other words, when a component or index of the system doubles, a doubling of the fire activity or intensity should be expected. The National Fire Danger Rating System evaluates the worst conditions on a rating area by 1) taking fuel and weather measurements when fire danger is normally the highest (mid- to late-afternoon), 2) measuring fire danger in the open, and 3) measuring fire danger on south to west exposures. This means that extrapolation of fire danger to other areas not in the immediate vicinity of the fire danger stations would involve scaling the fire-danger values down, not up. The ratings and indices are interpreted in terms of fire occurrence and fire behavior.

A Red Flag Warning would be issued through the National Fire Danger Rating System when weather conditions could sustain extensive wildfire activity and meet one or more of the following criteria in conjunction with Very High or Extreme fire danger:

a. Sustained surface winds, or frequent gusts, of 25 miles per hour or higher.

b. Unusually hot and dry conditions (e.g., relative humidity less than 20 percent).

c. Dry thunderstorm activity is foreseen during an extremely dry period.

d. Any time the forecaster foresees a change in weather that would result in a significant increase in fire danger (e.g., very strong winds associated with a cold front even though the rangeland fire danger index is below the very high category, extensive lightning, etc.).

Ground safety risks identified during scoping meetings included those associated with mining operations, such as around Colstrip, MT. Substantial blasting occurs to support mining operations. Explosives are prepared and inserted at designated points identified for the mining operation. The explosives are armed and triggered electronically. Historically there was concern that two-way radio devices could have a frequency to trigger an explosive. Accordingly, vehicles within a blast zone were instructed to turn off their radios to reduce risk. The introduction of low flying, highly electronic emitting aircraft to a mining environment was identified as a safety risk by scoping participants.

Low-level subsonic and supersonic events have the potential to disturb loose surface materials through overpressure and vibration. Surface mining operations have the potential to have loose soils on slopes, which could be disturbed by low-level overflights or sonic booms.

Larger aircraft and lower altitudes produce a greater potential for a wake vortex effect on the ground. When the B-1 operates in the mid- to high-altitude range, it has no effect on ground structures. When a large aircraft operates at a low altitude, typically below 1,000 feet AGL, a wake vortex generated by the aircraft turbulence can strike the ground with the force of a brief, strong rotating wind. Extensive review of wake vortices has resulted in the conclusion that, under unique circumstances of aircraft size, altitude, configuration, and meteorological conditions, there is a possibility that wake vortex damage on the ground could occur.

The four-state region is subject to storm wind impacts and tornados. The area under the proposed PRTC airspace is subject to both high winds and tornados. Tornado damage in the area is usually minimal because of the relatively sparsely populated area. Tornados in the area are spawned by severe thunderstorm activity and typically occur in the early morning hours. Wake vortices currently occur within the existing Powder River airspace and do not generate tornado speed winds.

Under normal flight conditions, and all but rare atmospheric conditions, wake vortices from B-52 and B-1 low altitude flights would not generate sufficient velocities to damage structures or vehicles, or pose a hazard to people or animals on the surface. Under infrequent circumstances, such as unusual aircraft maneuvers, damage could occur to a structure, such as a stock watering windmill, which was facing into the normal wind and was impacted by a wake vortex which created a rapid strong wind force from a different direction and twisted the windmill (Jurkovich and Skujins 2006).

Modern wind machines, towers, and other tall structures are designed to withstand wind forces of the type which could result from a large low-flying aircraft. There have not been any documented reports of wake vortex problems with older stock windmills or otherwise from low-level B-1 training in the existing Powder River airspace. Should wake vortex damage occur, the Air Force has established procedures for damage claims that begin by contacting Ellsworth AFB Public Affairs.

3.3.3.4 Bird Strike Hazard

Bird-aircraft strikes constitute a safety concern because they can result in damage to aircraft or injury to aircrews or local populations if an aircraft crashes. Aircraft may encounter birds at altitudes up to 30,000 feet MSL or higher. However, most birds fly close to the ground. Over 97 percent of reported bird strikes occur below 3,000 feet AGL. Approximately 30 percent of bird strikes happen in the airfield environment, and almost 55 percent occur during low-altitude flight training (Air Force Safety Center 2002).

Migratory waterfowl (e.g., ducks, geese, and swans) are the most hazardous birds to low-flying aircraft because of their size and their propensity for migrating in large flocks at a variety of elevations and

times of day. Waterfowl vary considerably in size, from 1 to 2 pounds for ducks, 5 to 8 pounds for geese, and up to 20 pounds for swans. There are two normal migratory seasons, fall and spring. Waterfowl are usually only a hazard during migratory seasons. These birds typically migrate at night and generally fly between 1,500 to 3,000 feet AGL during the fall migration and from 1,000 to 3,000 feet AGL during the spring migration.

Along with waterfowl, raptors, shorebirds, gulls, herons, songbirds, and other birds also pose a wildlife strike hazard. The results of bird-aircraft strikes show that strikes involving raptors result in the majority of Class A and Class B mishaps related to bird-aircraft strikes. Soaring birds of greatest concern in the proposed PRTC airspace are vultures and red-tailed hawks. Peak migration periods for raptors are from October to mid-December and from mid-January to the beginning of March. In general, military training flights above 1,500 feet AGL would be above most soaring raptors.

Songbirds are small birds, usually less than one pound. During nocturnal migration periods, they navigate along major rivers, typically between 500 to 3,000 feet AGL. The potential for bird-aircraft strikes is greatest in areas used as migration corridors (flyways) or where birds congregate for foraging or resting (e.g., open water bodies, rivers, and wetlands). As shown in Figure 3.6-2 several flyways traverse the existing and proposed airspace.

In order to address the issues of aircraft bird strikes, the Air Force has developed The Avian Hazard Advisory System (AHAS) to monitor bird activity and forecast bird strike risks. Using Next Generation Radar (NEXRAD) weather radars and models developed to predict bird movement, the AHAS is an online, near real-time, geographic information system (GIS) used for bird strike risk flight planning across the continental United States and Alaska. Additionally, as part of an overall strategy to reduce Bird Aircraft Strike Hazard (BASH) risks, the Air Force has developed a Bird Avoidance Model (BAM) using Geographic Information System (GIS) technology as a key tool for analysis and correlation of bird habitat, migration, and breeding characteristics and is combined with key environmental and man-made geospatial data. The model was created to provide Air Force pilots and flight scheduler/planners with a tool for making informed decisions when selecting flight routes. The model was created in an effort to protect human lives, wildlife, and equipment during air operations. This information is integrated into required Pilot briefings which take place prior to any sortie. While any bird-aircraft strike has the potential to be serious, many result in little or no damage to the aircraft, and only a minute portion result in a Class A mishap. During the fiscal years 1985 to 2009, the Air Force Bird/Wildlife Aircraft BASH Team documented 86,189 bird strikes worldwide. Of these, 43 resulted in Class A mishaps where the aircraft was destroyed. These occurrences constituted approximately 0.05 percent of all reported bird-aircraft strikes (Air Force Safety Center 2010).

Bird-aircraft strike data from 1999 through 2007 indicate that Ellsworth-based aircraft experienced 11 bird strikes in the Powder River MOA in nine years. The majority, approximately 41 percent, occur during July, August, and September. The months of January, February, and March exhibit the lowest incidence of approximately 12 percent of recorded bird strikes. The largest number of strikes occurred in the existing Powder River B MOA.

3.4 Air Quality

3.4.1 Definition of the Resource

Air quality in a given location is defined by the size and topography of the air basin, the local and regional meteorological influences, and the type and concentration of pollutants in the atmosphere, which are generally expressed in units of parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). One aspect of significance is a pollutant's concentration in comparison to a national and/or

state ambient air quality standard. These standards represent the maximum allowable atmospheric concentrations that may occur and still protect public health and welfare and include a reasonable margin of safety to protect the more sensitive individuals in the population. National standards are established by the U.S. Environmental Protection Agency (USEPA). They are termed the National Ambient Air Quality Standards (NAAQS) and represent maximum acceptable concentrations that generally may not be exceeded more than once per year, except for the annual standards, which may never be exceeded. Under the Clean Air Act (CAA), state and local agencies may establish air quality standards and regulations of their own, provided these are at least as stringent as the federal requirements. The states of ND and WY have set their own ambient air quality standards for certain pollutants; while the states of MT and SD, in general, have adopted the federal NAAQS for all criteria pollutants. Table 3.4-1 presents a summary of the national and state ambient air quality standards that apply to the ROI.

Table 3.4-1. National and State Ambient Air Quality Standards

Pollutant	*Averaging Time*	*ND Standards*[2]	*WY Standards*[2]	*SD Standards*[2]	*MT Standards*[2]	NATIONAL STANDARDS[1]	
						Primary[2,3]	*Secondary*[2,4]
Ozone (O_3)	8-hour	0.075	0.08 ppm	0.075 ppm	0.075 ppm	0.075 ppm	SAP
Carbon monoxide (CO)	8-hour	9 ppm	9 ppm	9 ppm	9 ppm	9 ppm	—
	1-hour	35 ppm	35 ppm	35 ppm	23 ppm	35 ppm	—
Nitrogen dioxide (NO_2)	Annual	0.053 ppm	0.05 ppm	0.053 ppm	0.05 ppm	0.053 ppm	SAP
Sulfur dioxide (SO_2)	Annual	0.023 ppm	0.02 ppm	0.03 ppm	0.02 ppm	0.03 ppm	—
	24-hour	0.099 ppm	0.10 ppm	0.14 ppm	0.10 ppm	0.14 ppm	—
	3-hour	0.273 ppm[5]	0.50 ppm	—	—	—	0.5 ppm
Particulate matter less than 10 microns in diameter (PM_{10})	AAA	--	50 µg/m^3	--	50 µg/m^3	--	SAP
	24-hour	150 µg/m^3	150 µg/m^3	150 µg/m^3	150 µg/m^3	150 µg/m^3	SAP
Particulate matter less than 2.5 microns in diameter ($PM_{2.5}$)	AAA	15 µg/m^3	15 µg/m^3	15 µg/m^3	15 µg/m^3	15 µg/m^3	SAP
	24-hour	35 µg/m^3	35 µg/m^3	35 µg/m^3	35 µg/m^3	35 µg/m^3	SAP
Lead (Pb)	Calendar Quarter	1.5 µg/m^3	1.5 µg/m^3	1.5 µg/m^3	1.5 µg/m^3	1.5 µg/m^3	SAP
	Rolling 3-Mo. Average			0.15 µg/m^3		0.15 µg/m^3	SAP
Hydrogen Sulfide	Instantaneous[6]	10 ppm	70 µg/m^3	—	—	—	—
	1-hour[7]	0.2 ppm	40 µg/m^3	—	—	—	—
	24-Day	0.1 ppm	—	—	—	—	—
	3-month	0.02 ppm	—	—	—	—	—

Notes: (1) Standards, other than for ozone and those based on annual averages, are not to be exceeded more than once a year. The ozone standard is attained when the number of days above the standard in three continuous calendar years is less than four.
(2) Concentrations are expressed in units in which they were promulgated. Units shown as µg/m^3 are based upon a reference temperature of 25°C and a reference pressure of 760 mm of mercury.
(3) Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
(4) Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
(5) 1-hour average concentration.
(6) WY standard is based on ½-hour average not to be exceeded more than 2 times per year.
(7) WY standard is based on ½-hour average not to be exceeded more than 2 times in any five consecutive days.

Sources: USEPA 2010b, USEPA 2010c.
WY - http://deq.state.wy.us/aqd/stnd/Chapter2_2-3-05FINAL_CLEAN.pdf
MT - http://www.deq.state.mt.us/dir/legal/Chapters/CH08-02.pdf
ND - http://www.legis.nd.gov/information/acdata/pdf/33-15-02.pdf
SD - http://legis.state.sd.us/rules/DisplayRule.aspx?Rule=74:36:02:02
AAA = Annual Arithmetic Mean.
SAP = Same as Primary

Identifying the ROI for air quality requires knowledge of the types of pollutants being emitted, pollutant emission rates, topography, and meteorological conditions. The ROI for inert pollutants (pollutants other than ozone [O_3] and its precursors) is generally limited to a few miles downwind from a source. The ROI for O_3 can extend much farther downwind than for inert pollutants. In the presence of solar radiation, the maximum effect of volatile organic compounds (VOCs) and nitrogen oxides (NO_x) emissions on O_3 levels usually occurs several hours after they are emitted and many miles from the source. Therefore, the ROI for O_3 may extend beyond the four-state region overlapped by the proposed PRTC.

Air quality within the planning area for the proposed PRTC and its surroundings could be affected by emissions from operations associated with the Proposed Action or an alternative. This section describes the existing air quality resource of the planning area and applicable air regulations that could apply to the proposed action and alternatives. Figure 2-7 shows the location of the proposed PRTC with respect to states and counties in the planning area. The Proposed Action would involve airspace over the states of MT, ND, SD, and WY. Table 3.4-2 summarizes the counties in each state that are within the ROI of the proposed PRTC project. Most of the ROI attains all national and state ambient air quality standards, and the impacts to air quality have not been a substantial constraint to new activities or projects in the ROI.

Table 3.4-2. Counties within Each State Potentially Affected by the Proposed PRTC

State	*County*	*NAAQS Attainment Status*
MT	Carter	In attainment
	Powder River	In attainment
	Fallon	In attainment
	Custer	In attainment
	Rosebud	Portion non-attainment PM_{10}
	Treasure	In attainment
	Big Horn	In attainment
WY	Crook	In attainment
	Campbell	In attainment
	Sheridan	Portion non-attainment PM_{10}
	Weston	In attainment
SD	Harding	In attainment
	Butte	In attainment
	Perkins	In attainment
	Carson	In attainment
	Ziebach	In attainment
	Meade	In attainment
	Lawrence	In attainment
	Pennington	In attainment
ND	Bowman	In attainment
	Slope	In attainment
	Adams	In attainment
	Hettinger	In attainment
	Grant	In attainment
	Sioux	In attainment
	Morton	In attainment
	Stark	In attainment
	Golden Valley	In attainment
	Billings	In attainment

3.4.2 Regulatory Setting

The federal CAA and its subsequent amendments establish air quality regulations and the NAAQS and delegate the enforcement of these standards to the states. The states enforce air pollution regulations and set guidelines to attain and maintain the national and state ambient air quality standards within their regions. These guidelines are found in a State Implementation Plan (SIP) designed to eliminate or reduce the severity and number of NAAQS violations. Following is a summary of the federal and state air quality rules and regulations that may apply to emission sources associated with the proposed action and alternatives. This is an inclusive summary. Because the Proposed Action involves the addition of airspaces and aircraft sorties to operations that are currently in place, the sources of air pollution expected to result from the proposed action are primarily aircraft exhaust emissions within the PRTC airspace. The Proposed Action includes no defined additions to the number of stationary sources at ground bases or restricted areas, and no increased ground-based vehicular activity within the PRTC.

Prevention of Significant Deterioration. Section 162 of the CAA established the goal of prevention of significant deterioration (PSD) of air quality in all international parks; national parks which exceeded 6,000 acres; and national wilderness areas which exceeded 5,000 acres if these areas were in existence on August 7, 1977. These areas were defined as mandatory Class I areas, while all other attainment or unclassifiable areas were defined as Class II areas. Under CAA Section 164, states or tribal nations, in addition to the federal government, have authority to re-designate certain areas as (non-mandatory) PSD Class I areas, i.e., a National Park or national wilderness area established after August 7, 1977, which exceeds 10,000 acres. Class I areas are areas where any appreciable deterioration of air quality is considered significant. Class II areas are those where moderate, well-controlled growth could be permitted. The PSD requirements affect construction of new major stationary sources in the Class I, II, and III areas and are a pre-construction permitting system.

PSD Class I Areas. Federal Mandatory PSD Class I areas are listed under 40 CFR Part 81. The closest mandatory PSD Class I Federal area in the region which potentially could be affected by the Proposed Action is Wind Cave National Park, Pennington County, SD approximately 30 miles from the proposed action (USEPA 2008a). Additionally, Native American lands of the Northern Cheyenne Reservation in Rosebud and Big Horn Counties, MT have been designated as a Class I state area by the State of MT and are within the region which potentially could be affected by the Proposed Action (MT Department of Environmental Quality 2007).

Visibility. CAA Section 169A established the additional goal of prevention of further visibility impairment in the Class I areas. Visibility impairment is defined as a reduction in the visual range and atmospheric discoloration. Determination of the significance of an activity on visibility in a Class I area is typically associated with evaluation of stationary source contributions. The USEPA is implementing a Regional Haze rule for Class I areas that will address contributions from mobile sources and pollution transported from other states or regions.

General Conformity. CAA Section 176(c), General Conformity, requires that federal agency actions be consistent with the CAA and any approved SIP. To implement this mandate, the EPA promulgated the conformity rule for general federal actions in the 30 November 1993 *Federal Register* (58 FR 63214-63259) and it became effective on 31 January 1994. In 2006, the EPA revised the general conformity rule to include *de minimis* emission levels for particulate matter with a diameter equal to or less than 2.5 microns ($PM_{2.5}$) and its precursors. On 5 April 2010, EPA finalized revisions to the general conformity rule that improve on the methods federal agencies can use to demonstrate conformity (75 FR 17253-17279) (EPA 2010a). These revisions took effect on July 6, 2010. Federal activities must not:

(a) Cause or contribute to any new violation;

(b) Increase the frequency or severity of any existing violation; or

(c) Delay timely attainment of any standard, interim emission reductions, or milestones in conformity to a SIP's purpose of eliminating or reducing the severity and number of NAAQS violations or achieving attainment of NAAQS.

General conformity applies only to nonattainment and maintenance areas. If the emissions from a federal action proposed in a nonattainment or maintenance area exceed annual *de minimis* thresholds (typically, 100 tons per year) identified in the rule, a formal conformity determination is required of that action. The *de minimis* thresholds are more restrictive as the severity of the nonattainment status of the region increases.

Primary Pollutant Concerns. The pollutants of primary concern for this air quality analysis in the ROI include VOCs, NO_x, carbon monoxide (CO), nitrogen dioxide (NO_2), O_3, sulfur dioxide (SO_2), lead (Pb), particulate matter less than 10 microns in diameter (PM_{10}), and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$). Although VOCs and NO_x (other than NO_2) have no established ambient standards, they are important precursors to O_3 formation. O_3 is a secondary pollutant which formed in the atmosphere by photochemical reactions with these previously emitted precursors. In September 1997, the USEPA promulgated 8-hour O_3 (revised in 2008) and 24-hour and annual $PM_{2.5}$ NAAQS. Due to a lawsuit in May 1999, the U.S. Court rescinded these standards and the USEPA's authority to enforce them. Subsequent to an appeal of this decision by the USEPA, the U.S. Supreme Court in February 2001 upheld these standards. This action initiated a new planning process to monitor and evaluate emission control measures for these pollutants. An area will attain the 8-hour O_3 standard if its three-year running average of the annual fourth-highest daily maximum 8-hour O_3 concentration remains below 0.075 ppm. The 1-hour O_3 standard, as well as designations and classifications for all 1-hour O_3 nonattainment and maintenance areas, have been revoked (USEPA 2008c). As is the case for the ROI, implementation of the 8-hour O_3 standard replaced the existing 1-hour standard.

Greenhouse Gas Emissions. Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. These emissions occur from natural processes and human activities. The accumulation of GHGs in the atmosphere regulates the earth's temperature.

The most common GHGs emitted from natural processes and human activities include carbon dioxide (CO_2), methane, and nitrous oxide (N_2O). Examples of GHGs created and emitted primarily through human activities include fluorinated gases (hydro fluorocarbons and per fluorocarbons) and sulfur hexafluoride. Each GHG is assigned a global warming potential. The global warming potential is the ability of a gas or aerosol to trap heat in the atmosphere. The global warming potential rating system is standardized to CO_2, which has a value of one. For example, methane has a global warming potential of 21, which means that it has a global warming effect 21 times greater than CO_2 on an equal-mass basis and N_2O has a global warming potential of 310. Total GHG emissions from a source are often reported as a CO_2 equivalent (CO_2e). The CO_2e is calculated by multiplying the emission of each GHG by its global warming potential and adding the results together to produce a single, combined emission rate representing all GHGs.

The USEPA issued the Final Mandatory Reporting of Greenhouse Gases Rule on 30 October 2009 (USEPA 2009). This rule does not apply to mobile sources of GHGs and would not apply to the PRTC training activities. EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, was signed by President Bush on January 24, 2007. The EO instructs federal agencies to conduct their environmental, transportation, and energy-related activities in an environmentally, economically and fiscally sound, integrated, continuously improving, efficient, and sustainable manner. The EO requires federal agencies to meet specific goals to improve energy efficiency and reduce GHG emissions by

annual energy usage reductions of 3 percent through the end of fiscal year 2015, or by 30 percent by the end of fiscal year 2015, relative to the baseline energy use of the agency in FY 2003. According to EO 13423 § 8 (c) military tactical equipment and vehicles may be exempted from this EO. In general, EO 13423 applies to activities and operations at the installation rather than to aircraft training activities. Thus, the PRTC is exempt from EO 13423.

In addition to EO 13423, on October 5, 2009, President Obama signed *EO 13514, Federal Leadership in Environmental, Energy, and Economic Performance*, to establish an integrated strategy towards sustainability in the federal government and to make reduction of GHGs a priority for federal agencies. Under the Executive Order, the Air Force will be reporting a comprehensive inventory of GHG emissions, including such emissions associated with Powder River airspace operations, for Fiscal Year (FY) 2010 in early January 2011, and annually thereafter. The emissions reported will include all "Scope 1" emissions, which are all direct emissions of GHGs owned or controlled by the agency; all "Scope 2" emissions, which are all indirect emissions of GHGs from electricity, steam, or heat purchased by the agency; and all "Scope 3" emissions, which includes supply chain, business travel, and employee commuting emissions. The comprehensive GHG emissions inventories for FY 2010 and beyond will, among other things, include emissions from aircraft operations; tactical and highway vehicles; and non-road engines and equipment. While GHG emissions from aircraft and tactical vehicles and equipment will be reported annually beginning with FY 2010, these combat and combat support systems are not subject to the Executive Order's GHG emissions reduction target. The PRTC is exempt from EO 13423 due to the proposed activity. EO 13514 § 19 (h) identifies an exemption for non-road equipment, vehicles and equipment, including aircraft, that are used in combat support or training for such operations.

On 18 February 2010, the Council on Environmental (CEQ) issued for public comment draft guidance "Consideration for Effects of Climate Change and Greenhouse Gas Emissions", the first draft guidance on how federal agencies should evaluate the effects of climate change and GHG emissions for NEPA documentation (CEQ 2010).

3.4.3 Existing Conditions

The USEPA has designated all areas of the U.S. as having air quality better than (attainment) or worse than (nonattainment) the NAAQS. A nonattainment designation generally means that a primary NAAQS has been exceeded more than once per year in a given area. Areas without sufficient data to determine the attainment/nonattainment status are designated as unclassified. Most of the project region attains all national and state ambient air quality standards. Lame Deer, MT, located in Rosebud County, is nonattainment for PM_{10} and is under the proposed airspace. Outside the airspace, the Laurel area of Yellowstone County, MT is nonattainment for SO_2 and the City of Sheridan portion of Sheridan County, WY is nonattainment for PM_{10}. (USEPA 2008c). Many counties within the project ROI presently have no ambient air monitoring stations due to their rural nature and lack of point source emissions or other known air quality concerns. These areas are considered as unclassified and are assumed to be attainment areas from a regulatory standpoint.

Generally, concentrations of photochemical smog are highest during the summer months and coincide with the season of maximum solar insulation. Inert pollutant concentrations tend to be the greatest during periods of light winds, stable atmospheric conditions, and surface-based temperature inversions. These conditions limit atmospheric dispersion.

Table 3.4-3 presents the maximum pollutant levels monitored at locations within the project ROI from 2004 through 2007. The monitoring station locations shown in the table were selected because they are within or near the project ROI and are thought to be representative of general background conditions in the ROI and are directly related to point source emissions or heavily populated areas.

Table 3.4-3. Maximum Pollutant Concentrations Monitored in the Proposed PRTC Project ROI—2004-2007

Pollutant/Monitoring Station[2]	*Averaging Time/ Measurement*	MAXIMUM CONCENTRATION BY YEAR[1]			
		2004	*2005*	*2006*	*2007*
Ozone O_3					
Thunder Basin, WY	1-hour (ppm)	0.078	0.074	0.087	0.087
Wind Cave, SD		–	0.083	0.083	0.079
Billings County, ND		0.062	0.065	0.073	0.071
Thunder Basin, WY[3]	8-hour (1) (ppm)	–	0.068	0.075	0.081
Wind Cave, SD		–	0.070	0.073	0.069
Billings County, ND		0.055	0.059	0.066	0.064
Nitrogen Dioxide NO_2					
Thunder Basin, WY	Annual (ppm)	0.002	0.002	0.002	0.002
Wind Cave, SD		–	0.001	0.001	0.001
Thunder Basin, WY	1-hour (ppm)	0.029	0.021	0.032	0.021
Sulfur Dioxide SO_2					
Wind Cave, SD	Annual (ppm)	–	0.001	0.001	0.001
Billings County, ND		0.001	0.001	0.001	0.001
Wind Cave, SD	24-hour (ppm)	–	0.002	0.003	0.002
Billings County, ND		0.002	0.002	0.002	0.002
Wind Cave, SD	3-hour (ppm)	–	0.003	0.007	0.004
Billings County, ND		0.006	0.005	0.007	0.009
PM_{10}					
Lame Deer, MT	Annual Arithmetic Mean ($\mu g/m^3$)	22	22	23	22
Arvada, WY		14	16	16	14
Wind Cave, SD		–	7	7	10
Lame Deer, MT	24-hour ($\mu g/m^3$)	48	80	120	107
Arvada, WY		36	138	51	40
Wind Cave, SD		–	32	28	44
$PM_{2.5}$					
Lame Deer, MT	Annual ($\mu g/m^3$)	5.9	7.7	–	–
Wind Cave, SD		–	5.4	5.3	6.9
Billings County, ND		4.4	4.3	4.8	5
Lame Deer, MT	24-hour ($\mu g/m^3$)	22	34	–	–
Wind Cave, SD		–	16	17	22
Billings County, ND		9	12	19	18

Notes: 1. No monitoring data available for CO or Pb.
2. Lame Deer, Rosebud County, MT – Site ID 30-087-0307
Arvada Elementary School, Sheridan County, WY – Site ID 560330099
Thunder Basin Grassland, Campbell County, WY – Site ID 560050123
Wind Cave National Park, Custer County, SD – Site ID 460330132
Billings County, ND – Site ID 380070002
3. 8-hour O_3concentration of 0.081 for Thunder Basin, WY exceeds Federal and State NAAQS

Sources: WY Department of Environmental Quality 2007, MT Department of Environmental Quality 2003, SD Department of Environment and Natural Resources 2005, and USEPA 2008b.

Some of the affected ROI does not have any ongoing monitoring and there are very few ambient monitoring stations within the Proposed Action area, and very limited within the existing Powder River airspace footprint. Not all parameters are measured at all monitoring stations. CO and Pb data were not reported at any of the selected monitoring stations. Air quality in the project ROI is generally

considered excellent due to its rural nature, the presence of few substantial emission sources, and the relatively high wind speeds that aid in the dispersion of air pollutants. Only one monitoring location within the project ROI, Lame Deer, MT in Rosebud County reported exceedances of the PM_{10} NAAQS. This location is used to monitor potential human exposure from remote power generating facilities.

Annual baseline GHG emissions for aircraft combustive emissions were calculated for methane, N_2O, and CO_2 and for a total CO_2e. Table 3.4-4 shows the annual GHG emissions from baseline aircraft operations.

The coal-fired electrical plant at Colstrip in Rosebud County had two days in 2003 where PM_{10} emissions were exceeded. In 2008, the County did not exceed emission standards.

Table 3.4-4. Annual GHG Emissions from Baseline Aircraft Operations (metric tons/year)

State	*CO_2*	*Methane*	*N_2O*	*CO_2e*
MT	5,875.48	0.17	0.19	5,937.97
ND	-	-	-	-
SD	839.96	0.02	0.03	848.89
WY	2,807.74	0.08	0.09	2,837.60
Total	**9,523.18**	**0.27**	**0.31**	**9,624.46**

Regional Air Emissions

The USEPA estimates point, area, and mobile source emissions as part of their National Emission Trends database. While some states compile countywide emission inventories for stationary sources, an emissions inventory is not available for the combined proposed action area that includes parts of the states of MT, WY, SD, and ND. Therefore, emissions data were determined for some of the largest or most significant stationary sources in each state within or near the proposed PRTC ROI. The emissions data for 2002 (USEPA 2008b) in tons per year are summarized in Table 3.4-5. In general, the largest stationary sources of air emissions within the ROI are related to energy exploration and production. The region is very rural in nature with known coal, natural gas, and oil reserves. The coal power plants show the highest annual emissions for all parameters.

The only affected area under the proposed PRTC airspace ROI which has been identified as non-attainment area for the NAAQS is Rosebud County, MT and Sheridan County, WY. The area is identified as the Lame Deer and Sheridan non-attainment area in national records. Rosebud County includes the Colstrip mine, the larger communities of Colstrip and Lame Deer, smaller communities, and scattered ranches. In 2008, Rosebud County or Sheridan County did not exceed the NAAQS standards for PM_{10} or $PM_{2.5}$. Tables 3.4-6 and 3.4-8 summarize the 2008 maximum PM_{10} pollutant concentrations for Rosebud and Sheridan Counties, respectively. Tables 3.4-7 and 3.4-9 present the most recent (2002) emissions summary of criteria air pollutants for Rosebud County and Sheridan County, respectively.

Table 3.4-5. Summary of 2002 Annual Emissions for Counties Affected by the Proposed Action (tons per year)

Counties	*VOCs*	*CO*	*NO_x*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*
MT						
Carter	30,476.12	132,590.53	934.48	681.82	14,184.39	10,702.48
Powder River	246.92	1,462.17	193.10	16.54	1,994.30	309.24
Fallon	432.81	2,093.28	1,367.71	27.33	2,931.66	428.64
Custer	654.99	5,634.97	1,704.78	85.63	3,319.35	508.42
Rosebud	1,079.00	9,816.00	35,896.00	17,619.00	8,604.00	2,911.00
Treasure	386.71	2,371.36	1,055.63	52.33	1,275.21	228.25
Big Horn	1,102.25	11,685.28	4,311.87	731.88	9,338.30	1,541.11
WY						
Crook	1,414.63	10,991.67	2,532.13	472.28	13,711.87	1,784.41
Campbell	4,458.76	29,366.76	12,644.17	10,617.26	37,319.35	10,437.21
Sheridan	2,400.85	17,461.47	3,351.55	522.97	22,136.62	2,539.67
Weston	1,149.59	4,836.16	3,264.04	3,791.54	9,501.09	1,538.58
SD						
Harding	193.97	934.72	128.66	11.13	1,731.56	290.36
Butte	409.71	2,754.03	442.74	68.21	1,947.20	351.08
Perkins	368.35	2,254.82	476.89	76.09	3,981.91	656.96
Corson	451.24	2,380.96	576.38	43.36	3,123.95	507.71
Ziebach	203.66	1,275.27	191.22	13.77	2,384.61	386.82
Meade	1,267.22	9,662.48	1,545.94	135.80	5,068.90	786.77
Lawrence	1,287.18	9,672.16	1,199.01	179.56	3,680.51	641.63
Pennington	5,448.76	40,535.73	9,558.01	2,738.69	8,409.39	1,802.38
ND						
Bowman	366.29	2,271.96	672.63	66.15	2,713.92	443.88
Slope	340.54	1,305.17	552.51	46.96	1,941.19	349.17
Adams	296.80	1,820.09	492.23	53.32	4,918.18	769.09
Hettinger	320.26	2,367.88	798.13	84.43	4,880.30	801.56
Grant	364.60	2,249.55	552.65	71.14	5,995.02	946.77
Sioux	1,571.31	7,885.42	351.55	55.00	2,874.75	798.89
Morton	1,492.08	14,168.11	4,834.49	7,176.91	9,186.64	2,128.65
Stark	1,352.71	11,894.73	3,241.20	365.32	6,248.70	1,028.07
Golden Valley	338.10	2,720.01	1,691.71	113.97	2,559.59	454.68
Billings	394.57	2,595.47	1,178.59	349.75	1,416.11	269.78

Source: USEPA 2008d, 2002 National Emissions Inventory

Table 3.4-6. 2008 Particulate Concentrations for Rosebud County, MT

Pollutant	*NAAQS Standard*	*Highest Recorded Concentration*	*Second Highest Recorded Concentration*	*Number of NAAQS Exceedances*	*Stations Monitoring Pollutant*
PM_{10}					
24-hour average	150 $\mu g/m^3$	56 $\mu g/m^3$	45 $\mu g/m^3$	0	2
Annual arithmetic mean	50 $\mu g/m^3$	21 $\mu g/m^3$	N/A	0	2

Table 3.4-7. 2002 Rosebud County, MT Criteria Pollutants Emissions (in tons per year of pollutant emitted)

	CO	*NO_x*	*$PM_{2.5}$*	*PM_{10}*	*SO_2*	*VOCs*
Non-Point + Mobile Sources	7,007	2,158	813	5,666	122	740
Point Sources	2,809	33,738	2,098	2,938	17,497	339
All Sources	9,816	35,896	2,911	8,604	17,619	1,079

Table 3.4-8. 2008 Particulate Concentrations for Sheridan County, WY

Pollutant	*NAAQS Standard*	*Highest Recorded Concentration*	*Second Highest Recorded Concentration*	*Number of NAAQS Exceedances*	*Stations Monitoring Pollutant*
PM_{10}					
24-hour average	150 $\mu g/m^3$	103 $\mu g/m^3$	83 $\mu g/m^3$	0	3
Annual arithmetic mean	50 $\mu g/m^3$	23 $\mu g/m^3$	N/A	0	3

Table 3.4-9. 2002 Sheridan County, WY Criteria Pollutants Emissions (in tons per year of pollutant emitted)

	CO	*NO_x*	*$PM_{2.5}$*	*PM_{10}*	*SO_2*	*VOCs*
Non-Point + Mobile Sources	17,315	3,352	2,540	22,137	494	2,248
Point Sources	146	0	0	0	29	153
All Sources	17,462	3,352	2,540	22,137	523	2,401

Under the existing conditions, B-1s conduct 1,750 and B-52s conduct 1,500 sortie-operations in the MOAs and ATCAAs in the Powder River airspace (see Table 2-14). Approximately 150 transient operations occur annually, primarily conducted by F-16s. The emission factors used to calculate combustive emissions for B-1, B-52, F-15, F-16 and KC-135 aircrafts were obtained from the *Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations* (Air Force Institute for Environment, Safety, and Occupational Health Risk Analysis 2003).

Table 3.4-10 shows the annual criteria pollutant emissions from baseline aircraft operations. The detailed emission calculations are presented in Appendix J.

Table 3.4-10. Annual Criteria Pollutant Emissions from Baseline Aircraft Operations (tons per year)

State	*VOC*	*CO*	*NO_x*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
MT	0.24	1.72	26.58	14.54	3.45	3.45
ND	-	-	-	-	-	-
SD	0.03	0.25	3.80	2.08	0.49	0.49
WY	0.11	0.81	12.59	6.92	1.65	1.65
Total	**0.38**	**2.78**	**42.97**	**23.54**	**5.59**	**5.59**

3.5 Physical Sciences

3.5.1 Definition of the Resource

Physical sciences include topography, geology, soils, and water. Topography refers to an area's surface features including its vertical relief. These features may have scientific, historical, economic, and recreational value. Geologic resources of an area typically consist of surface and subsurface materials and

their inherent properties. The term "soils" refers to unconsolidated materials formed from the underlying bedrock or other parent material. Soils play a critical role in both the natural and human environment.

Water resources include surface water, groundwater quantity and quality, floodplains, and wetlands. Surface water resources include lakes, rivers, and streams and are important for a variety of reasons, including economic, ecological, recreational, and human health. Groundwater includes the subsurface hydrologic resources of the physical environment and its properties are often described in terms of depth to aquifer or water table, water quality, and surrounding geologic composition.

Physical resources include a discussion of hazardous materials which can include fuels, paints, and maintenance products.

The ROI for physical sciences includes all land under the proposed PRTC MOAs and ATCAAs.

3.5.2 Regulatory Setting

The Clean Water Act (CWA) of 1977 (33 USC § 1251 *et seq*.) and the USEPA Storm Water General Permit regulate pollutant discharges. Section 404 of the CWA and EO 11990, *Protection of Wetlands*, regulate development activities in or near streams or wetlands. Potential development actions that may affect streams and/or wetlands require a permit from the U.S. Army Corps of Engineers (USACE) for dredging and filling in wetlands. Floodplains are defined by Executive Order (EO) 11988, *Floodplain Management*, as "the lowland and relatively flat areas adjoining inland and coastal waters including flood-prone areas of offshore islands, including at a minimum, the areas subject to a one percent or greater chance of flooding in any given year." Floodplains are not expected to be affected by the actions considered in this EIS, so the existing conditions and environmental consequences discussions analyzed in this section are limited to surface water and groundwater. Wetlands are discussed in Section 3.6, *Biological Sciences*.

Hazardous materials are identified and regulated under the Comprehensive Environmental Response, Compensation, and Liability Act; the Occupational Safety and Health Administration; and the Emergency Planning and Community Right-to-Know Act. Hazardous materials have been defined in AFI 32-7086, *Hazardous Materials Management*, to include any substance with special characteristics that could harm people, plants, or animals. Hazardous waste is defined in the Resource Conservation and Recovery Act as any solid, liquid, contained gaseous or semisolid waste, or any combination of wastes that could or do pose a substantial hazard to human health or the environment. Waste may be classified as hazardous because of its toxicity, reactivity, ignitibility, or corrosivity. In addition, certain types of waste are "listed" or identified as hazardous in 40 CFR 263.

3.5.3 Existing Conditions

3.5.3.1 Topography

Land resource regions are a group of geographically associated major land resource areas. Major land resource areas are geographically associated land resource units with similarities in climate, geology, physiography, soils, water sources, biological resources, and land use. Identification of these large areas is useful for describing regional characteristics for planning purposes.

The Northern Great Plains Spring Wheat Region major land resource area consists of rolling plains with isolated hills.

The proposed PRTC MOAs and ATCAAs are located within two major land resource areas: the Northern Great Plains Spring Wheat Region and the Western Great Plains Range and Irrigated

Region (U.S. Department of Agriculture [USDA] Natural Resource Conservation Service [NRCS] 2006). The Northern Great Plains Spring Wheat Region major land resource area, located almost entirely across North and South Dakota, consists of rolling plains with some local badlands, buttes, and isolated hills. Broad floodplains exist along most of the major drainages and elevation ranges from 1,650 feet in the east with gradual sloping to about 3,600 feet in the western portions of the proposed PRTC. Local relief is rolling with some relief up to 330 feet, but is typically lower in most areas of the Dakotas (USDA NRCS 2006).

The Western Great Plains Range and Irrigated Region major land resource area has large river valleys bordered by flat-topped buttes.

The Western Great Plains Range and Irrigated Region major land resource area is located across eastern MT and WY in an area of old, eroded plateaus and terraces. Some of the large river valleys in this area are bordered by badlands with steep slopes and flat-topped buttes that often rise sharply against the plains. Slopes are gently rolling to steep and elevation ranges from 2,950 feet to 5,900 feet increasing from east to west and north to south. Local relief is greater under the proposed PR-1A and PR-1B MOAs in the western area of the proposed PRTC (USDA NRCS 2006).

3.5.3.2 Geology

Surficial geology within the ROI consists primarily of shales, siltstones, and sandstones of the Tertiary Fort Union Formation. Marine and continental sediments of the Cretaceous MT Group typically underlie these deposits in MT and WY, while in ND and SD, the area is typically underlain by impermeable Cretaceous shale (USDA NRCS 2006).

The ROI lies within two large structural basins: the Williston Basin and the Powder River Basin. The Williston Basin is a sedimentary structural trough extending approximately 475 miles north-south and 300 miles east-west over eastern MT, western North and SD, and into Canada. Sedimentary deposition in the Williston Basin includes rocks well suited to serve as hydrocarbon sources (U.S. Geological Survey [USGS] 1996).

The Powder River Basin is a region in southeast MT and northeast WY about 120 miles east-west and 200 miles north-south known for its coal deposits. It is both a topographic drainage and geologic structural basin. The Powder River Basin is the single largest source of coal mined in the U.S., and contains one of the largest deposits of coal in the world (USGS 1998).

3.5.3.3 Soils

Soils information for this section is derived from the NRCS Soil Survey spatial and tabular database for the states of MT, WY, ND, and SD (USDA NRCS 2008a). A soil order is the highest organizational level in the soils classification system and soils are grouped according to the degree of their horizon development and the kinds of horizons present. Each of the soil map units described has minor soils that are encompassed within the map unit. These minor soils may have different properties and limitations that can only be delineated on-site. The properties and limitations of the soil type that comprises the majority of each soil map unit are presented in this section to provide an indication of the conditions and limitations found in the ROI. The soils within the ROI consist of five soil orders: Mollisols, Entisols, Inceptisols, Alfisols, and Vertisols (USDA U.S. Forest Service [USFS] 1980). These soil types are mapped on Figure 3.5-1.

Source: USDA NRCS 2008a

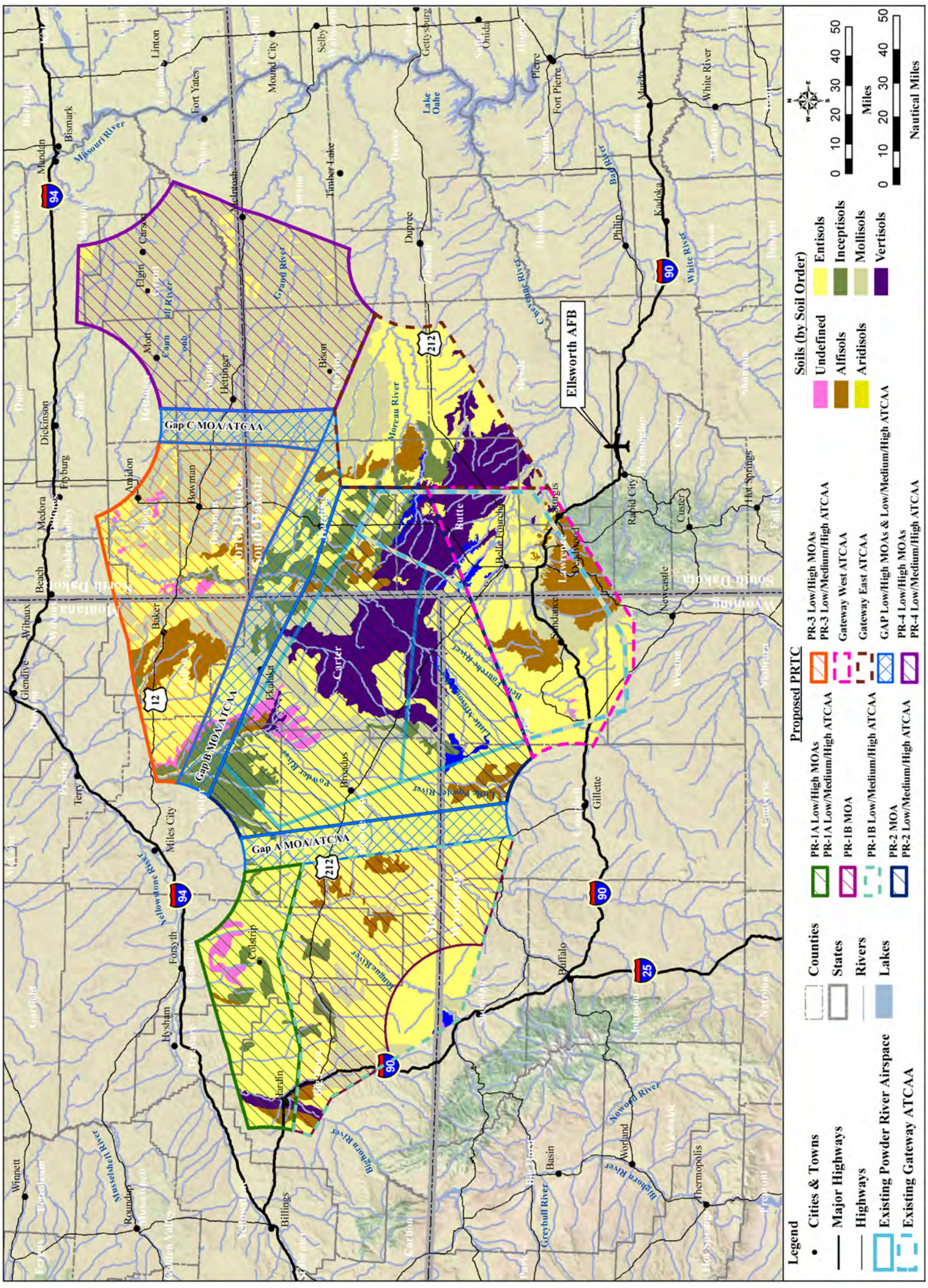


Figure 3.5-1. Soil Types Within the ROI

Mollisols: These young soils form in semi-arid to semi-humid areas, typically under a grassland cover. Their parent material is generally limestone, loess, or wind-blown sand and soils are typically a deep, high organic matter, nutrient-enriched surface soil between 60 to 80 centimeters thick. Because of their productivity and abundance, the mollisols are one of the more economically important soil orders (USDA NRCS 2008b).

Entisols: These soils are defined by their lack of horizons and are typically unaltered from their parent material. They are globally extensive, very diverse, and can be found in almost any climate. Many are sandy or very shallow (USDA NRCS 2008b).

Inceptisols: These soils are characterized by a minimal development of soil horizons. They tend to be widely distributed and found on fairly steep slopes, resistant parent material, and young geologic surfaces (USDA NRCS 2008b).

Alfisols: These soils are moderately leached, considered well developed, and their subsurface horizons typically contain clays, resulting in relatively high fertility. Typically, these soils are found in temperate humid and subhumid regions; they are extensive throughout the U.S. (USDA NRCS 2008b).

Vertisols: These soils are clayey soils that have deep, wide cracks for some time during the year that shrink as they dry and swell as they become moist. The natural vegetation is predominantly grass, savanna, open forest, or desert shrub (USDA NRCS 2008b). As shown on Figure 3.5-1, Vertisols underlie much of the existing Powder River airspace.

Almost all (99 percent) of the soils in the ROI have a pH greater than 5.0 (extremely acidic) or less than 8.5 (strongly alkaline), with the exception of approximately 0.38 percent (113,813 acres) of the soils whose pH of 4.6 is considered acidic (equivalent to tomato juice or black coffee) (Table 3.5-1).

Table 3.5-1. PRTC: pH of Soils within ROI

pH	*Percent of Soil with pH*	*Acres*
4.6	0.38%	113,813
5.8	0.31%	92,848
6.1	0.23%	68,887
6.2	0.05%	14,975
6.5	8.19%	2,452,987
6.7	6.47%	1,937,830
6.8	0.32%	95, 843
7	33.57%	10,054,555
7.2	13.19%	3,950,538
7.3	0.98%	293,519
7.5	11.55%	3,459,342
7.6	1.13%	338,446
7.8	0.63%	188,691
7.9	8.07%	2,417,046
8	1.01%	302,505
8.2	11.92%	3,570,160
Not rated	2.00%	599,020
Total	100.00%	29,951,005

3.5.3.4 Water

SURFACE WATER

The proposed PRTC MOAs and ATCAAs lie within a large regional watershed system called the Missouri River Basin. The Missouri River subbasin, one of six major subbasins within the Missouri River Basin, encompasses 529,350 square miles and all or part of 10 states including those within the ROI: WY, MT, ND, and SD. The Missouri River flows 2,341 miles from its headwaters in the Rocky Mountains at Three Forks, MT to its confluence with the Mississippi River in St. Louis and drains one-sixth of the contiguous U.S. (USEPA 2008e).

The Tongue River, on Figure 3.5-2, is one of the major surface water features within the ROI

As shown in Figure 3.5-2, the major surface water features within the ROI include (in approximate order from west to east): the Bighorn, Tongue, Powder, Little Powder, Little Missouri, Belle Fourche, Cheyenne, Moreau, Grand, and Cannonball rivers. The Bighorn, Tongue, Powder, Little Powder and Little Missouri rivers all drain to the north until their confluence with the Yellowstone River. The Yellowstone River, a major tributary to the Missouri River, flows along the northern boundary of the ROI to the northeast until its confluence with the Missouri River. The Cannonball, Grand, Moreau, Belle Fourche, and the Cheyenne rivers all drain east into the Missouri River or Lake Oahe (part of the Missouri River system).

The rivers and their associated tributaries within the ROI serve as an important source of water for both domestic and commercial public-supply, agricultural, and industrial uses. Much of the surface water has been largely appropriated for agricultural use, primarily irrigation, and for compliance with downstream water pacts. Reservoirs store some of the surface water for flood control, irrigation, power generation, and recreational purposes (USGS 1996).

The acidity of surface water within the ROI reflects the soils and most lakes and rivers within the ROI have a pH within the range of 4.5 to 9 (USEPA 2007). Most of the surface waters measured by the National Atmospheric Deposition Program/National Trends Network, a nationwide network of water monitoring sites supported by the USDA, show surface water pH within the ROI ranging from 4.8 to 6.5 with trends typically showing a slight increase in pH over the past 20 years (National Atmospheric Deposition Program/National Trends Network 2008).

GROUNDWATER

The proposed PRTC MOAs and ATCAAs lie within the Northern Great Plains aquifer system – a system that underlies most of ND and SD, about one-half of MT, and about one-third of WY encompassing about 300,000 square miles (USGS 1996). According to the USGS (2006), an aquifer system consists of two or more aquifers that function similarly, share common geologic and hydrologic characteristics, and can be hydraulically connected so that a change in hydrologic conditions in one of the aquifers could affect the other aquifers. The Northern Great Plains aquifer system lies primarily within the Williston and Powder River basins.

As shown in Figure 3.5-3, there are 4 major aquifers within the Northern Great Plains aquifer system in the ROI (from shallowest to deepest): Lower Tertiary, Upper Cretaceous, Lower Cretaceous, and Paleozoic (USGS 1996).

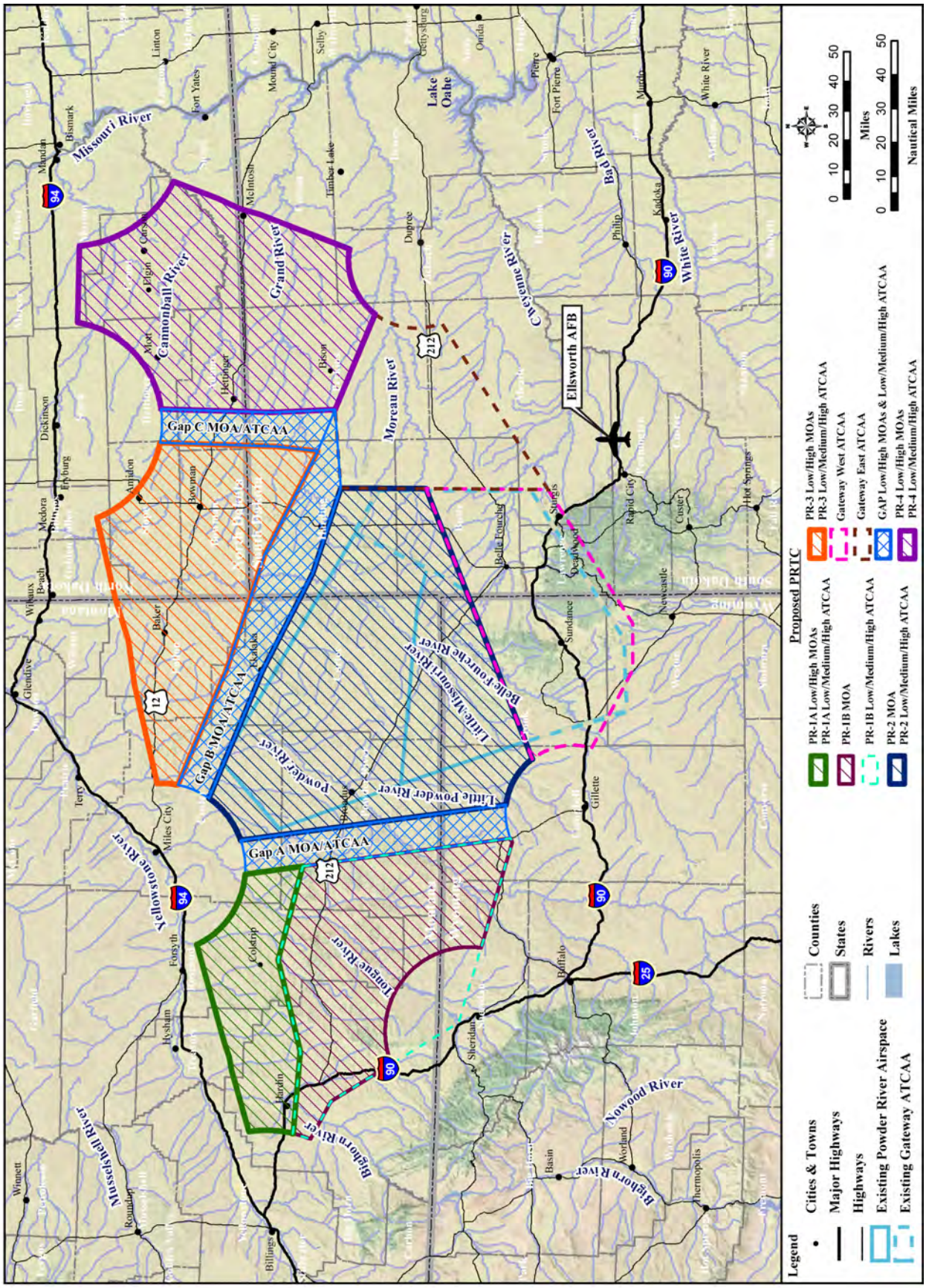


Figure 3.5-2. Surface Water Features

3.6 Biological Sciences

3.6.1 Definition of the Resource

Biological resources consist of native or naturalized plants and animals, along with their habitats, including wetlands. Although the existence and preservation of biological resources are both intrinsically valuable, these resources also provide essential aesthetic, recreational, and socioeconomic benefits to society. The analysis focuses on plant and animal species and vegetation types that are important to the functioning of local ecosystems, are of special societal importance, or are protected under federal or state law.

Biological resources include vegetation and habitat, wetlands, fish and wildlife, and special-status species. In addition, because of concerns expressed during scoping, domestic animals are included in the discussion of environmental consequences to biological resources.

The ROI for this resource is the lands under the proposed PRTC training airspace. The ROI spans several landownership classifications: Bureau of Land Management (BLM); USFS; DoD; National Park Service; USFWS; tribal, state, and local governments; and private lands.

3.6.2 Regulatory Setting

Endangered Species Act

The Endangered Species Act (ESA) of 1973 (16 USC §§ 1531–1544, as amended) established measures for the protection of plant and animal species that are federally listed as threatened and endangered, and for the conservation of habitats that are critical to the continued existence of those species. Federal agencies must evaluate the effects of their proposed actions through a set of defined procedures, which can include the preparation of a Biological Assessment and can require formal consultation with the USFWS under Section 7 of the Act.

Compliance with the ESA requires communication and consultation with the USFWS in cases where a federal action could affect listed threatened or endangered species, species proposed for listing, or candidates for listing. The primary focus of this consultation is to request a list of these species that may occur in the region of influence. If any of these species are present, a determination of the potential effects on the species is made. Should no species protected by the ESA be affected by the Proposed Action, no additional action is required. Letters were sent to the appropriate USFWS offices, as well as state agencies, informing them of the Proposed Action and alternatives, and requesting data regarding applicable protected species. Appendix E includes copies of relevant coordination letters sent by the Air Force.

Clean Water Act

The Clean Water Act (CWA) of 1977 (33 USC § 1251 *et seq*.) and the USEPA Storm Water General Permit regulate pollutant discharges. Section 404 of the CWA and EO 11990, *Protection of Wetlands*, regulate development activities in or near streams or wetlands. Potential development actions that may affect streams and/or wetlands require a permit from the U.S. Army Corps of Engineers (USACE) for dredging and filling in wetlands. EO 11988, *Floodplain Management*, requires federal agencies to take action to reduce the risk of flood damage; minimize the impacts of floods on human safety, health, and welfare; and to restore and preserve the natural and beneficial values served by floodplains. Federal agencies are directed to consider the proximity of their actions to or within floodplains.

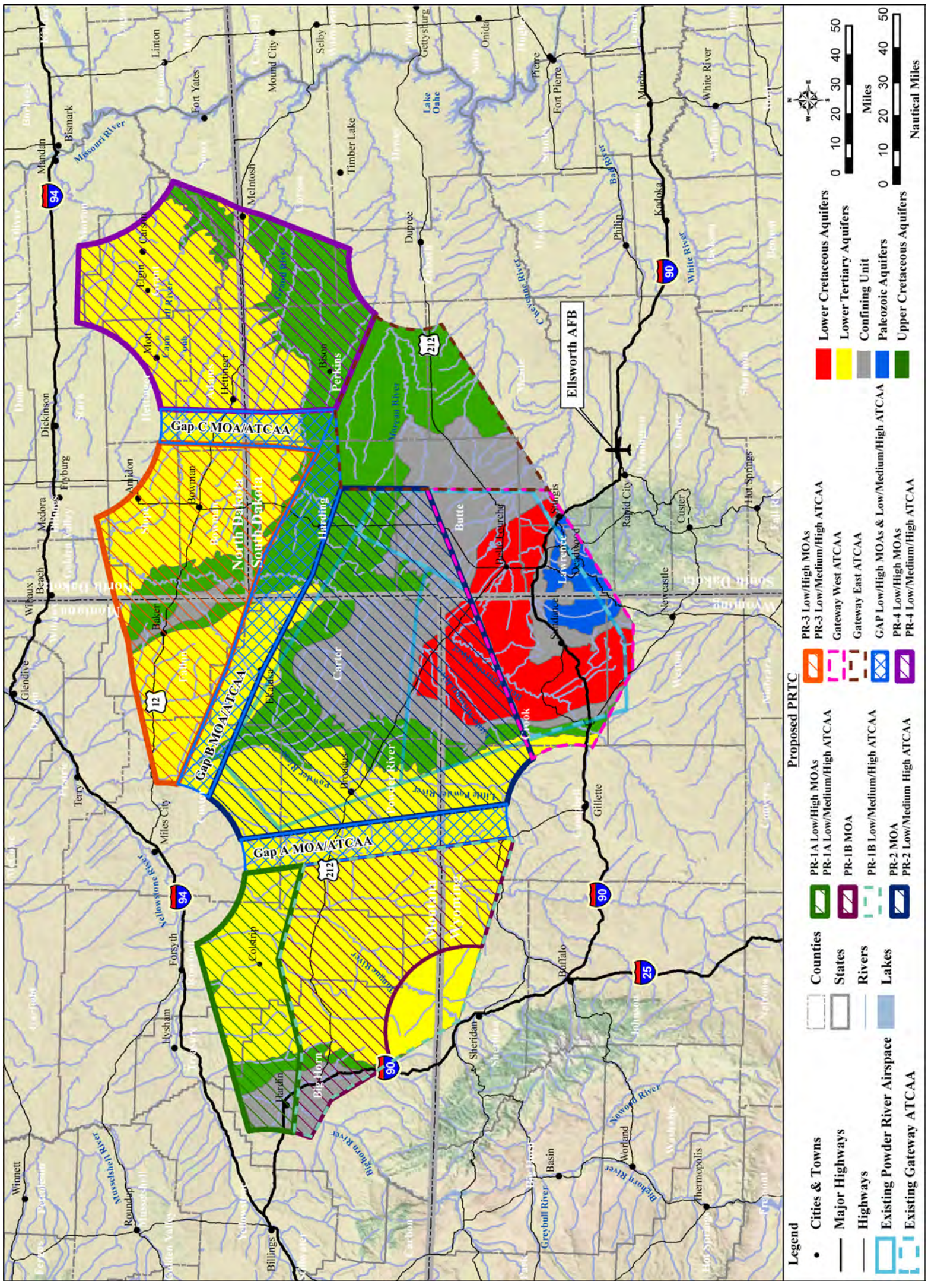


Figure 3.5-3. Aquifer

Migratory Bird Treaty Act (16 USC 703 et seq.) and EO 13186

The Migratory Bird Treaty Act governs the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests. The take of all migratory birds is governed by the Migratory Bird Treaty Act's regulation that affects educational, scientific, and recreational purposes and requires harvest to be limited to levels that prevent overuse. The Migratory Bird Treaty Act also prohibits the export, selling, purchase, barter, or offering for sale, purchase or barter, any migratory bird, their eggs, parts, and nests, except as authorized under a valid permit (50 CFR 21.11).

EO 13186 (effective January 10, 2001), outlines the responsibilities of federal agencies to protect migratory birds, in accordance with the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Acts, the Fish and Wildlife Coordination Act, ESA, and NEPA. This order specifies the following:

- The USFWS as the lead for coordinating and implementing EO 13186;
- Requires federal agencies to incorporate migratory bird protection measures into their activities; and
- Requires federal agencies to obtain permits from USFWS before any "take" occurs, even when the agency intent is not to kill or injure migratory birds.

Sikes Act (16 USC 670)

The Sikes Act applies to federal land under DoD control and requires military services to establish Integrated Natural Resources Management Plans (INRMPs) to conserve natural resources for their military installations. The INRMPs include evaluations of threatened and endangered species, other fish and wildlife resources, wetlands, migratory bird habitat, and forest lands. INRMPs are developed in cooperation with the USFWS and State Fish and Wildlife agencies.

3.6.3 Existing Conditions

3.6.3.1 Vegetation and Wetlands

The proposed PRTC airspace is located within the Great Plains-Palouse Dry Steppe Province ecoregion (Bailey 1995). This area is characterized primarily by mixed-grass and shortgrass prairies with scattered trees and shrubs, primarily sagebrush (*Artemisia* spp.) and rabbitbrush (*Chrysothamnus* spp.) (Bailey 1995). Typical grasses include buffalograss (*Buchloe dactyloides*), blue grama (*Bouteloua gracilis*), western wheatgrass (*Elymus smithii*), and needlegrass (*Stipa* spp.) (Bailey 1995;SD Game, Fish and Parks 2006). The region is primarily flat, but has occasional valleys and foothills that support woodlands such as bur oak, ponderosa pine, pine/juniper and riparian woodlands (dominated by cottonwoods [*Populus* spp.]). Table 3.6-1 lists the major vegetation types that underlie the ROI. Underlying soils are described in Section 3.5.3.3.

GRASSLANDS

The most extensive vegetation type within the project area ROI is grasslands covering 58 percent of the area and over 14,000,000 acres (Table 3.6-1). Figure 3.6-1 maps these vegetation types under the proposed PRTC airspace. The majority of the grasslands within the proposed project area lies in the ecotone between tall-grass and short-grass prairies and is characterized as mixed-grass prairies. The two most dominant vegetative associations are wheatgrass-needlegrass and blue grama-needlegrass-wheatgrass grasslands (Mac *et al.* 1998).

Typical northern plains grassland under the proposed PRTC airspace; primarily used for livestock grazing.

Table 3.6-1. Major Vegetation Types Underlying the Proposed PRTC Airspace

Habitat Type	*Acres*[1]	*% Area*
Grasslands Total	14,542,973	58
Mixed-grass and other prairie	13,750,503	
Introduced grassland (primarily hay/pasture)	792,470	
Shrubland & Steppe	5,542,632	22
Forest and Woodland	2,209,055	9
Cultivated Agriculture/Crops	2,078,986	8
Developed Areas	260,968	1
Barren and Sparsely vegetated	55,036	<1
Open Water	75,492	<1
Wetlands Total	376,763	1.5
Depressional/Herbaceous Wetlands	102,389	
Greasewood Flats/Woody/Riparian Wetlands	274,374	
TOTAL	**25,141,905**	**100**

Note: 1. Includes GAPs, MOAs, and ATCAAs that are part of each alternative. If MOAs and ATCAAs overlap, acreage is only counted once under the airspace.

Source: USGS 2007

Ninety-five percent of the grasslands present in the ROI composed of a diverse mix of herbaceous species including sand prairies, tallgrass prairies, mesic meadows, semi-desert grasslands, and foothills and piedmont grasslands. The remaining grasslands of the area are composed of introduced perennial and annual grasses and primarily used for haying and pastureland.

Shrubland and Steppe

The second most extensive vegetation type within the project area includes shrubland and steppe and covers approximately 22.9 percent (5,542,632 acres) of the area (Figure 3.6-1). Steppe vegetation types are co-dominated by shrubs and grasses. The majority of these shrublands in the ROI support sagebrush-dominated (*Artemisia* spp.) and sagebrush-steppe communities. Sagebrush communities are variable in composition and structure depending on the soils, elevation, and moisture present. In general, the vegetation in sagebrush communities is widely spaced and has an understory dominated by bunchgrasses and forbs.

The expanse and quality of sagebrush communities across the United States have declined over the past few decades mainly due to fragmentation, alteration, and loss of habitat as a result of urbanization, agriculture, grazing practices, invasive species, and disruption of natural disturbance regimes such as fire (Connelly *et al.* 2004; Rowland 2004). Alteration of fire regimes and the related invasion of invasive plants, notably cheatgrass (*Bromus tectorum*), are believed to be the greatest threats to the health of sagebrush communities (USDA NRCS 2005). It has been estimated that about 50 percent of the historical range of sagebrush habitat remains today (USDA NRCS 2005; Shroeder *et al.* 2004).

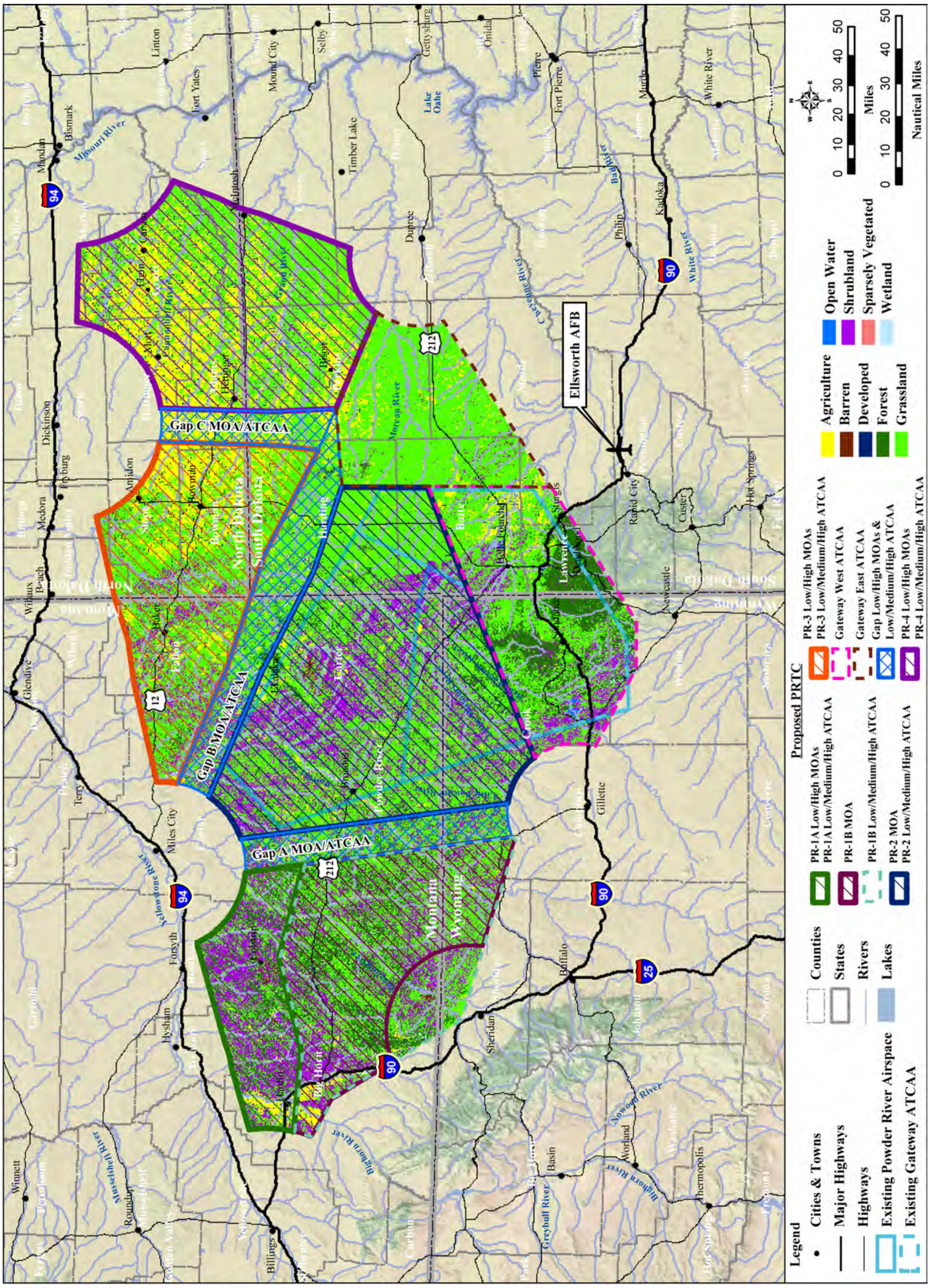


Figure 3.6-1. Vegetation

In the upper elevations of the region fire frequency has decreased, in some cases leading to the invasion of juniper (Juniperus spp.) and piñon pine (Pinus edulis) that outcompete herbaceous and shrub species upon which wildlife such as the greater sage-grouse depend. In some lower elevations, fire frequency has increased due to the spread of cheatgrass (Bromus tectorum) and other invasive grasses that burn readily and carry wildfires (USDA NRCS 2005). Cheatgrass is an annual species that can invade during the first season following a fire and is capable of fueling repeated fires at very short intervals. Frequent fires therefore prevent regeneration of sagebrush and other slower-growing shrubs, which can lead to a conversion of a shrub-dominated community to a community dominated by short-lived weedy grasses that offer limited forage value.

Forests and woodlands under the proposed PRTC include the Custer National Forest under portions of PR-1A and PR-1B.

Forests and Woodlands

Forests and woodlands make up approximately 9 percent of the ROI (approximately 2,209,055 acres) and are composed of primarily wooded draws and ravines, ponderosa pine forests, limber pine-juniper woodlands, and various other deciduous and coniferous forests. Wooded draws and ravines support ash (*Fraxinus* spp.) and elm (*Ulmus* spp.) species with some areas containing Rocky Mountain juniper (*Juniperus scopulorum*). Forests cover a small (approximately 128,000 acres [0.5%]) proportion of the project area and are found scattered on discontinuous mountains, canyons, and plateaus up to 6,000 feet, primarily in the southern and western project area (Figure 3.6-1 Vegetation). The forests are dominated by ponderosa pine (*Pinus ponderosa*) in the overstory with associated midstory woody species including Rocky Mountain juniper, green ash (*Fraxinus pennsylvancia* var. *lanceolata*), and chokecherry (*Prunus virginiana*). The density of woody species varies depending on moisture availability and the fire history, with more frequent fires creating a more open savannah-like forest with a grassy understory. Typical understory plants include bluebunch wheatgrass (*Pseudoroegneria spicata*) and needle-and-thread (*Stipa comata*) (USDA USFS 1990).

Agriculture

Cultivated agricultural areas (encompassing hay/pastureland, irrigated, and other cultivated cropland) cover approximately 8 percent of the ROI (2,078,986 acres) with major crops including wheat, sunflowers, alfalfa, hay, barley, and soybean fields (SDDA 2008; USDA 2007; NDDA 2000). Additional information on the socioeconomic agricultural impacts are found in Table 3.9.12 The availability of irrigation water is a limiting factor on agricultural production in the region. Dryland farming also occurs. Conversion of native grasslands to crops and pastureland is one of the primary reasons for a decline in diversity of wildlife habitat across the Great Plains, primarily east and south of the project area where more moisture is available. While croplands do not support the diversity of wildlife species that native habitat does, agricultural fields can provide open space, cover, and foraging habitat for a variety of wildlife species such as upland game birds, rodents, lagomorphs (rabbit species), introduced, and ubiquitous species (Brady 2007).

Agriculture and grasslands encompass over two-thirds of the vegetation under the proposed PRTC.

The majority of agricultural use in the project area on private land and public land leases is for livestock grazing. Grazing land use retains the open character of the landscape, can support native plant species, and allows forage and cover access for wildlife species. Agriculture and livestock are discussed in Section 3.8, *Land Use*.

Developed Areas

Developed areas, including commercial, industrial and residential developments, and other built up areas constitute about one percent of the area under the airspace. These are few and far between as the area is primarily rural and uninhabited in character.

Barren and Sparsely Vegetated Areas

Barren and sparsely vegetated areas include naturally barren areas such as badlands or other areas where characteristics of the soil or bedrock severely limit the growth of vegetation. Other barren areas include sandstone buttes, shale barren slopes, and exposed rocky outcrops such as the granite-metamorphic rocky outcrops in the Black Hills (NatureServe 2008).

Floodplains, Riparian Systems, and Other Wetlands

Floodplains. Floodplain forests within the ROI are riparian areas that occur along water bodies, usually along level ground, and vary in width from less than a mile to seven miles in the ROI. These systems include floodplains of medium and large rivers such as the Missouri River Basin and the Yellowstone River. Floodplains have alluvial soils and are subject to periodic flooding typically at 5 to 25 year intervals. Flooding is primarily driven by snowmelt in the mountains. Vegetative communities within these systems are variable ranging from floodplain forests dominated by cottonwood (*Populus* spp.), ash, elm, and willow (*Salix* spp.), to wet meadows dominated by graminoids (grasses and grass-like plants such as sedges [*Carex* spp.] and rushes [*Juncus* spp.]), to gravel/sand flats. In many cases these vegetative communities have been degraded due to groundwater depletion, lack of fire, or over-grazing (NatureServe 2008; Sullivan 1995).

Riparian Systems. Other riparian systems within the proposed airspace are differentiated from floodplains in that they are found as bands along more narrow rivers, along stream banks at higher elevations, or along seeps or isolated springs on hill slopes. These systems consist of a variety of vegetative communities including herbaceous-dominated systems, shrub-dominated areas within montane conifer or aspen forests, and tree-dominated systems within montane areas. The dominant shrubs within montane riparian areas include gray alder (*Alnus incana*), birch (*Betula* spp.), willow, and dogwood (*Cornus sericea*). At higher elevations along narrow valleys and canyons, dominant riparian tree species include Douglas-fir (*Pseudotsuga menziesii*), spruce (*Picea pungens* and *P. engelmannii*), aspen (*Populus tremuloides*), and Rocky Mountain juniper (NatureServe 2008).

Even though they occupy a small percentage of western lands, floodplains and riparian habitats are biologically rich, and therefore, disproportionately valuable for wildlife habitat. These areas provide an ecologically diverse transition between upland and aquatic systems and provide forage, cover, migration corridors, wind and sun protection, breeding habitat, and water sources for a variety of wildlife species. These areas, especially on slopes, are also subject to rapid changes such as resulting from flash floods and snow/soil movement events.

Wetlands

Wetlands are defined by the USACE and USEPA as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include marshes, bogs, and similar areas" (33 CFR 328.3[b]). Wetlands

provide a variety of functions including groundwater recharge and discharge, floodflow attenuation, sediment stabilization, sediment and toxicant retention, nutrient cycling, and habitat for plants and fish and wildlife species. Three criteria are necessary to define wetlands: vegetation (hydrophytes), soils (hydric), and hydrology (duration of flooding or soil saturation).

This section describes the major wetland types that occur underneath the airspace of the ROI. Wetlands were mapped as covering 1.5 percent of the area under the proposed airspace. Some portions of the floodplains and riparian areas described above meet the delineation criteria and are considered wetlands as well, but were too small in scale to map. The most common types of wetlands that occur under the ROI are Western Great Plains Depressional Wetlands and Inter-Mountain Basins Greasewood Flats. These two wetland types cover less than one percent of the area under the proposed airspace; however, wetlands, as well as riparian systems and floodplains, have a disproportionately high value to wildlife and ecosystem function in this region.

***Depressional/Herbaceous Wetlands*.** Approximately 102,389 acres of Western Great Plains Depressional wetlands are found under the ROI. The depressional wetlands include closed and open systems that are either freshwater or saline. Closed, freshwater systems have a perched water table, separate from the groundwater table, have an impermeable layer of clay or hydric soil, and are recharged by rainwater or runoff. These closed systems are usually dominated by a variety of herbaceous plants including graminoids and forbs (NatureServe 2008). Open freshwater systems include submergent and emergent marsh as well as wet meadows and wet prairies along lowland depressions and lake borders. They differ from the closed systems in that they are part of a larger watershed or are connected to the groundwater. Vegetative communities include emergent species such as cattails (*Typha* spp.), sedges, rushes, and spikerush (*Eleocharis* spp.) (NatureServe 2008). Saline systems often have a salt encrustation on the soil surface. These systems can be open or closed and are dominated by salt-tolerant and halophytic herbaceous species such as saltgrass (*Distichlis spicata*) and alkali sacaton (*Sporobolus airoides*), and are often intermingled with greasewood flats (NatureServe 2008).

***Greasewood Flats/Woody Wetlands*.** Approximately 274,374 acres of greasewood flats and other woody wetlands occur underneath the ROI. Greasewood flats are found near drainages on stream terraces and flat areas or can grow in rings around playas, which form in the bottoms of undrained basins. These sites have saline soils, a shallow water table, and flood intermittently, but normally remain dry for most of the growing season. Vegetative communities are usually dense to open shrublands dominated by greasewood (*Sarcobatus vermiculatus*) and co-dominant species including sagebrush and saltbush (*Atriplex* spp.). In areas where water or snow remains the longest, grasses may be present in the understory including alkali sacaton, western wheatgrass (*Pascopyrum smithii*) and saltgrass (NatureServe 2008). Woody vegetation that grows in riparian areas was covered under Riparian Systems above.

Other types of wetlands which exist under the proposed airspace, but are too small to map at a regional scale, include fens, playas, wet meadows, seeps, and springs (USEPA 2008f).

Open Water

Open water habitats constitute a very small percentage of the area under the proposed airspace and are important in sustaining many fish and wildlife species in the region. Open water occurs most frequently in the North Dakota and South Dakota portions under the proposed airspace. Shallow water habitats may be vegetated with submergent plants (e.g., pondweeds), which provide food and cover for aquatic vertebrates and invertebrates as well as waterfowl. Open water habitats also typically support emergent wetland or riparian vegetation around their margins and in very shallow areas. Migratory birds, particularly waterfowl, find open water in the Great Plains states invaluable for rest stops and foraging on long migration routes (see Section 3.6.3.2, *Wildlife*).

Water provides breeding habitat and water sources for waterfowl and other wildlife.

3.6.3.2 Wildlife

The major wildlife habitats that occur under the proposed airspace are summarized in Table 3.6-2. Eight primary habitats are present, each supporting its own distinctive array of wildlife species. Within each of these habitats there exist a matrix of microhabitats with subtle differences in plant composition and physiographic features. In addition, the ROI overlays a multitude of private, public, and tribal land ownership (see Section 3.8, *Land Use*). As a result, wildlife habitat management objectives and techniques vary from area to area according to the landowner. Given that the proposed project area covers a number of habitats in four states, the diversity of wildlife species is considerable. This section discusses the primary game and nongame wildlife species that occur under the project area. Table 3.6-3 summarizes representative species and their season of occurrence. Information on species of special concern and federally listed species is presented in Section 3.6.3.3.

Table 3.6-2. Wildlife Habitats that Occur Under the Proposed PRTC Airspace

Habitat Type	*Description*	*Habitat Value*	*Characteristic Wildlife*
Wetlands, Floodplains and Riparian Systems	Riparian areas along streams and rivers, floodplains, depressional wetlands, and greasewood flats	These areas have value for most life-stages of amphibians, as well as foraging, cover, breeding, and water sources for a variety of other wildlife species.	Mammals (mule and white-tailed deer, moose); amphibians; birds (waterfowl and breeding migratory)
Open Water	Lakes, rivers, streams, reservoirs, ponds.	Open water habitat in the study area has value for fish, most life-stages of amphibians, as well as foraging, breeding, and a water source for a variety of other wildlife including waterfowl and shorebirds.	Mammals (river otter); amphibians and reptiles (snapping turtle, frogs); birds (migratory and resident waterfowl, shorebirds, wading birds); fish; invertebrates
Grasslands	Mixed-grass prairies with varying amounts of shrub cover, shortgrass prairies, and rangelands, which can be dominated by introduced grasses such as cheatgrass.	Provides foraging, nesting, and migration habitat	Mammals (ungulates, prairie dogs and other rodents); birds (upland game birds, songbirds, raptors); reptiles (snakes, lizards)
Shrubland and Steppe	Sagebrush, saltbush, montane-foothill deciduous shrubland, northwestern great plains shrubland	Provide foraging, cover, and nesting habitat for a wide variety of species.	Birds (sharp-tailed grouse, songbirds, raptors ungulates (pronghorn, deer)
Forests and Woodlands	Ponderosa pine forests, bur oak, and pine/juniper woodlands,	Forested upland habitat in the study area has value for breeding, foraging, cover from predators, and shelter for a variety of wildlife species.	Mammals (elk, mule deer, black bear, mountain lion, bats); Birds (songbirds, woodpeckers), amphibians (tree frogs, salamanders)
Agriculture	Major crops include wheat, sunflowers, alfalfa, hay, barley, and soybean fields	Value for foraging and cover for a variety of wildlife species.	Upland game birds, rodents, and lagomorphs and ubiquitous species.
Developed Areas	Comprised mainly of buildings, paved surfaces, landscaped areas, and other infrastructure.	Developed areas in the study area are not important habitat for wildlife. Some wildlife use human structure for nesting or forage on garbage in developed areas.	Ubiquitous species such as small mammals (e.g., rodents), birds (e.g., mockingbird, grackle, eastern towhee)
Barren and Sparsely Vegetated	Rocky outcrops, cliffs, or sparsely vegetated grasslands and shrublands	Provide very little habitat value. Rocky outcrops and cliffs can provide refuge or nesting areas for some species.	Small mammals, lizards, raptors.

Table 3.6-3. Representative Game and Nongame Wildlife Species that Occur Under the Proposed PRTC Airspace

Wildlife Grouping	*Representative Species*[1]	*Season(s) of Occurrence*
Game Species		
Ungulates	White-tailed deer, mule deer, elk, moose, and pronghorn.	Generally year-round
Upland Game Birds	Sharp-tailed grouse, turkey, ring-necked pheasant, chukar, mourning dove	Generally year-round
Waterfowl	Merganser, green-winged teal, lesser scaup, snow goose, Canada goose, mallard, redhead, ring-necked duck, etc.	Year round: mallard, Canada goose; Summer: green-winged teal, lesser scaup; snow geese; redhead
Mammals	*Carnivores:* (e.g., black bear, mountain lion, fox, bobcat,; coyote, mink, weasel, badger) *Small mammals*: (e.g., , prairie dogs, cottontails, white-tailed jackrabbits, raccoon, muskrat, porcupine, beaver, skunk)	Generally year-round
Nongame Species		
Mammals	Northern pocket gopher, chipmunks, ground squirrels, mice, voles, rats *Bats:* (e.g., big brown bat, hoary bat)	Generally year-round
Birds	*Raptors:* (e.g., prairie falcon, red-tailed hawk, Swainson's hawk, sharp-shinned, golden eagle, barn owl, great-horned owl) *Woodpeckers:* (e.g., downy woodpecker, northern flicker, sapsuckers) *Other:* (e.g., meadowlark, longspur, sparrows, swallows, warblers, finches, black-billed magpie, chickadee)	Year -round: red-tailed hawk, prairie falcon, great-horned owl; woodpeckers, black-billed magpie, chickadee Winter: Sharp-shinned hawk Summer: golden eagle, barn owl, Swainson's hawk, woodpeckers, warblers, swallows, sparrows.
Amphibians	Plains spadefoot, boreal chorus frog, Great Plains toad, leopard frog, salamanders	Primarily spring-summer (outside hibernation season)
Reptiles	Eastern racer, plains gartersnake, bullsnake, common sagebrush lizard, greater short-horned lizard, painted turtle	Primarily spring-summer (outside hibernation season)

Notes: 1. This table does not include ESA-listed species or Species of Special Concern (see next section).
Sources: MT Natural Heritage Program 2007; Bailey 1995.

Game Species

Species considered "game species" by local state game and fish departments within the project area include ungulates, upland game birds, waterfowl, carnivores such as mountain lion, bear, and coyotes, and other mammals that are trapped including mink, fox, and raccoon.

White-tailed deer represent both a biological and an economic resource under the proposed PRTC.

Ungulates: Ungulate game species within the project area include mule deer, white-tailed deer, elk, pronghorn (commonly known as antelope), and moose. Mule deer occur throughout the project area in grasslands, riparian areas, foothills and montane shrublands, and aspen groves (MT Natural Heritage Program 2007; ND Game and Fish 2005). Their winter is spent primarily in lower elevations and mule deer move to higher elevations in the summer (Scribner 2006). Elk primarily inhabit coniferous forests interspersed with openings such as meadows and grasslands (MT Natural Heritage Program 2007). White-tailed deer are most often found in lower elevation river and creek bottoms where vegetation is dense (MT Natural Heritage Program 2007; ND Game and Fish 2005). Moose prefer wetter habitats and usually inhabit mountain meadows, river valleys, swamps, willow flats, and mature coniferous forests (MT Natural Heritage Program 2007). Because these habitats are limited in the ROI, moose are uncommon. Pronghorn are found throughout the project area mainly in open rolling sagebrush/grasslands with slopes of less than 10 percent (ND Game and Fish 2005, 2006; MT Natural Heritage Program 2007).

Other Game Species: Large carnivores such as black bears and mountain lions are hunted, primarily in western portions of MT and WY. Smaller game includes a variety of furbearing mammals and those considered "predatory" including coyote, badger, beaver, bobcat, mink, weasel, muskrat, porcupine, prairie dogs, squirrels, rabbits, red fox, raccoon, and skunk.

Upland game birds: A variety of upland game birds occur throughout the proposed project area. Most species, including sharp-tailed grouse, chukar, and ring-necked pheasant, are found in open grasslands and croplands (MT Natural Heritage Program 2007; ND Game and Fish 2005). Wild turkeys can be found in similar habitat as well as in open ponderosa pine forest and wooded river bottoms (MT Natural Heritage Program 2007; ND Game and Fish 2005). The greater sage-grouse is also present and is discussed in Section 3.6.3.3, *Special Status Species*.

Waterfowl: The proposed project area generally occurs under the convergence of several principal routes of both the Central Flyway and the Mississippi Flyway for migratory birds (Figure 3.6-2). The diversity of species crossing under the proposed airspace during migratory periods is large. Waterfowl known to occur in the area include the merganser, green-winged and cinnamon teal, scaups, snow goose, Canada goose, mallard, redhead duck, and ring-necked duck. These species are dependent upon wetlands and surface waters such as freshwater ponds, lakes, rivers, and marshes for their primary habitat during migration stopovers and for foraging (MT Natural Heritage Program 2007; ND Game and Fish 2005). Such habitats are typically located in river valleys and lower elevations within the ROI. Croplands and grasslands in the airspace may also be used by waterfowl and shorebirds for foraging.

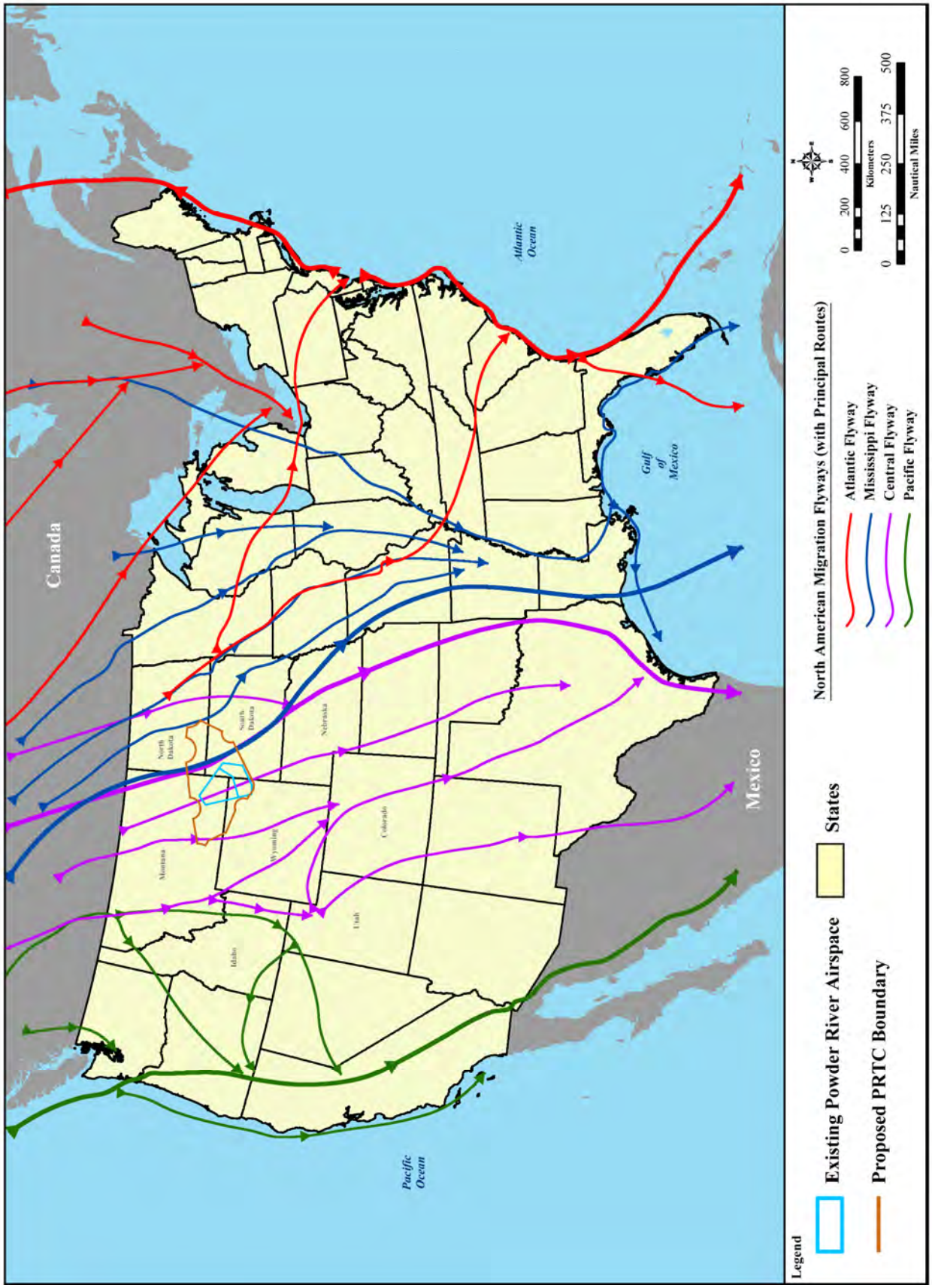


Figure 3.6-2. Migratory Flyways

NONGAME SPECIES

Typical nongame species include birds, bats and small rodents. Nongame bird species include raptors (hawks, owls, golden eagle) songbirds and other perching birds. All amphibian species are nongame and those present in the project area include salamanders, the Great Plains toad and the plains spadefoot. The eastern racer, greater short-horned lizard and the painted turtle are examples of reptiles that can be found within the project area.

3.6.3.3 Threatened, Endangered, and Other Special Status Species

FEDERALLY LISTED SPECIES

Five animal species that are listed under the ESA as threatened or endangered (three birds, one mammal, and one fish) and two ESA candidate bird species have been documented or have the potential to occur in suitable habitats within or near the ROI (Table 3.6-4). The federally listed bird species include the endangered interior least tern (*Sterna antillarum athalassos*), the threatened piping plover (*Charadrius melodus*), and the endangered whooping crane (*Grus americana*). The western distinct population segment of the yellow-billed cuckoo (*Coccyzus americanus*) and the greater sage-grouse (*Centrocercus urophasianus*) are candidate species.

The interior least tern and the piping plover are both found along sand, gravel and/or pebble beaches of rivers and lakes, primarily along the Missouri and Yellowstone Rivers, both of which fall just outside the airspace (Hagen *et al.* 2005). Some of the piping plover range overlaps the project area and, given the close proximity of suitable habitat, there is potential for these species to occur along tributaries within the ROI.

The central migration route of the whooping crane is the last naturally-occurring route of this species in the U.S. and has been mapped as crossing from northwest ND through central SD east of the proposed ROI (NatureServe 2008). The whooping crane is a seasonal migrant that uses wetland areas of ND and SD east of the proposed airspace for stopover and resting during these long migrations. The western yellow-billed cuckoo is also a long-distance migrant that uses riparian forested thickets in SD, and occasionally WY, for breeding (WY Game and Fish [WYGF] 2005).

The greater sage-grouse is dependent year-round upon sagebrush shrublands, which have been in decline in recent years. Consequently, sage-grouse population numbers have been decreasing for decades, thought to be due to reduction in suitable habitat (Connelly *et al.* 2004; Rowland 2004). In 1999, growing concern for the species lead to a petition to list the greater sage-grouse under the ESA. After review, the USFWS ruled in 2004 that listing was not warranted (McCarthy and Kobriger 2005). Subsequent recent review resulted in adding the greater sage-grouse to the federal candidate list on March 5, 2010. The species receives special management attention under USFS, BLM, and in all four states of the project area.

The historic range of the black-footed ferret (*Mustela nigripes*) included all four of the project area states. Having nearly been extirpated in the U.S. as a result of prairie dog extermination, the black-footed ferret has been successfully reintroduced to eight states as of 2008, including MT, WY, and SD. Although all of these populations are listed as endangered, some of them are managed as nonessential experimental. The black-footed ferret is found in shortgrass and mixed–grass prairies, and suitable habitat for reintroduction is defined as prairie dog towns that are generally greater than 80 acres or are part of a 1,000 acre or more complex of prairie dog colonies (WY Game and Fish 2005; USFWS 2008a). One of the recent reintroduction sites is located on the Northern Cheyenne Native American Reservation in southeast MT (USFWS 2008b), which is under the proposed PR-1B MOA.

Table 3.6-4. Federally Listed Species Known to Occur or with Potential to Occur under the Proposed PRTC Airspace (Page 1 of 2)

Common Name	*Scientific Name*	Airspace States and Counties of Occurrence				*FED*[1]	*Expected Occurrence and Habitat*
		ND	*SD*	*MT*	*WY*		
Birds							
Piping plover	*Charadrius melodus*	All Counties – rare	Corson	Fallon, Custer?		T	Potential during migration, nesting occurs along Missouri and Cheyenne rivers and may occur along Moreau River. Uses sandbars, islands, shorelines.
Whooping crane	*Grus americana*	All counties - rare	Butte, Corson, Meade, Perkins, Pennington, Ziebach	Custer, Fallon, Yellowstone	Very rare migrant	E	Potential during migration. Uses sloughs, marshes, rivers, lakes, ponds, croplands, and pastures.
Interior least tern	*Sterna antillarum athalassos*	Morton, Sioux	Meade	Custer, Rosebud		E	Potential during migration, nesting occurs along Missouri and Cheyenne rivers and may occur along Moreau River. Uses sandbars, islands, shorelines.
Yellow-billed cuckoo	*Coccyzus americanus*				Crook, Sheridan	C	Cottonwood –riparian areas
Greater sage-grouse	*Centrocercus urophasianus*	Bowman, Slope, Golden Valley	Butte, Harding, with incidental observations in Perkins and Meade	Carter, Fallon, Custer, Powder River, Rosebud, Big Horn, Treasure	Campbell, Crook, Sheridan, Weston,	C	Dependent upon large stands of mature sagebrush year round for foraging and cover. Flat, open grassland needed for breeding (leks). Historically occurred across the entire ROI; eastern portion of range has subsided.

Table 3.6-4. Federally Listed Species Known to Occur or with Potential to Occur under the Proposed PRTC Airspace (Page 2 of 2)

Common Name	*Scientific Name*	Airspace States and Counties of Occurrence				*FED*[1]	*Expected Occurrence and Habitat*
		ND	*SD*	*MT*	*WY*		
Mammals							
Black-footed ferret	*Mustela nigripes*		Six parcels in western portion of state, includes Badlands and Wind Cave national parks	Four parcels in state, one in southeastern portion on N. Cheyenne Reservation		E, N/E in MT, WY, SD	Historical occurrence across ROI. All current populations have been re- introduced; suitable habitat includes prairie dog towns >80 acres or any towns part of a >1,000 acre complex of prairie dog colonies
Fish							
Topeka shiner	*Notropis topeka*		Corson (historical)			E	Historical occurrence only. All current populations are found in small streams within eastern SD, within the Big Sioux, Vermillion, and James River watersheds

Note: 1. Federal Listing as N/E = Nonessential Experimental, referring to reintroduced populations
"?" indicates uncertainty as to county occurrence.
Sources: USFWS 2006; USFWS 2007; USFWS 2008a; WY Natural Diversity Database (WYNDD) 2003; Montana Sage Grouse Work Group 2005; SD Wildlife Division, Department of Game, Fish and Parks 2008; McCarthy and Kobriger 2005.

The endangered Topeka shiner (*Notropis topeka*) occupies small prairie streams that have groundwater input. The current known populations have been found outside the ROI, with the closest populations being in eastern SD, within the Big Sioux, Vermillion, and James River watersheds (Shearer 2003). The USFWS species list includes a historical occurrence for the Topeka shiner in Corson County, SD; however, the species is no longer considered present.

Species of Special Concern

Eighty-six species of special concern to the states and other federal agencies (e.g., Bureau of Land Management [BLM], USFS) that are considered the highest priority for each state in the ROI (24 birds, 7 mammals, 8 fish, 8 reptiles and amphibians, and 38 plants) may occur in counties under the proposed ROI. Appendix K lists these species and the ROI states and counties in which they are found. Appendix K briefly describes the habitat requirements for each. General species groups that often receive special management consideration by federal and state wildlife agencies and/or have potential to be affected by aircraft training within the proposed airspace include bats and waterfowl. The bald eagle was previously listed for federal protection under the ESA; however, due to recovery the bald eagle was delisted in 2007. The bald eagle is now protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act

Bats: Three species of bats considered species of special concern in MT and WY are found in the project area. Townsend's big-eared bat (*Corynorhinus townsendii)* inhabits caves and abandoned mines near conifer and bottomland woodlands. The pallid bat (*Antrozous pallidus)* can be found in ponderosa pine forests and big sagebrush shrublands with rock outcrops. The spotted bat (*Euderma maculatum)* prefers open, arid habitats close to tall cliffs (MT Natural Heritage Program 2007).

Waterfowl: Waterfowl species of special concern include the common loon (*Gavia immer*), the horned grebe (*Podiceps auritus*) and the American white pelican (*Pelicanus erythrorhynchos*). The common loon is found in WY and often inhabits clear, secluded mid-elevation lakes typically less than four acres in size. The horned grebe is a passage migrant within the proposed airspace and can be found in most open water resources. The American white pelican is also considered a passage migrant and is often observed in lakes, marshes, and rivers (MT Natural Heritage Program 2007). Section 3.6.3.1 details the limited extent of water bodies in the ROI, so those water sources present are of considerable importance to waterfowl as well as other species.

Domestic Animals

The majority of agricultural use in the project area on private land and public land leases is for livestock grazing. Ranches and associated livestock grazing alone constitute approximately 78 percent of the land use in the ROI. Cultivated agricultural areas (encompassing hay/pastureland, irrigated, and other cultivated cropland) cover approximately 8 percent of the ROI (2,078,986 acres) with major crops including wheat, sunflowers, alfalfa, hay, barley, and soybean fields (SDDA 2008; USDA 2007; NDDA 2000).

Beef cattle, with some milk cows, represent the greatest proportion of livestock in the ROI, accounting for 71 percent of all livestock. Sheep and lambs account for 23 percent, horses account for 4.7 percent and the remaining 0.5 percent is comprised of hogs and pigs.

Livestock in the ROI counties represents a portion of the statewide livestock inventory for each of the four states. The beef cows in the ROI counties in MT comprise approximately 13.5 percent of the total inventory of beef cows in the state. The beef cow inventory in the ROI states of ND and WY also comprise 25 percent and 17 percent of the total inventory in the respective states. The number of milk

cows in the ND ROI counties comprises over 33 percent of the total number of milk cows in the state. Livestock on the ROI farms is shown on Table 3.9.13.

3.7 Cultural and Historic Resources

3.7.1 Definition of the Resource

Cultural resources are prehistoric and historic sites, buildings, districts, or objects that are important to a culture or community. Cultural resources are generally divided into four categories: archaeological resources, architectural resources, traditional cultural resources, and cultural landscapes.

Archaeological resources occur in places where people altered the ground surface or left artifacts or other physical remains (e.g., arrowheads, glass bottles, pottery). Archaeological resources can be classified as either sites or isolates. Isolates generally cover a small area and often contain only one or two artifacts, while sites are usually larger in size, contain more artifacts, and sometimes contain features or structures. Archaeological resources can be either prehistoric or historic.

Architectural resources are standing buildings, dams, canals, bridges, windmills, oil wells, and other such structures. They are generally historic in affiliation.

Traditional cultural properties can include properties, sites, or other resources associated with the cultural practices or beliefs of a living community that link the community to its past and help maintain its cultural identity that are eligible or listed on the NRHP. Traditional cultural resources are areas that are associated with the cultural practices or beliefs of a living community that link the community to its past and help maintain its cultural identity that have not been evaluated for NRHP eligibility. Sacred sites are well known areas associated with cultural practices or beliefs of a living community. Most traditional cultural properties, resources, or sacred sites in MT, WY, SD, and ND are associated with Native Americans. Traditional cultural properties or resources may also be associated with other traditional lifeways, such as ranching. Traditional cultural properties or resources can include archaeological resources, locations of prehistoric or historic events, sacred areas, sources of raw materials used in the manufacture of tools and/or sacred objects, certain plants, or traditional hunting and gathering areas.

Cultural landscapes are geographic areas where cultural and natural resources and wildlife have been associated with historic events, activities, or people, or which serve as an example of cultural or aesthetic value. The four types of cultural landscapes are: historic sites (e.g., battlefields, properties of famous historical figures), historic designed landscapes (e.g., parks, estates, gardens), historic vernacular landscapes (e.g., industrial parks, agricultural landscapes, villages), and ethnographic landscapes (contemporary settlements, religious sites, massive geological structures). These categories are not mutually exclusive from each other or the other types of resources defined here (Birnbaum 1994).

The ROI for cultural resources is the area within which the proposed action has the potential to affect existing cultural resources. For the Proposed Action, the ROI is defined as the land under the training airspace proposed for use by B-1, B-52, and transient aircraft in day-to-day or LFE training.

3.7.2 Regulatory Setting

Archaeological and historic sites and structures are protected under a number of laws including the Antiquities Act of 1906, Historic Sites Act of 1935, Archaeological Resources Protection Act of 1979, and the National Historic Preservation Act (NHPA) of 1966, as amended. Under the NHPA and its implementing regulations, only significant cultural resources are considered when assessing the possible impacts of a federal undertaking or action. Significant archaeological, architectural, and traditional cultural resources include those that are listed or eligible for listing for inclusion on the National Register

of Historic Places (NRHP). The significance of cultural resources is usually determined by using specific criteria as defined by the NHPA under 36 CFR 60.4, including association with an event or individual significant to the past, ability to contribute to scientific research, or ability to add to an understanding of history or prehistory. Cultural resources must exceed 50 years of age to be considered for listing on the NRHP. However, more recent resources such as Cold War-era buildings may warrant protection if they manifest "exceptional significance." Traditional cultural resources can be evaluated for NRHP-eligibility, as well. Whether or not a traditional cultural resource is evaluated for NRHP eligibility, it may have special importance to the respective tribe, and as such, DoD has particular trust responsibilities to ensure its proper stewardship.

National Historic Landmarks are cultural resources of national historic importance and are automatically listed on the NRHP. Under the implementing regulations for Section 106 (36 CFR Part 800.10) for the NHPA, special consideration to minimize harm to National Historic Landmarks is required and both the Advisory Council for Historic Preservation and the Secretary of the Interior are consulted if any adverse effects are likely to occur to such resources. *National Monuments* were established under the Antiquities Act of 1906, which gives the President of the United States authority to restrict the use of public land owned by the federal government as parks or conservation lands by EO. National Monuments were "historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest"" (16 USC 431-433) that were identified for protection and federal management. National monuments that are historic in character and managed by the National Park Service are administratively listed on the NRHP. Devils Tower, now under the Gateway ATCAA, was the first national monument to be established on September 24, 1906.

Several laws and regulations address the requirement of federal agencies to notify or consult with Native American tribes or otherwise consider their interests when planning and implementing federal undertakings. In particular, on April 29, 1994, the President issued the *Memorandum on Government-to-Government Relations with Native American Tribal Governments*, which specifies a commitment to developing more effective day-to-day working relationships with sovereign tribal governments. In addition to the Memorandum, EO 13175 *Consultation and Coordination with Indian Tribal Governments* (November 6, 2000) reaffirms the U.S. Government's responsibility for continued collaboration and consultation with Tribal Governments in the development of federal policies that have tribal implications, to strengthen the U.S. government-to-government relationships with Native American tribes, and reduce the imposition of un-funded mandates upon Native American tribes. This EO supersedes EO 13084 signed May 14, 1998.

The DoD Instruction 4710.02, *DoD Interactions with Federally-Recognized Tribes*, September 16, 2006, implements the DoD Native American and Alaska Native Policy, assigns responsibilities, and provides procedures for DoD interaction with federally-recognized tribes. Other laws and regulations requiring consultation with Native Americans include the NHPA of 1966, Native American Religious Freedom Act, and EO 13007. The NHPA requires agencies to consult with Native American Tribes if a proposed federal action may affect historic properties to which they attach religious and cultural significance. The Native American Religious Freedom Act sets the policy of the U.S. to "protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise the traditional religions of the American Indian…including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonies and traditional rites."

EO 13007, *Indian Sacred Sites*, issued on May 24, 1996 requires that in managing federal lands, agencies must accommodate access and ceremonial use of sacred sites, which may or may not be protected by other laws or regulations, and must avoid adversely affecting the physical integrity of these sites.

3.7.2.1 Data Sources

Information on cultural resources within the ROI was derived from conducting background research to identify NRHP and the State Register of Historic Places properties beneath the affected airspace, National Historic Landmarks, National Battlefields, National Historic Trails, any cultural landscapes, ghost towns, historic forts, or historic ranches recorded or known within the same area, and Native American Reservations, sacred areas, or traditional use areas. State Historic Preservation Offices (SHPOs) were contacted at Cheyenne, WY; Helena, MT; Bismarck, ND; and Pierre, SD; and sources were reviewed on the National Register Information System, and the on-line SD State Register. Regional offices of the BLM and cultural resources managers associated with national forests under the airspace were also contacted. Information was solicited as well from Tribal Historic Preservation Offices associated with the four reservations that are under portions of the proposed airspace: the Crow Reservation, Northern Cheyenne Reservation, Standing Rock Reservation, and the Cheyenne River Reservation and from state historic preservation societies in WY, MT, ND, and SD. Other Native American Tribes contacted are listed in Table 3.7-1.

3.7.2.2 Native American Government-to-Government Consultation

In an ongoing effort to identify traditional cultural resources as well as to satisfy the requirements of various laws, regulations, and EOs, the Air Force is consulting with Native American tribes according to the Presidential Memorandum on Government-to-Government Relations with Native American Tribal Governments, EO 13175, and DoD Policy on Native American and Native Alaskan Consultation.

There are four Native American Reservations located under portions of the airspace -- the Northern Cheyenne Reservation, the Crow Reservation, the Standing Rock Reservation, and the Cheyenne River Reservation (Figure 3.7-1). Ellsworth AFB initiated Government-to-Government consultation with each of these tribes in April and May 2008 and in July and August 2009. In addition, 11 reservations outside of the airspace in MT, WY, ND, and SD were sent letters requesting information on concerns and initiating Government-to-Government consultation in June 2008 (Table 3.7-1). The Oglala Sioux and Rosebud Sioux Tribes responded that they would like to be included in the Government-to-Government consultation for the proposed action.

Table 3.7-1. Native American Groups Contacted

Crow Nation, Crow Reservation	Three Affiliated Tribes Business Council, Fort Berthold Reservation	Rosebud Sioux Tribe, Rosebud Reservation
Northern Cheyenne Tribe	Turtle Mountain Tribal Council, Turtle Mountain Reservation	Eastern Shoshone Tribal Council, Wind River Reservation
Standing Rock Reservation	Chippewa-Cree Business Committee, Rocky Boy's Reservation	Oglala Sioux Tribal Council, Pine Ridge Reservation
Cheyenne River Sioux Tribe, Cheyenne River Reservation	Fort Peck Tribal Executive Board, Fort Peck Native American Reservation	Confederated Salish and Kootenai Tribe, Flathead Native American Reservation
Spirit Lake Sioux Tribal Council, Spirit Lake Reservation	Arapaho Business Council, Wind River Reservation	Fort Belknap Community Council, Fort Belknap Reservation

Source: See Appendix M

Tribal scoping meetings were held at the Crow Agency on June 23, the Northern Cheyenne Tribal Council Chamber in Lame Deer, MT on June 24, the Standing Rock Reservation in McLaughlin, SD and Fort Yates,

ND on July 11, and at the Cheyenne River Reservation at Dupree, SD on July 16, 2008. There were three primary areas of concern expressed by representatives during scoping meetings that relate to cultural resources. These are 1) the effects on Native American sacred areas and ceremonies by overflights and noise (mentioned by both the general public and by members of each of the four reservations), 2) visual effects to sites and sacred areas from overflights and chaff and flares, and 3) effects on sacred areas and historic sites from subsonic and supersonic noise.

Specific concerns associated with the Proposed Action included:

- The annual Crow Fair and Rodeo takes place at Crow Agency in August, which is an important event on the Crow Native American Reservation.
- There are also other sensitive times and areas on the Crow Reservation that the Crow request be avoided. The Crow also expressed concerns over impacts on tribal ceremonies.
- The Northern Cheyenne have concerns about ceremonies and calving with aircraft activity in airspace over their reservation. They also expressed concerns about noise, impacts on civil aviation, and impacts on the local economy.
- Calving and ceremonial times are a concern to the Standing Rock Native American Reservation, which primarily occur in the summer. One area they expressed concern about is west of Bullhead on the Grand River where Sundance ceremonies are held. The Standing Rock Tribe also expressed concerns over Bear Butte, Wind Cave, and Devils Tower, which they consider sacred areas. The Standing Rock Tribe also expressed concerns about weather patterns and flight safety (aircraft crashes).
- Members of the Cheyenne River Native American Reservation expressed concerns over use of airspace over the reservation between June and August for ceremonial purposes and during calving season. They expressed concerned over potential financial loss during calving season. Sacred/Ceremonial sites are located near Bear Butte, Thunder Butte, Slim Buttes, Inyan Karan Mountain, Devils Tower, and all reservation rivers. Concerns were expressed for ceremonial activities such as Vision Quests and Sundance activities.

Social Communities

A small Amish settlement is located 10 miles north of Ashland, MT under the proposed PR-1B MOA airspace. A small Hutterite Colony, called 40-Mile, is located about halfway between Sheridan, WY and Hardin, MT, also under the proposed PR-1B MOA. While these communities differ in their religious beliefs and cultural practices, both are farming communities that have descended from the Anabaptists. Both communities maintain communal lifestyles and remain largely isolated from the culture at large. The Amish and the Hutterites maintain material simplicity to varying degrees. Most Amish do not operate machinery or use modern technology. Pacifism is a basic tenet of Hutterite religion. Variation from baseline noise levels may be more disruptive to communities whose residents are not accustomed to machine or industrial noise.

3.7.3 Existing Conditions

The affected environment includes the lands and resources potentially affected by the Proposed Action. The affected airspace varies according to which of the alternatives is adopted, but would involve all areas beneath newly created or expanded MOAs and ATCAAs. The rich history of these areas are described briefly below.

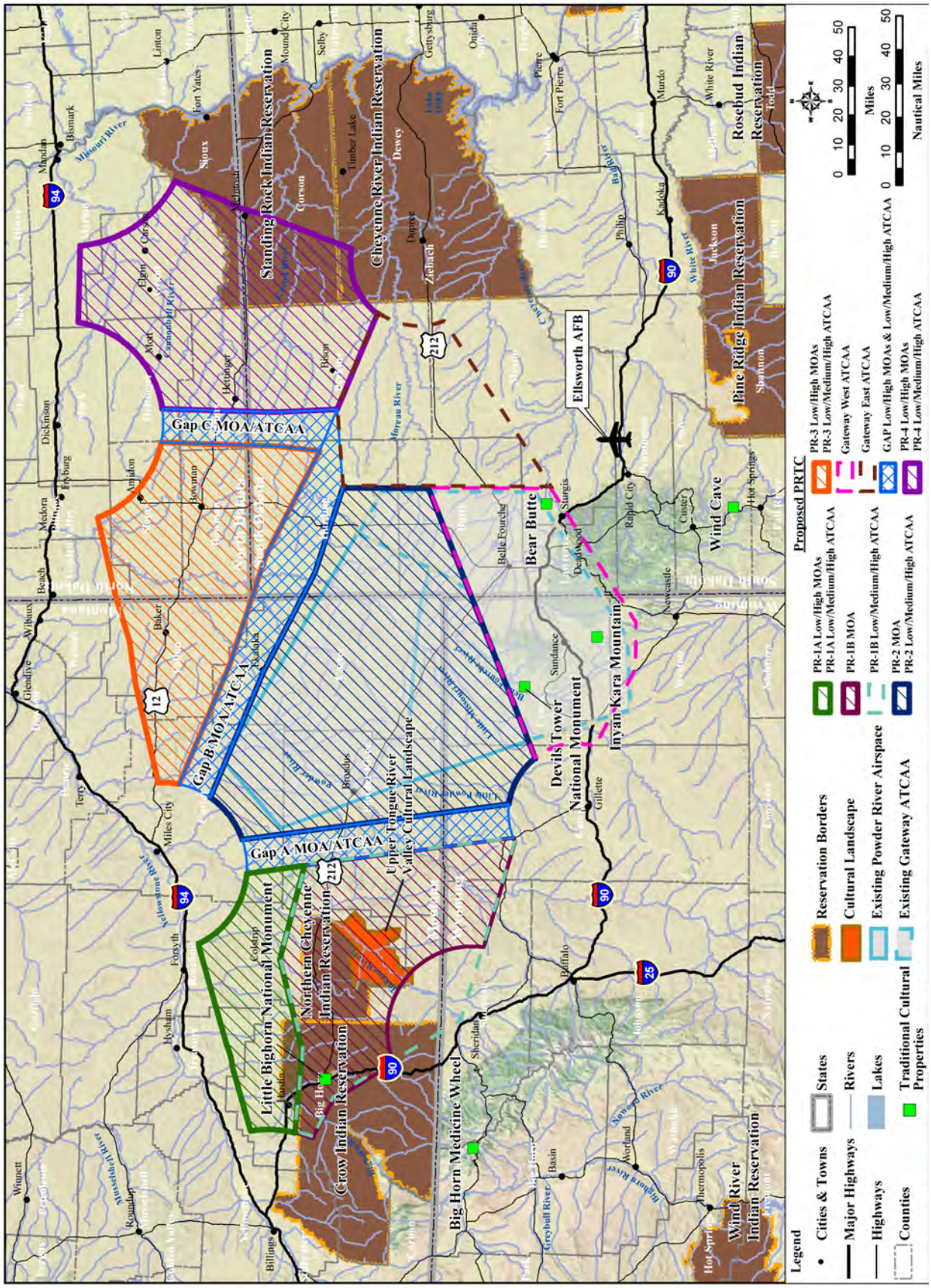


Figure 3.7-1. Native American Reservations and Identified Traditional Cultural Properties within the Affected Environment

3.7.3.1 Historic Setting

Historic setting is derived from written records and oral traditions from Western and Native American cultures.

PREHISTORY

In a conventional Western version of the 'prehistory' (i.e., the period before written evidence) of the ROI, Frison (1978) has suggested a cultural chronology for the high plains of North America. This chronology is presented here because most of the prehistoric complexes known in the project area are represented in Frison's chronology. Aside from the evidence of archaeology and written history, oral traditions of the Crow, Cheyenne, Sioux, and other Native American peoples of the high plains provide further useful information.

PALEOINDIAN PERIOD

The Paleoindian Period dates from approximately 12,000 B.C. to 6,000 B.C. The Paleoindian period includes a large number of apparently distinct human groups, which range from the earliest known recorded Clovis complex to the later and varied "Plano" groups. Evidence for Clovis period use of the project area is scant. Excavations at Paleoindian period sites indicate that later Paleoindian groups relied heavily on extinct species of bison for food and industrial items. Plant processing items (e.g., manos, metates, and pestles) are generally lacking at Paleoindian sites, suggesting that plants were used secondary to hunting for subsistence.

Gradually, the Paleoindian peoples began to rely more heavily on small game and wild plants for subsistence leading into what is known as the Archaic Period.

ARCHAIC

The Archaic Period is characterized in part by an increase in the archaeological record of ground stone tools and baking hearths - evidence of increased reliance of plant foods. Technologies were also adapted to changing climatic conditions and more permanent settlements are found. In the high plains, the Archaic Period is subdivided into Early Plains, Middle Plains, and Late Plains Archaic as described below.

The Early Plains Archaic dates from approximately 6,000 B.C. to 2,500 B.C. Bison hunting continued into this period (both extinct and modern forms). Evidence for the processing of plant foods is still scarce at Early Plains Archaic sites, but plant resources were likely gathered in season rounds. Simple manos and grinding slabs are occasionally found at Early Plains Archaic sites.

Frison's (1978) Middle Plains Archaic Period dates from approximately 2,500 B.C. to 500 B.C. and is associated with the widespread appearance of occupations throughout the northern Plains, even in areas that were previously devoid of human groups. In some areas of the northern Plains, such as north-central WY, archaeological evidence suggests an increased reliance on plant foods and their preparation. McKean Complex sites in WY also include flat sandstone grinding slabs and manos and roasting pits (HRA 1979). Bison continued to be an important resource during the Middle Plains Archaic.

Approximate dates for the Late Plains Archaic range from 1,000 B.C. to A.D. 700. This period is associated with communal bison hunting on the plains. Evidence for the preparation of plant resources is scarce during this period.

LATE PREHISTORIC PERIOD

The first 200 years or so of the Late Plains Archaic Period overlap with the Late Prehistoric Period. The Late Prehistoric Period dates from approximately A.D. 500 to A.D. 1700 and is associated with the

introduction of the bow and arrow (Frison 1978, HRA 1979). Communal bison hunting reached its greatest expression, in terms of efficiency, during this period. There are hundreds of Late Prehistoric Period bison kill sites in the northern plains.

After moving westward from their original homeland in Minnesota, Cheyenne bands unified in the Black Hills of South Dakota in the mid 1700s. Bear Butte is sacred to the Cheyenne (as well as other tribes) The Sweet Medicine legends explain the origin of the Sacred Arrows, an event that took place at Bear Butte. The Sacred Arrows are the most sacred possession of the Cheyenne people (Rambow 2004). Ethnographic accounts suggest that the Cheyenne adapted to more of a nomadic lifestyle after moving to the Black Hills rather than the more sedentary, horticultural based lifestyle they originally practiced (Gunnerson and Gunnerson 1988). Cheyenne hunted bison on horseback and horses became an important part of their economy (Gunnerson and Gunnerson 1988). By the mid 1800s the Cheyenne encountered increased European-American emigration, warfare, and disease (Moore et al. 2001).

Sioux traditions place their origins near northern lakes east of the Mississippi River (DeMallie 2001). According to Sioux legend, before European contact, the Sioux practiced a seasonal round, and based dates of ceremonies on the equinoxes (Rosebud Sioux Tribe 2010). The Sioux practiced a semi-woodland culture before becoming a plains culture (Rosebud Sioux Tribe 2010). Other oral histories suggest that some Sioux bands moved west to hunt bison (DeMallie 2001). By the mid 1600s, Sioux economy focused on bison hunting. Sioux bands gathered during mid-summer or autumn in large groups to celebrate the Sun Dance and good fortunes. During other times of the year smaller groups disbanded and operated independently (Schusky 1975). By the mid 1800s the Sioux were a major power between the Black Hills and the Missouri River, and often warred with the Pawnee (Gunnerson and Gunnerson 1988).

Crow traditions place their origins near the Bear Paw Mountains and at the Three Forks of the Missouri River (Voget 2001). In the 1700s horses became central to Crow economy and the quest for wealth, status, and spouses. Bison was the major meat source for the Crow by the late 1700s; with the hunt significantly aided by horses (Voget 2001). After the introduction of the horse, the Crow were mobile for a good portion of the year (Curtis 1909). Traditional Crow religious practices include the sweat lodge, vision quest, and the Sun Dance. The Crow Sun Dance differs from that of other Plains tribes (Voget 2001).

Proto-Historic Period

The Proto-Historic Period begins around 1700 and is generally considered to end with the arrival of the Lewis and Clark Expedition in 1805 (Wood and Associates 2003). The horse was introduced to northern Plains Native Americans during the beginning of this period. This changed bison hunting strategies, trading networks, and settlement patterns. Small amounts of European trade goods also appear in archaeological sites dating to this time period (HRA 1979a).

History

The historic Euroamerican occupation and settlement of the project area can be broken down into several periods, including early exploration and the fur trade, the gold rush and Native American/U.S. Government conflicts, and ranching/agricultural development.

In 1805 the Lewis and Clark expedition passed just north of the project area. From 1805 to the 1850s the Euroamerican presence in the region consisted of explorers and traders. The area was influenced by the fur trade out of Taos to the south and the Missouri River trade to the north. The fur trade was centered mainly on beaver pelts and reached its peak between 1820 and 1840. Because the fur trade

was based on a single resource, it declined when areas were trapped out of beaver pelts and when the fashion changed from beaver hats to silk hats.

Westward movement continued along the Oregon Trail and other trails throughout the 1800s. These roads began informally, but as traffic to the area increased (especially during the gold rush) the roads began to see formal construction and upkeep. Steamboats began moving up the Missouri and Yellowstone Rivers in the 1850s. In the 1860s commercial steamboats began docking further up the rivers at forts there (Malone *et al.* 1991). Railroads have also been a significant factor in the history of the project area. Construction of the Union Pacific Railroad across WY in the late 1860s and the Northern Pacific routes across ND and MT in the 1880s (Muhn 1980) opened the lands now in the project area to permanent settlement. The railroad provided the necessary connection to eastern markets vital to ranching development.

One of the lasting effects of Euroamerican movement into lands previously occupied only by Native Americans was the disruption of Native American lifeways. Prior to the incursion of Euroamericans into their lands, Native Americans in the Plains generally relied upon hunting and gathering for survival. Overhunting of animals by Euroamericans and Native Americans to supply the demand for furs and pelts depleted the range of resources used by Native Americans for subsistence. This resulted in a settlement clustering effect around forts, where trading could occur and new forms of subsistence could be obtained. This clustering, in addition to the over-exploitation of formerly rich lands, brought Native Americans and Euroamericans into conflict for resources.

The Treaty of Fort Laramie was an agreement between the U.S. and representatives of the Lakota nation, Yankronai Sioux, Santee Sioux, and Arapaho signed in 1868 at Fort Laramie in the WY Territory, guaranteeing to the Lakota ownership of the Black Hills, and furthered land and hunting rights in SD, WY, and MT. The Powder River Country was to be henceforth closed to all Euroamericans. The treaty created the Great Sioux Reservation which included the current Standing Rock, Cheyenne River, Pine Ridge, and Rosebud reservations. The Missouri River formed the eastern boundary of the reservation which stretched west to the Black Hills. Unceded Native American Territory stretched further south and west (Figure 3.7-2).

Conflict was exacerbated by the Black Hills gold rush. Prospectors moved into the region illegally to begin mining in the 1860s. The Black Hills gold rush reached its peak in 1876 when the majority of the land in areas containing gold was claimed. Mining and other intrusions into the Great Sioux Reservation created tension and the U.S. government took action on the side of the Euroamericans. Though the best known clash of U.S. forces and tribal groups came in the form of the Battle of Little Bighorn on June 25 and 26, 1876, a variety of other battles took place within the affected environment. These battles, mostly from the 1860s to the 1880s were the result of Native American resistance (primarily Cheyenne and Sioux groups) to displacement from their lands. These battles are currently identified as part of the Great Sioux War and include:

- the battle of Powder River, located in southern MT (March 17, 1876);
- the battle of the Rosebud in southern MT (June 17, 1876);
- the battle of Slim Butte in SD (September 8, 1876);
- the battle of Wolf's Mountain, located in southern MT (January 7, 1877); and
- the battle of Lame Deer in southeastern MT (May 7, 1877).

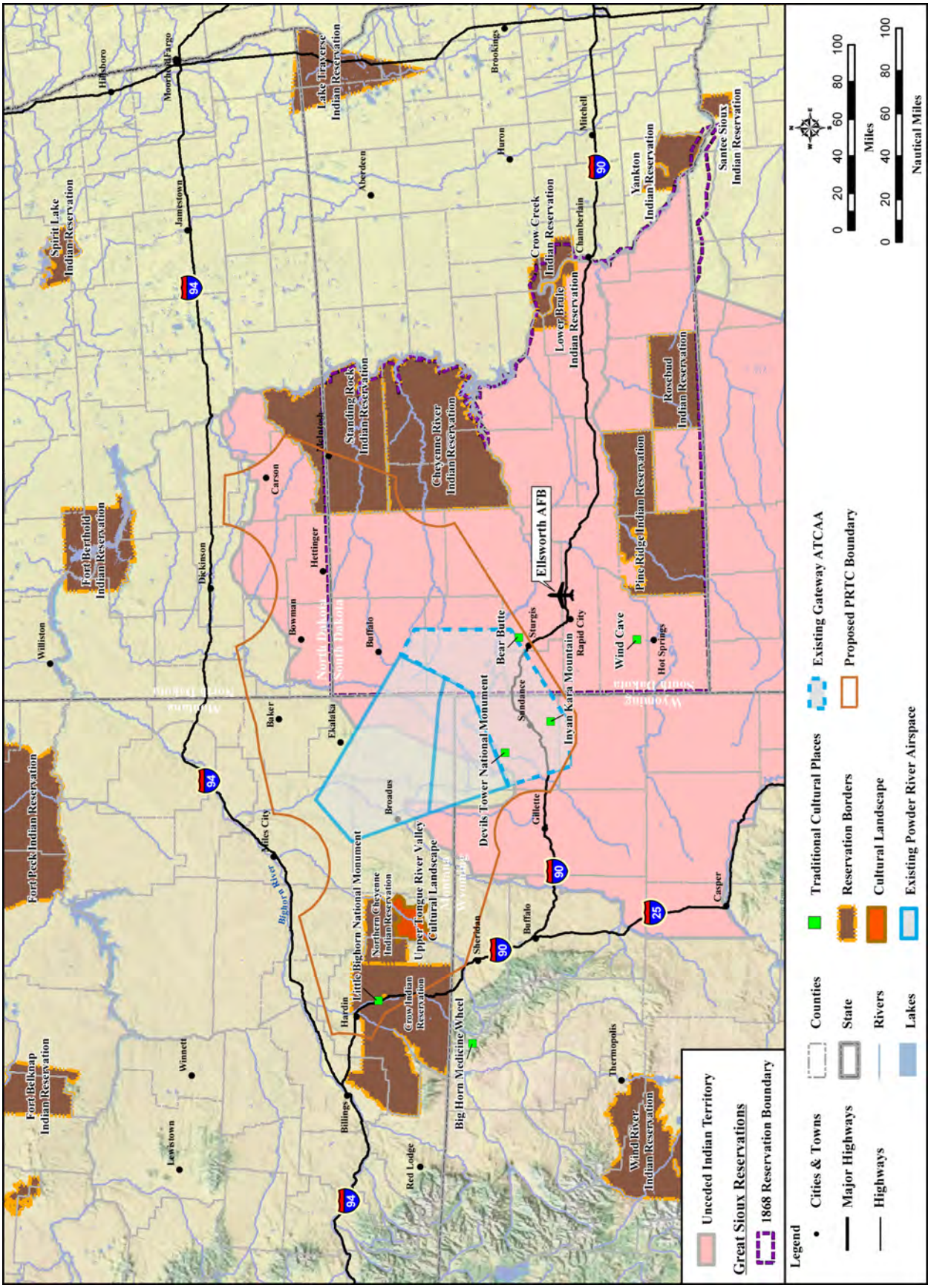


Figure 3.7-2. Native American Historic and Existing Lands in Relation to the Proposed PRTC

Continuing hostilities and the intense activity of Euroamericans working gold claims in the region resulted in the U.S. Congress enacting legislation which "in effect, abrogated the Fort Laramie Treaty" and constituted a taking of tribal property (448 U.S. 371 [1980]). U.S. government policies regarding reservations and the use of the military forced most of the northern Native American groups onto reservations by the early 1880s (Malone *et al.* 1991; Muhn 1980). The Battle of Wounded Knee in 1890 effectively ended organized Sioux and Cheyenne resistance.

Though mining continued in the Black Hills into the 21st century, the majority of the boom was over by the 1880s and the easily extracted gold was played out. This resulted in an exodus of many Euroamerican gold miners, leaving only those with large-scale operations and those that chose to stay for farming and ranching.

In 1889, five reservations were created by the Dawes Act, the Standing Rock Reservation, Cheyenne River Reservation, Lower Brule Reservation, Rosebud Reservation, and the Pine Ridge Reservation (see Figure 3.7-2). The boundaries of these five reservations permitted approximately 9 million acres, one half of the former Great Sioux Reservation, to be opened for ranching and homesteading.

The Crow Reservation was established in 1851 as a portion of Crow tribal lands. The Crow and Sioux-Cheyenne were traditional enemies and Crow scouts regularly supported U.S. Cavalry actions against the Sioux and related Cheyenne tribal groups. The Northern Cheyenne Reservation was established in 1884 following an 1878-1879 seven-month running fight by the Northern Cheyenne to return to a portion of their traditional lands after being relocated to Oklahoma.

With the end of Native American/U.S. government hostilities and the end of the gold rush, the livestock industry began to develop in earnest in the area proposed for the PRTC. The vast grass and sagebrush were valuable for fattening livestock. Cattle and sheep ranches were established in the 1870s and 1880s. Farming developed slowly in the project area due to the arid conditions that prevail in the region. The previous establishment of the livestock industry in areas with water (river drainages) prevented small farmers from settling in the area until the later 1880s and 1890s. With increased immigration to the U.S., good cheap land became scarce. Farmers began settling in more marginal areas in the early 1900s and relied on dry farming techniques. Increasing settlement by farmers in the region and the troubles of dry farming resulted in a push by private investors and government to establish systems of irrigation to support farmers. The 1902 Reclamation Act was intended to support the development of agriculture nationwide by making funds available to support such projects.

Approximately one-half of the Crow Reservation and all of the Northern Cheyenne Reservation are under the proposed PR-1B MOA. The Northern Cheyenne Health Service facilities are pictured.

Most of the development in the project area from the early 1900s to present has revolved around ranching, farming, and exploitation of energy resources in the forms of coal, oil, and natural gas (Muhn 1980).

Following the procedures of the Dawes Act, the remaining reservations were in turn greatly reduced in size, through the allocation of 320 acre parcels to heads of families and other measures which greatly reduced the land in Native American ownership, while attempting to force them to convert to farmers and craftsmen. "Surplus" land was then made available for homesteading, and often, allocated land was sold by its Native American owners. In some cases, even when homesteads were abandoned during the Dust Bowl era of the 1930s, the land ended up in federal control. Some tribal lands became part of the modern National Grasslands, Badlands National Park, and land controlled by the Bureau of Land

Management or other federal agencies, rather than reverting to the Native American nations. The sale of lands privately held by Native Americans and non-Native Americans (inholdings) continues in some areas into the 21st century.

Devils Tower National Monument, in northeastern WY, is under the existing Gateway ATCAA. The top of Devils Tower is at elevation 5,112 MSL. The floor of the Gateway ATCAA is 18,000 feet MSL.

3.7.3.2 Identified Cultural Resources

WYOMING

Fourteen properties are currently listed in the NRHP in Crook and Sheridan Counties, WY beneath the proposed PRTC airspace (Table 3.7-2). Twelve of these properties are under the existing Powder River airspace. They consist of archaeological sites, historic structures at Devils Tower National Monument, bridges, and historic buildings. No properties under the proposed PRTC airspace are located in Campbell or Weston Counties, WY. Devils Tower National Monument (Table 3.7-3) is beneath the existing Gateway ATCAA (see Figure 3.7-1) and also beneath the proposed Gateway ATCAA which begins at 18,000 feet MSL.

A search of ghost towns within the lands beneath the affected airspace in WY revealed the presence of four ghost towns. Several of the ghost towns contain standing wood/log structures associated with historic mining, ranching, stage or Pony Express routes, or railroad stations (Table 3.7-4). Most of the ghost towns have not been subjected to professional archaeological and/or architectural assessments and may be eligible for the National or State Registers pending further investigation by cultural resources professionals.

There is one historic ranch beneath the proposed airspace (Table 3.7-5). Ranch A is listed on the NRHP and deserves special consideration due to the large number of standing structures present at the site.

A historic vernacular landscape within the area beneath the affected airspace is present in the form of a historic trail (Table 3.7-6). The Texas Trail runs through Weston, Crook, and Campbell Counties.

Several traditional cultural properties and resources, have been identified within the lands beneath the affected airspace (Table 3.7-7). The areas of Devils Tower and Inyan Kara Mountain are considered sacred sites by Native American peoples of the region. There are also two traditional cultural resources whose status is being discussed in consultation with tribes. The first is located to the north of the town of Gillette on Forest Service land inside the project area. The second is located northwest of the town of Hulett. These unnamed traditional cultural resources are associated with multiple Tribes.

Inyan Kara Mountain, south of Devils Tower in northeast WY, is considered sacred by American Indian peoples of the area. The mountain is at 6,348 feet MSL and is under the existing Gateway ATCAA which has a floor of 18,000 feet MSL.

Table 3.7-2 NRHP Listed Resources Under Proposed PRTC Airspace (Page 1 of 6)

Site Name	*General Location*	*Alternative*[1]
WY		
Arch Creek Petroglyphs	Moorcroft	A, B, C
DXN Bridge over Missouri River	Hulett	Existing, A, B, C
EBF Bridge over Powder River	Leiter	A, C
Entrance Road—Devils Tower National Monument	Devils Tower	Existing, A, B, C
Entrance Station—Devils Tower National Monument	Devils Tower	Existing, A, B, C
Inyan Kara Mountain	Sundance	Existing, A, B, C
McKean Archaeological Site	Moorcroft	Existing, A, B, C
Old Headquarters Area Historic District	Devils Tower	Existing, A, B, C
Ranch A	Beulah	Existing, A, B, C
Sundance School	Sundance	Existing, A, B, C
Sundance State Bank	Sundance	Existing, A, B, C
Tower Ladder-Devils Tower National Monument	Devils Tower	Existing, A, B, C
Vore Buffalo Jump	Sundance	Existing, A, B, C
WY Mercantile	Aladdin	Existing, A, B, C
MT		
Baker Hotel	Fallon/Baker	A, B, C
Fallon County Jail	Fallon/Baker	A, B, C
Cross Ranch Headquarters	Powder River/Broadus	A, B, C
Bones Brother Ranch	Rosebud/Birney	A, C
Wolf Mountain Battlefields	Rosebud/Birney	A, C
Baldwin House	Big Horn/Lodge Grass	A, C
Battle of the Rosebud Site	Big Horn/Kirby	A, C
Boyum, John, House	Big Horn/Hardin	A, C
Burke, Thomas H., House	Big Horn/ Hardin	A, C
Cammock's Hotel	Big Horn/Lodge Grass	A, C
Chivers Memorial Church	Big Horn/Lodge Grass	A, C
Commercial District	Big Horn/Hardin	A, C
Drew, J.W., Grain Elevator	Big Horn/Lodge Grass	A, C
Ebeling, William, House	Big Horn/Hardin	A, C
Eder, Charles S., House	Big Horn/Hardin	A, C
First Baptist Church	Big Horn/Hardin	A, C
Haverfield Hospital	Big Horn/Hardin	A, C
Kopriva, Francis, House	Big Horn/Hardin	A, C
Lee Homestead	Big Horn/Decker	A, C
Little Bighorn Battlefield National Monument	Big Horn/Hardin	A, C
Lodge Grass City Jail	Big Horn/Lodge Grass	A, C
Lodge Grass Merchandise Company Store	Big Horn/Lodge Grass	A, C
Moncure Tipi	Big Horn/Busby	A, C
OW Ranch	Big Horn/Birney	A, C
Pease's George, Second Store	Big Horn/Lodge Grass	A, C
Ping, J.J., House	Big Horn/Hardin	A, C
Reno Apartments	Big Horn/Hardin	A, C
Residential District	Big Horn/Hardin	A, C
Ryan's, John, House	Big Horn/ Lodge Grass	A, C
Sharp's Jay, Store	Big Horn/Lodge Grass	A, C
Simmonsen's House	Big Horn/Lodge Grass	A, C

Table 3.7-2 NRHP Listed Resources Under Proposed PRTC MOA Airspace (Page 2 of 6)

Site Name	*General Location*	*Alternative*[1]
St. Joseph's Catholic Church	Big Horn/Hardin	A, C
Stevens, Dominic House	Big Horn/Lodge Grass	A, C
Sullivan Rooming House	Big Horn/Hardin	A, C
Sullivan, James J., House	Big Horn/Hardin	A, C
Trytten, J.M., House	Big Horn/Lodge Grass	A, C
Tupper, J. S., House	Big Horn/Hardin	A, C
ND		
Fort Dilts	Bowman/Rhame	A, B, C
Schade, Emma Petznick and Otto, House	Bowman/Bowman	A, B, C
H-T Ranch	Slope/Amidon	A, B, C
Mystic Theatre	Slope/Marmarth	A, B, C
Original Slope County Courthouse	Slope/Amidon	A, B, C
Adams County Courthouse	Adams/Hettinger	A, B
Cedar Creek Bridge	Adams/Haynes	A, B
U.S. Post Office – Hettinger	Adams/Hettinger	A, B
Hettinger County Courthouse	Hettinger/Mott	A, B
Neuburg Congregational Church	Hettinger/Mott	A, B
Stern, John and Fredricka (Roth), Homestead	Hettinger/Mott	A, B
Riverside	Hettinger/New England	A, B
Carson Roller Mill	Grant/Carson	A, B
Hope Lutheran Church	Grant/Elgin	A, B
Medicine Rock State Historic Site	Grant/Heil	A, B
SD		
Archaeological Site No. 39HN1	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN121	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN150	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN155	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN159	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN160	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN162	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN165	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN167	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN168	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN17	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN171	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN174	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN177	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN18	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN198	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN199	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN205	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN207	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN208	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN209	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN21	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN210	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN213	Harding/Ludlow	A, B, C

Table 3.7-2 NRHP Listed Resources Under Proposed PRTC MOA Airspace (Page 3 of 6)

Site Name	*General Location*	*Alternative*[1]
Archaeological Site No. 39HN217	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN218	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN219	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN22	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN227	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN228	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN232	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN234	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN26	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN30	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN484	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN485	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN486	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN487	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN5	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN50	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN53	Harding/Ludlow	A, B, C
Archaeological Site No. 39HN54	Harding/Ludlow	A, B, C
Ashcroft, Thomas, Ranch	Harding/Buffalo	A, B, C
Blake Ranch House	Harding/Gustave	Existing, A, B, C
Emmanuel Lutheran Church and Cemetery	Harding/Ralph	A, B, C
Fowler Hotel	Harding/Buffalo	A, B, C
Giannonatti Ranch	Harding/Ludlow	A, B, C
Golden Valley Norwegian Church	Harding/Ralph	A, B
Johnson, Axel, Ranch	Harding/Reva	A, B, C
Lighting Spring	Harding/Ludlow	A, B, C
Little Missouri Bank Building	Harding/Camp Crook	Existing, A, B, C
Livingston, John and Daisy May, Ranch	Harding/Sorum	A, B, C
Peace Valley Evangelical Church and Cemetery	Harding/Ralph	A, B, C
Shevling, L.W., Ranch	Harding/Harding	Existing, A, B, C
Stokes, Oliver O., House	Harding/Harding	Existing, A, B, C
Vessey School	Harding/Haley	A, B, C
Belle Fourche Commercial District	Butte/Belle Fourche	Existing, A, B, C
Belle Fourche Dam	Butte/Belle Fourche	Existing, A, B, C
Belle Fourche Experiment Farm	Butte/Newell	Existing, A, B, C
Bolles, Charles, House	Butte/Belle Fourche	Existing, A, B, C
Butte County Courthouse and Historic Jail Building	Butte/Belle Fourche	Existing, A, B, C
Butte-Lawrence County Fairgrounds	Butte/Nisland	Existing, A, B, C
Ditchrider House	Butte/Nisland	Existing, A, B, C
Fruitdale School	Butte/Fruitdale	Existing, A, B, C
Fruitdale Store	Butte/Fruitdale	Existing, A, B, C
Gartner, Carl Frederick, Homestead	Butte/Newell	Existing, A, B, C
Gay, Thomas Haskins, House	Butte/Belle Fourche	Existing, A, B, C
Harris, Fred S., House	Butte/Belle Fourche	Existing, A, B, C
Hay Creek Bridge	Butte/Belle Fourche	Existing, A, B, C
Hoover Store	Butte/Hoover	A, B, C
Hoover, Alexander House	Butte/Hoover	A, B, C

Table 3.7-2 NRHP Listed Resources Under Proposed PRTC MOA Airspace (Page 4 of 6)

Site Name	*General Location*	*Alternative*[1]
Johnson, William, House	Butte/Fruitdale	Existing, A, B, C
Kenaston, William G., House	Butte/Newell	Existing, A, B, C
Langdon School	Butte/Nisland	Existing, A, B, C
Lincoln School	Butte/Belle Fourche	Existing, A, B, C
Minnesela Bridge	Butte/Belle Fourche	Existing, A, B, C
Newell Depot Bridge	Butte/Newell	Existing, A, B, C
Newell High School	Butte/Newell	Existing, A, B, C
Scotney, John Aaron, House	Butte/Belle Fourche	Existing, A, B, C
Small, Charles and Eleanor House	Butte/Belle Fourche	Existing, A, B, C
Snoma Finnish Cemetery	Butte/Fruitdale	Existing, A, B, C
Soper-Behymer Ranch	Butte/Belle Fourche	Existing, A, B, C
SD Department of Transportation Bridge No 10-109-360	Butte/Belle Fourche	Existing, A, B, C
SD Department of Transportation Bridge No. 10-270-338	Butte/Newell	Existing, A, B, C
Stonelake Bridge	Butte/Newell	Existing, A, B, C
Tri-State Bakery	Butte/Belle Fourche	Existing, A, B, C
Vale Bridge	Butte/Vale	Existing, A, B, C
Vale Cut Off Belle Fourche River Bridge	Butte/Belle Fourche	Existing, A, B, C
Vale School	Butte/Vale	Existing, A, B, C
Viken, Nicholas Augustus Homestead	Butte/Newell	Existing, A, B, C
Wide Awake Grocery Building	Butte/Belle Fourche	Existing, A, B, C
Archaeological Site No. 39MD81	Meade/Sturgis	A, B, C
Archaeological Site No. 39MD82	Meade/Sturgis	A, B, C
Bear Butte	Meade/Sturgis	A, B, C
Erskine School	Meade/Sturgis	A, B, C
Fort Meade District	Meade/Sturgis	A, B, C
Frozenman Stage Station	Meade/Bison	
Graf, Stephen and Maria, House	Meade/Sturgis	A, B, C
Raskob, Jacob and Elizabeth Ranch	Meade/Sturgis	A, B, C
SD Department of Transportation Bridge No. 47-151-389	Meade/Sturgis	A, B, C
Stromprude Trail Ruts	Meade/Bison	A, B
Sturgis Commercial Block	Meade/Sturgis	A, B, C
Sturgis High School	Meade/Sturgis	A, B, C
Tallent, Annie, House	Meade/Sturgis	A, B, C
Wenke, John G., House	Meade/Sturgis	A, B, C
Ainsworth, Oliver N., House	Lawrence/Spearfish	Existing, A, B, C
Baker Bungalow	Lawrence/Spearfish	Existing, A, B, C
Cook, Fayette, House	Lawrence/Spearfish	Existing, A, B, C
Corbin, James A. House	Lawrence/Spearfish	Existing, A, B, C
Court, Henry, House	Lawrence/Spearfish	Existing, A, B, C
Dakota Tin and Gold Mine	Lawrence/Spearfish	Existing, A, B, C
Deadwood Historic District	Lawrence/Deadwood	Existing, A, B, C
Dickey, Eleazer C. and Gwinnie, House	Lawrence/Spearfish	Existing, A, B, C
Dickey, Walter, House	Lawrence/Spearfish	Existing, A, B, C
Driskill, William D., House	Lawrence/Spearfish	Existing, A, B, C

Table 3.7-2 NRHP Listed Resources Under Proposed PRTC MOA Airspace (Page 5 of 6)

Site Name	*General Location*	*Alternative*[1]
Episcopal Church of All Angels	Lawrence/Spearfish	Existing, A, B, C
Evans, Robert H., House	Lawrence/Spearfish	Existing, A, B, C
Frawley Historic Ranch	Lawrence/Spearfish	Existing, A, B, C
Galena School	Lawrence/Lead	A, B, C
Halloran-Matthews-Brady House	Lawrence/Spearfish	Existing, A, B, C
Harvey, Jerome and Jonetta Homestead Cabin	Lawrence/Lead	Existing, A, B, C
Hewes, Arthur, House	Lawrence/Spearfish	Existing, A, B, C
Homestake Workers House	Lawrence/Spearfish	Existing, A, B, C
Keets, Henry, House	Lawrence/Spearfish	Existing, A, B, C
Knight, Webb, S., House	Lawrence/Spearfish	Existing, A, B, C
Kroll Meat Market and Slaughterhouse	Lawrence/Spearfish	Existing, A, B, C
Lead Historic District	Lawrence/Lead	Existing, A, B, C
Lown, William Ernest, House	Lawrence/Spearfish	Existing, A, B, C
The Mail Building	Lawrence/Spearfish	Existing, A, B, C
McLaughlin Ranch Barn	Lawrence/Spearfish	Existing, A, B, C
Mount Theodore Roosevelt Monument	Lawrence/Deadwood	Existing, A, B, C
Old Finnish Lutheran Church	Lawrence/Lead	Existing, A, B, C
Qullian, Thomas, House	Lawrence/St. Onge	Existing, A, B, C
Old Redwater Bridge	Lawrence/Spearfish	Existing, A, B, C
Riley, Almira, House	Lawrence/Spearfish	Existing, A, B, C
St. Onge State Bank	Lawrence/St. Onge	Existing, A, B, C
Spearfish City Hall	Lawrence/Spearfish	Existing, A, B, C
Spearfish Filling Station	Lawrence/Spearfish	Existing, A, B, C
Spearfish Fisheries Station	Lawrence/Spearfish	Existing, A, B, C
Spearfish Historic Commercial District	Lawrence/Spearfish	Existing, A, B, C
Old Spearfish Post Office	Lawrence/Spearfish	Existing, A, B, C
St. Lawrence O'Toole Catholic Church	Lawrence/Central City	Existing, A, B, C
St. Onge Schoolhouse	Lawrence/St. Onge	Existing, A, B, C
Toomey House	Lawrence/Spearfish	Existing, A, B, C
Uhlig, Otto L., House	Lawrence/Spearfish	Existing, A, B, C
Walsh Barn	Lawrence/Spearfish	Existing, A, B, C
Walton Ranch	Lawrence/Spearfish	Existing, A, B, C
Whitewood Historic District	Lawrence/Whitewood	Existing, A, B, C
Whitney, Mary, House	Lawrence/Spearfish	Existing, A, B, C
Wolzmuth, John, House	Lawrence/Spearfish	Existing, A, B, C
Woodmen Hall	Lawrence/St. Onge	Existing, A, B, C
Beckon, Donald, Ranch	Perkins/Zeona	A, B, C
Bethany United Methodist Church	Perkins/Lodgepole	A, B
Carr No. 60 School	Perkins/Lodgepole	A, B
Carr, Anna, Homestead	Perkins/Bison	A, B
Duck Creek Lutheran Church and Cemetery	Perkins/Lodgepole	A, B
Foster Ranch House	Perkins/Chance	A, B
Golden Rule Department Store	Perkins/Lemmon	A, B
Harriman, L. F., House	Perkins/Lemmon	A, B
Immanuel Lutheran Church	Perkins/Zeona	A, B, C
Lemmon Petrified Park	Perkins/Lemmon	A, B
Lemmon, G. E., House	Perkins/Lemmon	A, B

Table 3.7-2 NRHP Listed Resources Under Proposed PRTC MOA Airspace (Page 6 of 6)

Site Name	*General Location*	*Alternative*[1]
Richards Cabins	Perkins/Faith	A, B, C
Rockford No. 40 School	Perkins/Bison	A, B
Sittner Farm	Perkins/Meadow	A, B
Sorum Cooperative Store	Perkins/Sorum	A, B
Sorum Hotel	Perkins/Sorum	A, B
Spring Creek School	Perkins/Zeona	A, B, C
Veal, Thomas J., Ranch	Perkins/Chance	A, B
Antelope Creek Stage Station	Corson/Morristown	A, B
Fort Manuel	Corson/McIntosh	A, B
Grand River State Station	Corson/Morristown	A, B

Note: 1. Alternatives A, B, and C described in EIS Section 2.4; Existing refers to the Powder River A/B MOAs and ATCAAs.

Table 3.7-3 National Monuments Under Proposed PRTC Airspace

Site Name	*General Location*	*Status*	*Alternative*[1]
WY			
Devils Tower	Devils Tower	NRHP Listed	Existing, A, B, C
MT			
Little Bighorn Battlefield	Garryowen	NRHP Listed	A, C

Note: 1. Alternatives A, B, and C described in EIS Section 2.4; Existing refers to the Powder River MOAs and ATCAAs.
Source: NPS 2010

Table 3.7-4. Ghost Towns Under Proposed PRTC Airspace

Name	*County*	*Remains*	*Status*	*Alternative*[1]
WY				
Mineral Hill	Crook	Many original buildings	Not Listed	Existing, A, B, C
Moskee	Crook	Single standing building	Not Listed	Existing, A, B, C
Tinton	Crook	10-12 buildings remain	Not Listed	Existing, A, B, C
Old Upton	Weston	Many shacks, including the first jail	Not Listed	Existing, A, B, C
ND				
Amidon	Slope	Many original buildings (some still occupied)	Not Listed	A, B, C
Bucyrus	Adams	Many original buildings (some still occupied)	Not Listed	A, B
Gascoyne	Bowman	Many original buildings, houses, schools, general store	Not Listed	A, B, C
Griffin	Bowman	Old school house, general store	Not Listed	A, B, C
Marmarth	Slope	Many original buildings (some still occupied)	Not Listed	A, B, C
SD				
Astoria	Lawrence	Many original buildings	Not Listed	A, B, C
Balmoral (Preston)	Lawrence	Many original buildings	Not Listed	Existing, A, B, C
Bear Gulch I	Lawrence	Many original buildings	Not Listed	Existing, A, B, C
Carbonate	Lawrence	Many original buildings	Not Listed	Existing, A, B, C
Central City	Lawrence	Two blocks of old buildings	Not Listed	Existing, A, B, C
Crook City	Lawrence	Stone school house	Not Listed	Existing, A, B, C
Maitland	Lawrence	Many original buildings/ruins	Not Listed	Existing, A, B, C
Pluma	Lawrence	Mill ruins	Not Listed	A, B, C
Reed	Butte	School house	Not Listed	A, B, C
Savoy	Lawrence	Many original buildings	Not Listed	Existing, A, B, C
Terraville	Lawrence	Ruins	Not Listed	Existing, A, B, C
Tinton	Lawrence	10-12 buildings	Not Listed	Existing, A, B, C
Trojan	Lawrence	Portland Mine buildings, several small houses, stores	Not Listed	Existing, A, B, C
Whitewood	Lawrence	Many original buildings	NRHP Listed	Existing, A, B, C

Note: 1. Alternatives A, B, and C described in EIS Section 2.4; Existing refers to the Powder River MOAs and ATCAAs.
Source: United States Ghost Towns 2010

Table 3.7-5 Historic Ranches Under Proposed PRTC Airspace

Name	*General Location*	*Status*	*Alternative*[1]
WY			
Ranch A	Beulah	NRHP Listed	Existing, A, B, C
MT			
Cross Ranch Headquarters	Powder River/Broadus	NRHP Listed	A, B, C
Bones Brothers Ranch	Rosebud/Birney	NRHP Listed	A, C
Drew, J.W., Grain Elevator	Big Horn/Lodge Grass	NRHP Listed	A, C
Lee Homestead	Big Horn/Decker	NRHP Listed	A, C
OW Ranch	Big Horn/Birney	NRHP Listed	A, C
ND			
H-T Ranch	Slope/Amidon	NRHP Listed	A, B, C
SD			
Frawley Ranch	Lawrence	National Landmark (NRHP Listed)	Existing, A, B, C
Ashcroft, Thomas, Ranch	Harding/Buffalo	NRHP Listed	A, B, C
Blake Ranch House	Harding/Gustave	NRHP Listed	Existing, A, B, C
Giannonatti Ranch	Harding/Ludlow	NRHP Listed	A, B, C
Johnson, Axel, Ranch	Harding/Reva	NRHP Listed	A, B, C
Livingston, John and Daisy May, Ranch	Harding/Sorum	NRHP Listed	A, B, C
Shevling, L.W., Ranch	Harding/Harding	NRHP Listed	Existing, A, B, C
Gartner, Carl Frederick, Homestead	Butte/Newell	NRHP Listed	Existing, A, B, C
Soper-Behymer Ranch	Butte/Belle Fourche	NRHP Listed	Existing, A, B, C
Raskob, Jacob and Elizabeth Ranch	Meade/Sturgis	NRHP Listed	A, B, C
Viken, Nicholas Augustus Homestead	Butte/Newell	NRHP Listed	Existing, A, B, C
William Holst Farmstead	Meade/Vale	SD State Register Property	Existing, A, B, C
McLaughlin Ranch Barn	Lawrence/Spearfish	NRHP Listed	Existing, A, B, C
Veal, Thomas J., Ranch	Perkins/Chance	NRHP Listed	A, B
Walsh Barn	Lawrence/Spearfish	NRHP Listed	Existing, A, B, C
Beckon, Donald, Ranch	Perkins/Zeona	NRHP Listed	A, B, C
Carr, Anna, Homestead	Perkins/Bison	NRHP Listed	A, B
Foster Ranch House	Perkins/Chance	NRHP Listed	A, B
Walton Ranch	Lawrence/Spearfish	NRHP Listed	Existing, A, B, C

Source: NPS 2010

Note: 1. Alternatives A, B, and C described in EIS Section 2.4; Existing refers to the Powder River MOAs and ATCAAs.

Table 3.7-6. Historic Trails Under Proposed PRTC Airspace

Site Name	*Counties*	*Status*	*Alternative*[1]
WY			
Texas Trail	Weston, Crook, Campbell	Not Listed	Existing, A, B, C

Note: 1. Alternatives A, B, and C described in EIS Section 2.4; Existing refers to the Powder River MOAs and ATCAAs.

Source: NPS 2010

Table 3.7-7. Traditional Cultural Properties and Traditional Cultural Resources Under Proposed PRTC Airspace

Area Name	*General Location*	*Status*	*Alternative*
WY			
Devils Tower	Devils Tower	NRHP Listed	Existing, A, B, C
Inyan Kara Mountain	South of Sundance	NRHP Listed	Existing, A, B, C
Unnamed 1	North of Gillette	Not Listed	Existing, A, B, C
Unnamed 2	Northwest of Hulett	Not Listed	Existing, A, B, C
MT			
Battle of Wolf Mountain Site	Tongue River	NRHP Listed	A, C
Battle of Rosebud Creek Site	Kirby	NRHP Listed	A, C
Chalk Buttes	Ekalaka	Not Listed	Existing, A, B, C
SD			
Bear Butte	Sturgis	NRHP Listed	A, B, C

Note: 1. Alternatives A, B, and C described in EIS Section 2.4; Existing refers to the Powder River MOAs and ATCAAs.
Source: NPS 2010

MONTANA

Thirty-eight properties are currently listed on the NRHP in Fallon, Powder River, Rosebud, and Big Horn Counties (Table 3.7-2). They consist of battlefields and historic buildings.

Little Bighorn Battlefield National Monument falls under the proposed airspace. Though this property is also listed on the NRHP, it deserves special consideration due to its status as a National Monument. In addition, the battlefield itself is held as sacred by many Native Americans. A Sioux and Cheyenne monument, as well as historic markers, are part of the battlefield.

There are five historic ranches beneath the proposed airspace in MT that are listed on the NRHP.

Little Bighorn Battlefield National Monument is under the proposed Powder River 1 MOA. The MOA is proposed to permit training overflights to 500 feet AGL.

Three historic battlefields lie beneath the proposed project airspace. The Little Bighorn Battlefield is already a National Monument, and the Battle of Wolf Mountains (currently nominated for National Landmark status) and the Battle of Rosebud Creek are on the NRHP. The MT SHPO is currently processing a form to elevate all of the battlefields of the Great Sioux War to the NRHP (personal communication, Hampton 2008). These battlefields are also either current traditional cultural properties, or in consultation for recognition of that status.

The Tongue River Valley (Table 3.7-8), in Rosebud County, has been the focus of a project to document and nominate the cultural landscape to the NRHP. The area has been studied and nominated for this designation due to the number and preservation of sites from prehistoric contexts (over 1,700 sites), Great Sioux War battlefield context (Wolf Mountains Battlefield), and early ranching settlement contexts (Three Circle Ranch, SH Ranch, and others) (personal communication, Hampton 2008).

The Tongue River Valley in southeastern MT has been nominated as cultural landscape due to the large number and preservation of cultural sites. Proposed overflights would be down to 500 feet AGL.

Table 3.7-8. Cultural Landscapes Under Proposed PRTC Airspace in MT

Area Name	*General Location*	*Alternative*
Tongue River Valley	Ashland	A, C

Note: 1. Alternatives A and C described in EIS Section 2.4.

Two Traditional Cultural Properties have been specifically identified within the lands beneath the affected airspace (Table 3.7-7). The location of the Battle of Wolf Mountains, and the Battle of Rosebud Creek Site are both listed on the NRHP. The Chalk Buttes are an area considered sacred by Native American peoples of the region. In addition, as many as 48 cultural resources have been recorded which have ceremonial functions on the Northern Cheyenne Reservation (Deaver and Tallbull 2001). The recorded ceremonial sites include vision questing/fasting sites, sweat lodges, and memorials

NORTH DAKOTA

Fourteen properties are currently listed in the NRHP in Bowman, Slope, Adams, Hettinger, and Grant Counties, ND beneath the proposed PRTC airspace (Table 3.7-2). They consist of historic buildings and bridges. No properties under the proposed PRTC airspace are located in Golden Valley, Sioux, Morton, Stark, or Billings Counties, ND.

A search of ghost towns within the lands beneath the affected airspace in ND revealed the presence of five ghost towns. Several of the ghost towns contain standing wood/log structures associated with historic mining, ranching, stage or Pony Express routes, or railroad stations (Table 3.7-4). Most of the ghost towns have not been subjected to professional archaeological and/or architectural assessments and many may be eligible to the National or State Registers pending further investigation by cultural resources professionals.

There is one historic ranch beneath the proposed airspace (Table 3.7-5). The H-T Ranch is already listed on the NRHP, however, it deserves special consideration due to the large number of standing structures present at the site.

SOUTH DAKOTA

One hundred and seventy-three properties are currently listed in the National or State Register in Harding, Butte, Meade, Lawrence, Perkins, and Corson Counties, SD beneath the proposed PRTC airspace (Table 3.7-2). They consist of archaeological sites, historic buildings, bridges, monuments, stage stations and cemeteries. Eighty-two of these properties are under the existing Powder River training airspace. No National or State Register properties under the proposed PRTC airspace are located in Pennington and Ziebach Counties, SD.

Three National Landmarks are located beneath the existing Gateway ATCAA training airspace and under the proposed Gateway ATCAA (Table 3.7-9). All three of these sites are also listed on the NRHP. Bear Butte is a sacred area, the Frawley Ranch is a historic ranch, and the Deadwood Historic District is an area of historic structures and features. The Northern Cheyenne Tribe owns land near Bear Butte.

Three properties beneath the PRTC airspace are listed on the SD State Register of Historic Places (Table 3.7-10). Two are composed of historic structures while the Thoen Stone and Site are the location of an inscribed stone detailing a doomed mining expedition in 1833.

Bear Butte, on the southern edge of the existing Gateway ATCAA, in northwest South Dakota, is a Sioux and Cheyenne sacred area. Bear Butte is a prehistoric and historic location of annual tribal gatherings, and is also the birthplace of Crazy Horse.

Table 3.7-9. National Landmarks Under Proposed PRTC Airspace in SD

Site Name	*General Location*	*Alternative*
Bear Butte	Sturgis	A, B, C
Frawley Ranch	Whitewood	Existing, A, B, C
Deadwood Historic District	Deadwood	Existing, A, B, C

Note: 1. Alternatives A, B, and C described in EIS Section 2.4; Existing refers to the Powder River MOAs and ATCAAs.

Table 3.7-10. SD State Register Sites Under Proposed PRTC Airspace

Site Name	*Site Name*	*Alternative*
Sturgis City Auditorium	Meade/Sturgis	A, B, C
William Holst Farmstead	Meade/Vale	Existing, A, B, C
Thoen Stone and Site	Lawrence/Spearfish	Existing, A, B, C

Note: 1. Alternatives A, B, and C described in EIS Section 2.4; Existing refers to the Powder River MOAs and ATCAAs.

There are 15 ghost towns within the lands beneath the proposed PRTC airspace in SD. Several of the ghost towns contain standing wood/log structures associated with historic mining, ranching, stage or Pony Express routes, or historic railroad stations (Table 3.7-4). Most of the ghost towns have not been evaluated. Many may be eligible to the National or State Registers pending further investigation by cultural resources professionals.

Eighteen historic ranches are located under the proposed airspace. A number of these ranches have been found eligible (and not yet listed) or have not been evaluated for potential eligibility to the NRHP (Table 3.7-5). In addition, one of these properties, the William Holst Farmstead, is listed on the SD State Register.

One traditional cultural property has been identified within the lands beneath the affected airspace (Table 3.7-7). The area of Bear Butte is considered sacred by Native American peoples of the region.

3.8 Land Use

3.8.1 Definition of the Resource

The attributes of land use addressed in this analysis include general land use patterns, land ownership, land management plans, and special use areas. General land use patterns characterize broad types of uses within a large area, for example, agricultural, rangeland, forest, and urban, which may support various uses such as recreation, grazing, mineral production, commercial or residential development. Land ownership is a categorization of land according to type of owner; the major land ownership categories include private, federal, Native American, and state. Federal lands are described by the managing agency, which may include the USFWS, USFS, BLM, or DoD. Land management plans include those documents prepared by agencies to establish appropriate goals for future use and development. As part of this process, sensitive land use areas (e.g., Wilderness, Wild and Scenic Rivers) are often identified by agencies as being worthy of more rigorous management.

Recreation resources consider outdoor recreational activities that take place away from the residences of participants. This includes natural resource areas (such as BLM-managed land) and associated developed facilities (such as off-road vehicle trails and developed camp sites) that are designated or available for public outdoor recreational use. Cultural and historic sites and battlegrounds are lands with high recreational use.

The ROI for land use consists of about 44,689 square miles comprised of the lands under the current airspace (about 9,587 square miles) plus the land under an additional 35,102 square miles of expanded airspace (Table 3.8-1). This ROI is the land and land users under the proposed PRTC airspace. Of this land, 41 percent is in MT, 29 percent in SD, 16 percent in ND, and14 percent in WY.

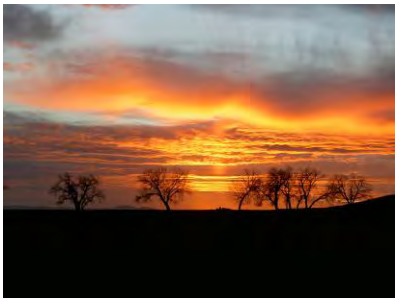
3.8.2 Regulatory Setting

The proposed airspace overlies a portion or all of 29 counties in four states, as listed in Table 3.8-1 (see Figure 3.8-1). Most counties are managed and governed by elected commissioners, and few have "home rule" charters. Land use controls (such as zoning) are generally only used within incorporated cities. Native American Reservations within the ROI have tribal sovereignty over their reservations and govern through tribal elections. Land uses on the reservations are determined by tribal decisions.

3.8.3 Existing Conditions

3.8.3.1 Landscape Character

Landscape character can be defined as a distinct, recognizable, and consistent pattern of natural and cultural elements in the landscape that makes one landscape different from another. A region's landscape character reflects the interactions between people and place, and often is significant to the formation of local identity.



The expansive nature and general solitude of the western big-sky landscape was seen as a quality of life feature by scoping participants.

The ROI extends over portions of the North American Great Plains. The natural landscape varies throughout, consisting of broad, high plains, badlands, rivers, and forested mountains. Wide open vistas and an expansive sky characterize the region. The ROI includes iconic natural formations such as the Badlands of SD and northeastern WY's Devils Tower. This natural landscape creates the physical setting for the region's landscape and land use which includes townships, communities, western

landscapes, ranches, associated buildings, fences, mining, and energy production through wind farms.

As primarily rural areas, the portions of counties in the ROI under the existing and proposed airspace have a range in population density from 0.4 to 4.0 persons per square mile, with most areas counting fewer than three persons per square mile (see Socioeconomic section 3.9).

3.8.3.2 General Land Use Patterns

The ROI (also referred to as the "study area" in this land use section) is located in north central U.S. and characterized by wide open space and low population density. Major transportation routes in the study area include Interstate 94 to the north and Interstate 90 to the south, both traveling in an east/west direction. The primary state highways include US 12, US 212, US 85, and Highway 59. The area has widely spaced small communities, generally along the primary roads, providing a basic network for services and provisions. There are no towns with populations over 2,000 persons within the existing Powder River A or B MOAs. The proposed PRTC MOAs overlie the towns of Colstrip (population 2,346), and Hardin (population 3,514). Ranches, individual residences, and smaller communities are widely spaced throughout the region. Table 3.8-1 shows that seven counties underlie the existing Powder River airspace of about 9,748 square miles.

Table 3.8-2 presents generalized land use in the ROI. Figure 3.8-1 shows a generalized pattern of land use in the ROI based on vegetative and surface conditions. The region is mostly classified as rangeland (78 percent), predominantly used for cattle grazing. Grazing occurs on several of the vegetation types described in Section 3.6.3.1. At higher elevations, forests cover about 8 percent of the ROI, and provide the basis for a timber industry in the Black Hills of SD and eastern WY. Forested areas are also popular for dispersed outdoor recreation including hunting. Cultivated agriculture is the predominant land use in the ND portion of the ROI. These farms are typically medium- to large-scale operations producing grain crops such as wheat, hay, oats, and barley. Agriculture is also dominant along the Yellowstone and Little Bighorn Rivers in the far western part of the ROI. A small percentage of land in the ROI (1 percent) is developed or "urbanized." Urban land and water and barren lands account for less than 2 percent of the area. The existing Powder River airspace (underlying Powder River MOA A and B) has over 90 percent rangeland, very little cultivated agricultural land (less than 11 percent), small communities, and no land characterized as "urban."

The ROI has extensive subsurface mineral and energy resources spanning about 120 miles from Miles City, MT to Casper, WY. The Powder River Basin contains 58 percent of the assessed federal coal reserve. Of coal produced on federal land, 88 percent comes from the Powder River Basin (U.S. Department of Energy 2007). Associated with this coal are coal-bed methane gas reserves and, to a lesser extent, crude oil. Exploration and energy resource extraction are primary activities in the ROI along with other compatible surface uses. Above the surface, the nearly ever present winds form a basis for development of wind farms for renewable energy.

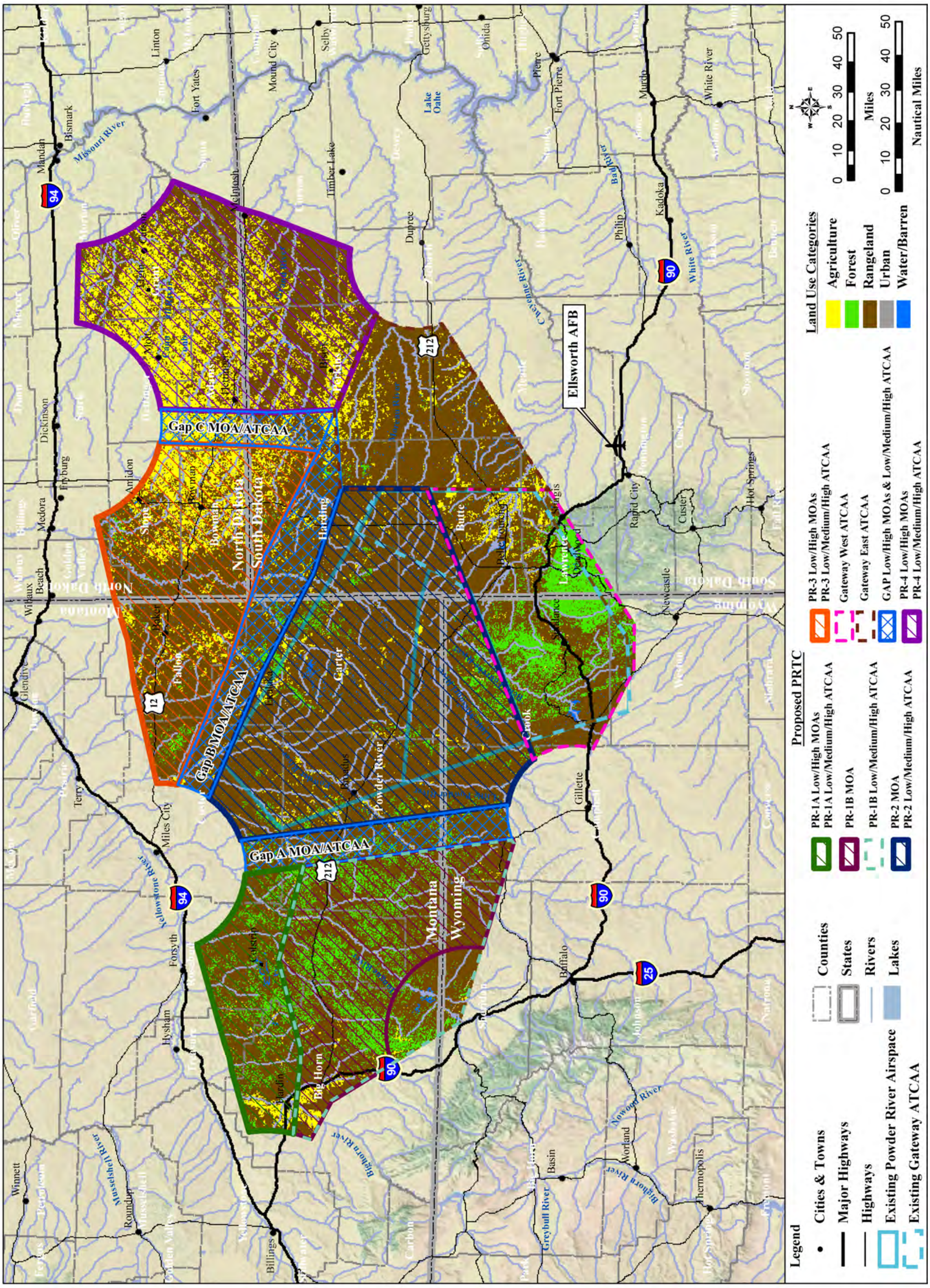


Figure 3.8-1. Generalized Land Use in the ROI

Table 3.8-1. Land Jurisdiction in ROI

County	*Current Powder River airspace (square miles)*	*Expanded PRTC (square miles)*	*% of Expanded PRTC Area*
MT	**4,040**	**14,368**	**40.9%**
Big Horn	-	2,638	**7.5%**
Carter	2,463	3,337	**9.5%**
Custer	325	1,626	**4.6%**
Fallon	-	1,370	**3.9%**
Powder River	1,252	3,296	**9.4%**
Rosebud	-	1,896	**5.4%**
Treasure	-	205	**<1%**
ND	**0**	**5,715**	**16.3%**
Adams	-	987	**2.8%**
Billings	-	30	**<1%**
Bowman	-	1,160	**3.3%**
Golden Valley	-	86	**<1%**
Grant	-	1,505	**4.3%**
Hettinger	-	588	**1.7%**
Morton	-	119	**<1%**
Sioux	-	296	**<1%**
Slope	-	942	**2.7%**
Stark	-	2	**<1%**
SD	**2,760**	**10,133**	**28.9%**
Butte	1,516	2,247	**6.4%**
Corson	-	895	**2.5%**
Harding	581	2,669	**7.6%**
Lawrence	294	579	**1.6%**
Meade	369	908	**2.6%**
Pennington	-	0	**0.0%**
Perkins	-	2,731	**7.8%**
Ziebach	-	104	**<1%**
WY	**2,787**	**4,886**	**13.9%**
Campbell	99	1,129	**3.2%**
Crook	2,688	2,830	**8.1%**
Sheridan	-	661	**1.9%**
Weston	-	266	**<1%**
Total	**9,587**	**35,102**	**100.0%**

Source: ESRI 2000.

Table 3.8-2. Generalized Land Use in the ROI (square miles)

	Water/ Barren	*Urban*	*Rangeland*	*Forest*	*Agriculture*	*Total*
Existing Powder River MOAs[1]	**286**	**0**	**8,087**	**734**	**480**	**9,587**
Proposed PRTC						
PR-1A MOA/ATCAA	14	16	1,477	349	103	1,959
PR-1B MOA/ATCAA[2]	18	24	3,758	779	130	4,708
PR-2 MOA/ATCAA	21	30	7,562	317	208	8,137
PR-3 MOA/ATCAA	22	82	3,318	64	1,013	4,499
PR-4 MOA/ATCAA	44	134	3,247	16	2,026	5,466
Gap A MOA/ATCAA	2	1	898	116	15	1,033
Gap B MOA/ATCAA	5	9	1,507	42	110	1,674
Gap C MOA/ATCAA	2	18	313	0	334	667
Gateway East ATCAA	33	12	2,537	14	212	2,808
Gateway West ATCAA	39	60	2,419	1,025	221	3,764
Total[3]	**200**	**386**	**27,036**	**2,722**	**4,372**	**34,716**

Notes: 1. Does not include estimated 200 square miles of other land uses.
2. ATCAA extends beyond MOA boundary.
3. Does not include estimated 386 square miles of other land uses.

Source: Landfire 2008

3.8.3.3 Ownership

Figure 3.8-2 shows land ownership in the ROI, and Table 3.8-3 quantifies the surface ownership underlying each of the proposed PRTC airspace elements. Over half the land under the existing Powder River A and B MOAs (about 55 percent), is privately owned. About 36 percent of the land is federal (public) land and about 9 percent is state-owned. State-owned land includes dispersed school sections (brown dots on Figure 3.8-2).

The expanded PRTC area includes a slightly different mix of ownership. The majority (72 percent) of the land under the proposed PRTC is privately owned. Most of the private land in the ROI has split estate ownership, with the surface held privately and the mineral and oil and gas rights held by the federal government. Much of the private land is used for grazing, agriculture, and some land is made available for hunting by the public. The federal government leases mineral rights, along with the surface use of private land needed to extract the resources.

Native American reservations account for 10 percent of the ROI and are concentrated under two proposed airspace units. All of the Northern Cheyenne and portions of the Crow Reservations are under the proposed PR-1A and PR-1B MOAs. Portions of the Cheyenne River Sioux and Standing Rock Reservations are under the proposed PR-4 MOA. Agriculture and grazing are dominant uses on these tribal lands. The Northern Cheyenne and Crow Reservations have extensive coal reserves.

About 14 percent of the land surface is federal land managed by the USFS or BLM. Both agencies manage lands for multiple purposes, including productive or consumptive uses such as energy production, timbering, hunting, and grazing, and non-consumptive uses such as dispersed recreation and resource conservation. The WY portion of the ROI is almost entirely federally-owned interspersed with state land. Private land is mostly along rivers and streams. State land (about 5 percent of the ROI) is interspersed in the private and federal lands. State land is typically used and managed like surrounding lands, with the states deriving tax revenues from productive uses.

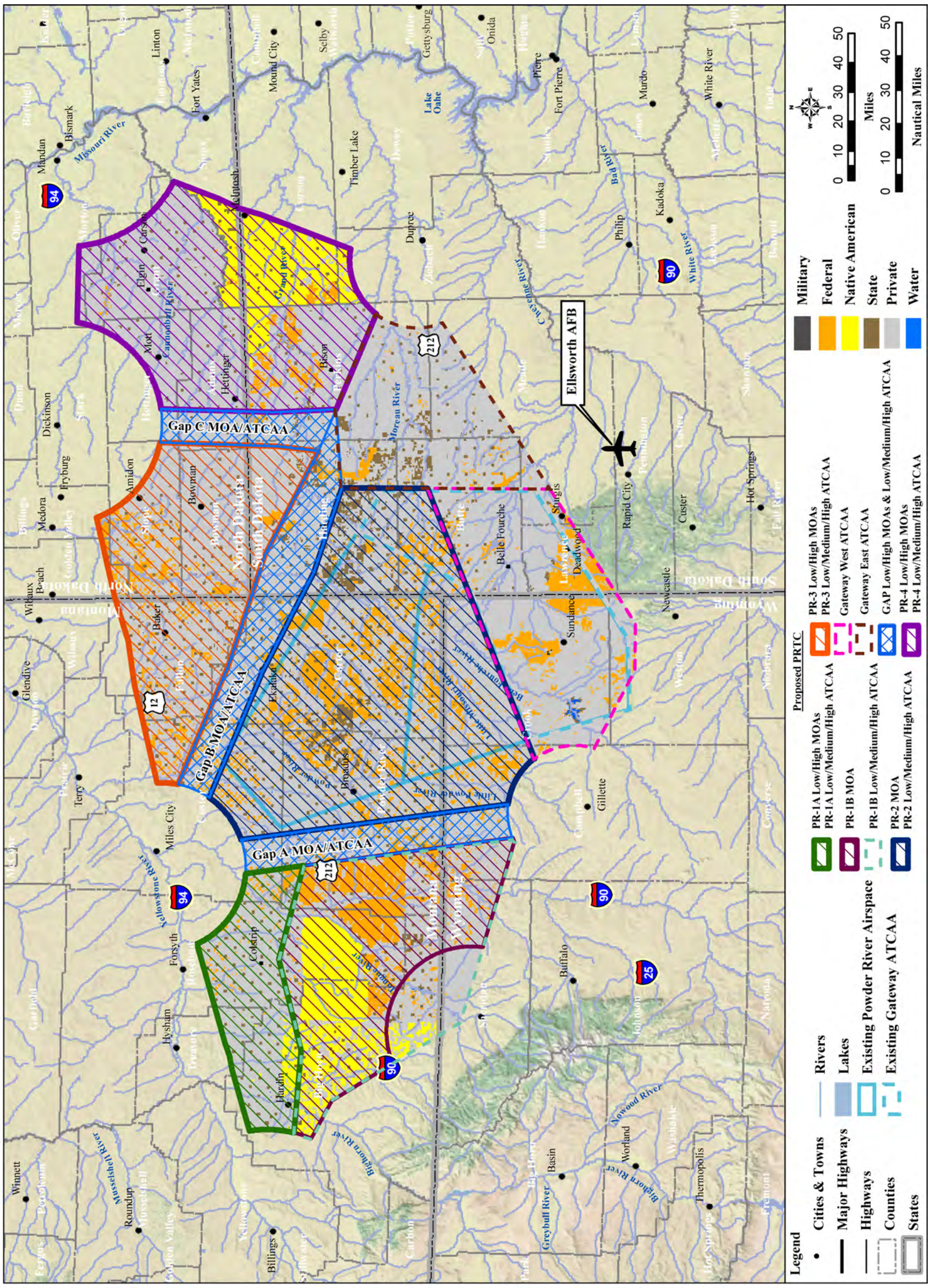


Figure 3.8-2. Land Ownership in the ROI

Table 3.8-3. Land Ownership in ROI (Square Miles)

	Private	*State*	*Native American*	*Military*	*Federal Land*	*Total*[1]
Existing Powder River MOAs	**3,217**	**532**	**0**	**0**	**2,097**	**5,846**[2]
Proposed PRTC						
PR 1A Low/High MOA and Low/Medium/High ATCAA	1,699	100	116	0	92	2,007
PR 1B Low/Medium/High ATCAA[2].	2,499	140	1,248	0	936	4,823
PR 1B MOA	1,890	114	1,168	0	908	4,080
PR 2 MOA and Low/Medium/High ATCAA	5,941	661	0	0	1,620	8,222
PR 3 Low/High MOA and Low/Medium/High ATCAA	3,739	229	0	0	571	4,539
PR 4 Low/High MOA and Low/Medium/High ATCAA	3,791	168	1,281	0	272	5,512
Gap A Low/High MOA and Low/Medium/High ATCAA	870	43	0	0	136	1,049
Gap B Low/High MOA and Low/Medium/High ATCAA	1,416	123	0	0	153	1,692
Gap C Low/High MOA and Low/Medium/High ATCAA	631	24	0	0	16	671
Gateway East ATCAA	2,506	236	0	0	99	2,841
Gateway West ATCAA	3,090	54	0	2	663	3,809
Totals[3]	26,182	1,778	2,645	2	4,558	35,165

Notes: 1. Excludes 41 square miles of water bodies (ownership not classified).
2. ATCAA extends MOA boundary.
3. Totals do not double count PR-1B MOAs

Source: USGS 2008

Under the existing Powder River MOAs, the BLM administers land within the Miles City Field Office in MT, a small portion of the land in the Buffalo and Newcastle Field Offices in WY, and the ND and SD Field Offices. Under the existing Powder River airspace, the USFS administers portions of the Custer National Forest, with segments in the Ashland and Sioux Ranger Districts. The Ashland Ranger District has one of the largest grazing programs in the nation, and is rich in coal and wildlife. The Sioux Ranger District, located in the southeast corner of MT and the northwest corner of SD, is comprised of hills or mesas of ponderosa pine rising above rolling grasslands. The area offers excellent antelope, mule deer, white-tail deer and game bird hunting. The area is rich in archeology, paleontology, produces some oil, and supports a sizable livestock population. One of the largest populations of Merlins (a small falcon) is found in the Sioux Ranger District (USDA USFS 2008).

Under the proposed PRTC, BLM administers a larger portion of the federal lands of these same administrative areas named above, and the mineral rights on most of the state and private land. The USFS manages additional units of the Custer National Forest in MT, the Thunder Basin National Grassland in WY, Black Hills National Forest (spanning WY and SD), Grand River National Grasslands in SD, and the Little Missouri National Grasslands in ND. These areas all offer recreational resources, particularly hunting and some fishing. Figure 3.8-3 shows the location of the national forest and grasslands in the ROI.

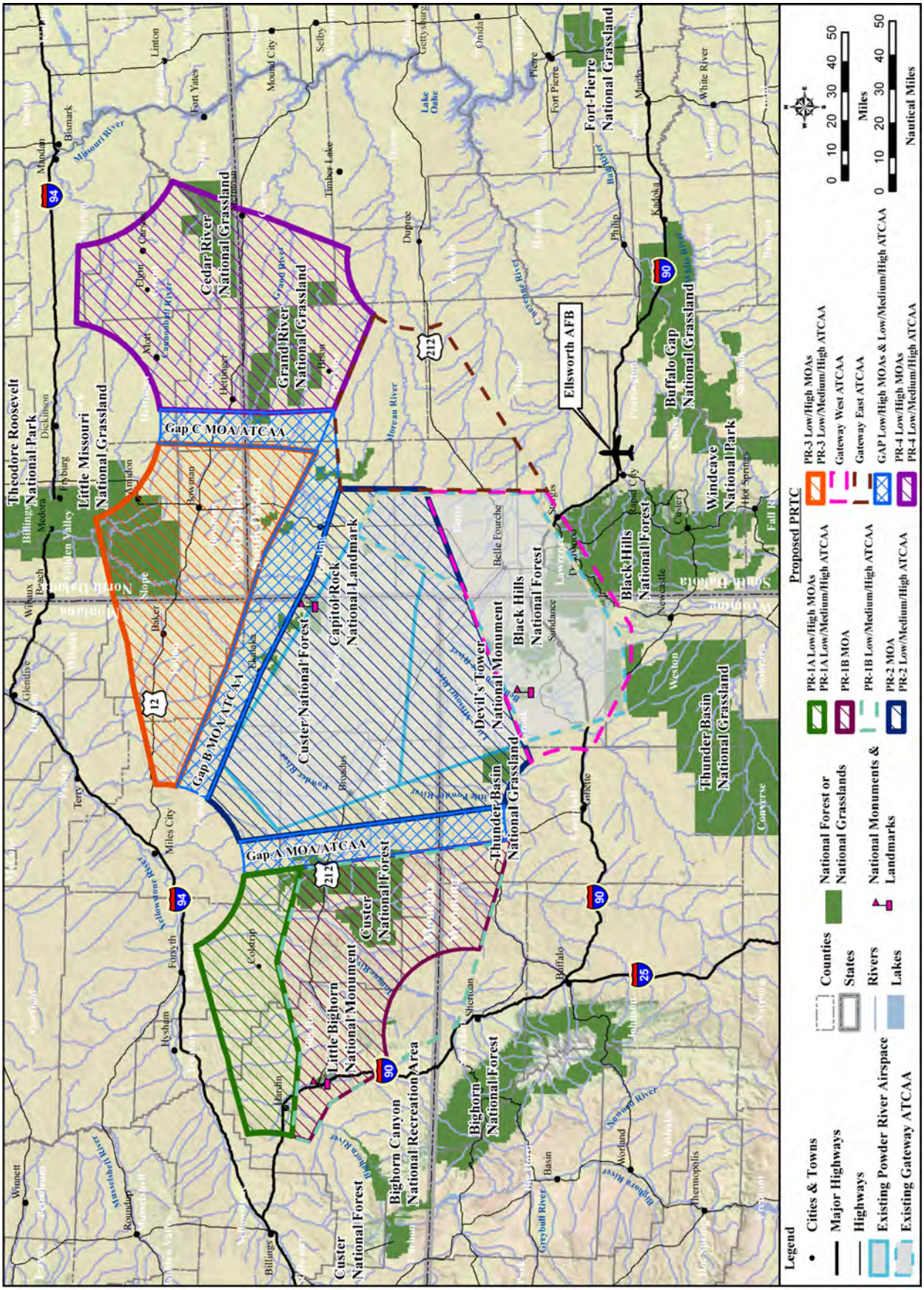


Figure 3.8-3 National Forest and Grasslands in the ROI

3.8.3.4 Ranching, Farming, and Rural Communities

Ranching and farming are well-established activities that define the regional character and economy since settlement by Americans of European descent. Ranching and farming have become important activities of Native Americans within the ROI. Agricultural operations tend to occur in rural regions. In the ROI, these regions tend to be quiet with wide open spaces with expansive vistas. Ranch operations include cattle round-ups for branding and shipping, horseback riding to maintain property in remote areas, and light aircraft for surveillance. Some ranchers and farmers consider the ability to maintain their operations with minimal outside intrusion to be a quality of life factor.

3.8.3.5 Special Use Areas

Some federal land within the ROI is managed and protected for particular resource values or attributes such as wilderness or wildlife preserves. The area also has units of the National Park system, State Parks, and National Monuments. Table 3.8-4 lists major special areas in the ROI with the primary attraction of the area. The ROI includes portions of the Custer and Black Hills National Forests, Thunder Basin National Grassland, Cedar River and Grand River National Grasslands. These areas are popular for recreation, including hunting, fishing, and birding. Both USFS and BLM designate areas or locations with specific attributes or resource value for special management. There are two classified National Landmarks in the USFS Sioux Ranger District, the Castles and Capitol Rock. The Castles, located in the Slim Buttes Unit in SD, are a massive limestone uplift that resembles a medieval castle. Capitol Rock, located in the Long Pines Unit in MT, is a massive white limestone uplift that resembles the Nation's capitol building.

There are no wilderness areas or wild and scenic river segments under the proposed airspace.

The open spaces and this statue in Belle Fourche help explain the perspective of residents and visitors who value the western heritage of the area.

3.8.3.6 Recreation and Tourism

Access to and quality of recreation opportunities is important within the ROI. Activities such as off-road vehicles, hunting, fishing, hiking, horseback riding, and rock climbing occur on both public and private lands. Devils Tower National Monument, Badlands National Park, state parks, battlefields and other historic sites situated within the study area are revered as remote contemplative sites. People who choose to live in or visit this region often value its open space, isolation, and natural beauty.

The ROI includes a wide range of recreational opportunities which provide both important social and economic benefits. The wide open spaces and remoteness of the study area provide settings with a high degree of solitude. Popular activities include camping, hunting (deer and antelope, waterfowl), fishing, nature viewing, hiking, motorized and non-motorized biking, off-road vehicle use, scenic driving, cross country skiing, and snowmobile use. Most public lands have specific off-road designations to provide safe, quality recreational opportunities while minimizing adverse impacts on sensitive resource values (Air Combat Command [ACC] 2007). Many Special Recreation Management Areas provide areas for specific activities in order to accommodate a wide range of public preferences, including those that seek quiet activities and those that generate noise as part of the activity. Hunting, as an organized public recreational activity, occurs on suitable private land throughout the ROI. For example, ND Department of Game and Fish has developed the Private Land Open to Sportsmen

program, for leasing land for public pedestrian access as part of a wider conservation program. In addition, some private land owners throughout the ROI run commercial hunting operations as a source of income.

Table 3.8-4. Special Use Areas and Points of Interest in the ROI

Airspace	*Special Area*	*Attraction/Uses*
Existing Powder River airspace	Custer National Forest	Timber, recreation, hunting, fishing, grazing
Proposed PRTC		
PR-1A MOA/ATCAA	Little Bighorn Battlefield National Monument	Historic value. Tourism. Annual visitation ranges between 300,000 and 500,000 visits per year
	Custer National Forest	Timber, recreation, hunting, grazing
PR-1B MOA/ATCAA	Custer National Forest	Timber, recreation, hunting, grazing
PR-2 MOA/ ATCAA	Custer National Forest	Timber, recreation, hunting, fishing, grazing
	Thunder Basin National Grassland	Exceptional wildlife viewing, hunting, fishing,, undeveloped camping, livestock grazing
	Capitol Rock National Landmark	Massive limestone formation in prairie setting.
PR-3 MOA/ ATCAA	Little Missouri National Grassland	Recreation, hunting (particularly waterfowl), spectacular badlands landscape, hiking, camping, horseback riding, photography, canoeing, fishing, hunting, and backpacking
	Custer National Forest	Timber, recreation, hunting, fishing, grazing
PR-4 MOA/ ATCAA	Grand River National Grassland	Recreation, remote, wildlife /nature viewing, hunting (particularly waterfowl), cultural interest
	Cedar River National Grassland	Recreation, remote, wildlife /nature viewing, hunting (particularly waterfowl), cultural interest
Gap A MOA/ATCAA	Custer National Forest	Timber, recreation, hunting, fishing, grazing
Gap B MOA/ATCAA	Custer National Forest	Timber, recreation, hunting, grazing
Gap C MOA/ATCAA	Grand River National Grassland	Recreation, hunting (particularly waterfowl)
Gateway East ATCAA	Custer National Forest	Timber, recreation, hunting, grazing
Gateway West ATCAA	Black Hills National Forest	Timber industries; hunting and fishing; diverse recreation; developed campgrounds, scenic by-ways
	Custer National Forest	Timber, recreation, hunting, fishing, grazing
	Devils Tower National Monument	Climbing, spectacular rock formation, interpretive site
	Town of Sturgis	Annual Motorcycle rally

3.9 Socioeconomics

3.9.1 Definition of the Resource

Socioeconomics is defined as the basic attributes and resources associated with the human environment, particularly population and economic activity. Economic activity typically encompasses employment, personal income, and regional industries. Changes to these fundamental socioeconomic components can influence other resources such as housing availability, utility capabilities, and community services.

The ROI for socioeconomics consists of 29 counties across rural southeastern MT, northeastern WY, southwestern ND, northwestern SD (Figure 3.9-1). Throughout this Socioeconomics section, the term ROI refers to these 29 counties in their entirety. The term affected area is the specific land area under the proposed PRTC airspace boundaries. There are eight counties in which over 90 percent of the counties' land area is included under the proposed airspace (see Table 3.9-1). Given the rural nature of the ROI, many of the population centers are small or are outside the airspace. The focus of this analysis is based on county-level data and combined county-level data from the affected counties. More detailed data, at the census block-group level, is available regarding certain demographic characteristics. Discussions of these demographic data are specific to those portions of the counties underlying the proposed airspace.

Socioeconomics includes population, employment, and economic activity, which sustains the communities under the proposed PRTC.

3.9.2 Existing Conditions

3.9.2.1 Population and Housing

Portions of the airspace associated with the proposed action have been in existence for many years. The existing Powder River A and B MOAs cover most of the area proposed for the PR-2 MOA. The PRTC changes being proposed would alter the current airspace configuration by expanding the total affected airspace to include counties underlying the proposed PR-1A MOA and ATCAA, PR-1B MOA and ATCAA, Gap A MOA and ATCAA, Gateway West ATCAA, Gateway East ATCAA, Gap B MOA and ATCAA, PR-4 MOA and ATCAA, Gap C MOA and ATCAA, and PR-3 MOA and ATCAA. Some areas under the proposed edges of the PR-2 MOA and ATCAA are outside the current Powder River A and B MOAs.

The Powder River A and B MOAs were configured to avoid densely populated and metropolitan or urban areas. The proposed PRTC by design tends to be also located over rural and less developed areas. While populated areas do occur within the boundaries of the PRTC affected airspace, these areas are typically scattered, relatively low in density compared to urbanized areas, and would be avoided during training to the maximum extent possible. The following information concentrates on the existing conditions in each county that could be affected under the proposed airspace. The information includes counties under the existing Powder River airspace which would continue to be affected by military aircraft training under either the proposed PRTC or No Action.

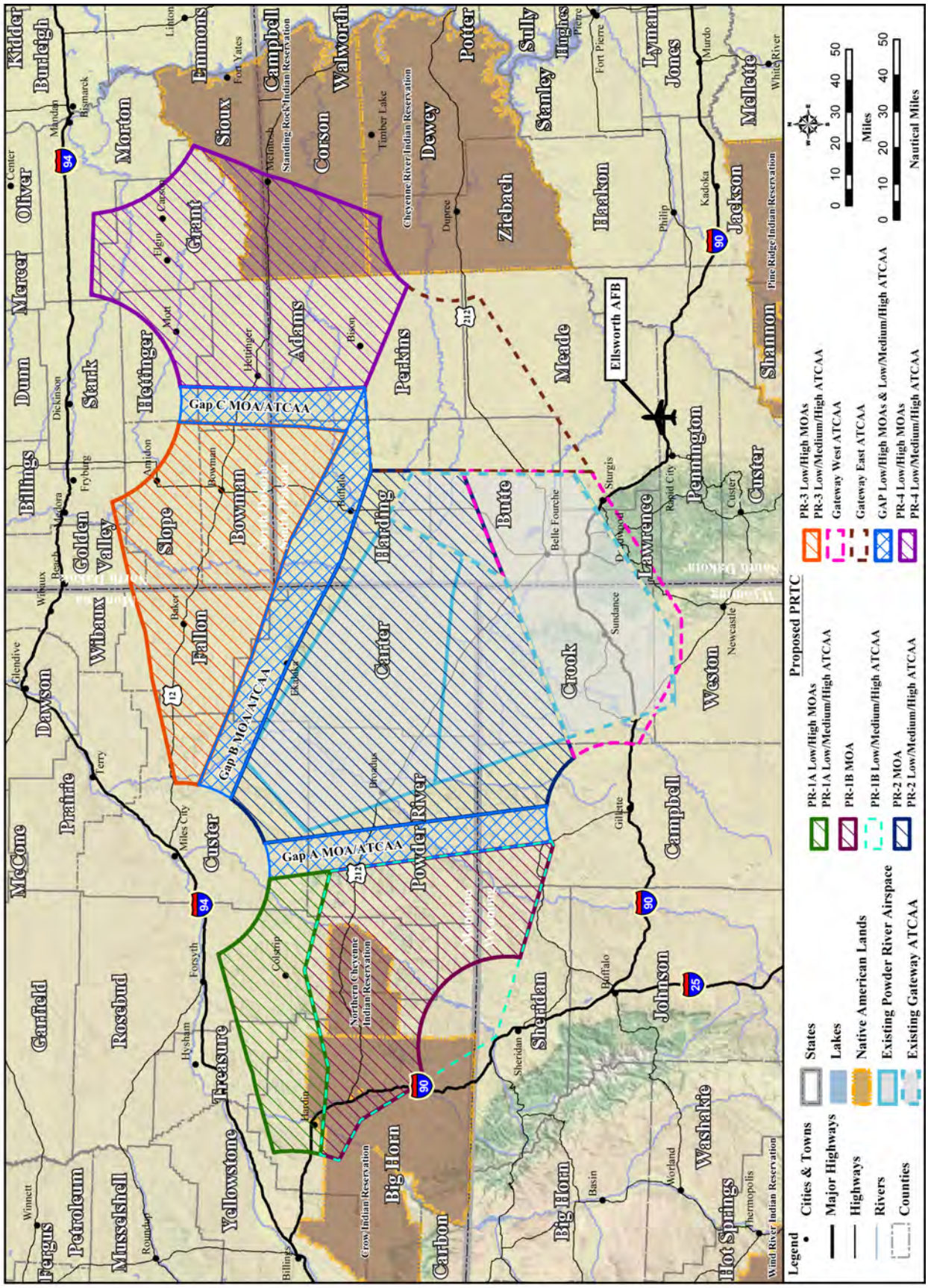


Figure 3.9-1. Counties Under or Around the Existing and Proposed Airspace

Table 3.9-1. Land Area under the PRTC Affected Airspace by County

County/State	*Affected Acres in County/State under Existing Powder River airspace*	*Affected Acres in County/State under Proposed PRTC*	*Percent of Total Affected Area under Proposed PRTC*	*Percent of County/State under Proposed PRTC*
MT[5]	2,688,390	9,193,600	40.93%	9.87%
Big Horn	-	1,686,400	7.5%	52.5%
Carter[1]	1,646,673	2,135,680	9.5%	99.7%
Custer[1]	288,041	1,040,640	4.6%	42.9%
Fallon	-	876,800	3.9%	84.5%
Powder River[1]	753,676	2,109,440	9.4%	100.0%
Rosebud	-	1,213,440	5.4%	37.7%
Treasure	-	131,200	0.6%	20.8%
ND[5]	0	3,657,600	16.28%	8.29%
Adams	-	631,680	2.8%	99.8%
Billings	-	19,200	0.1%	2.6%
Bowman	-	742,400	3.3%	99.4%
Golden Valley	-	55,040	0.2%	8.6%
Grant	-	963,200	4.3%	90.3%
Hettinger	-	376,320	1.7%	51.9%
Morton	-	76,160	0.3%	6.1%
Sioux	-	189,440	0.8%	26.2%
Slope	-	602,880	2.7%	77.3%
Stark	-	1,280	0.0%	0.1%
SD[5]	1,766,945	6,485,120	28.87%	13.35%
Butte[1, 2]	970,663	1,438,080	6.4%	99.2%
Corson	-	572,800	2.5%	35.3%
Harding[1, 3]	371,962	1,708,160	7.6%	99.7%
Lawrence[1, 4]	188,170	370,560	1.6%	72.4%
Meade[1, 4]	236,150	581,120	2.6%	26.1%
Pennington	-	-	0.0%	0.0%
Perkins[2]	-	1,747,840	7.8%	94.5%
Ziebach	-	66,560	0.3%	5.3%
WY[5]	1,783,723	3,127,040	13.92%	5.03%
Campbell[1]	63,172	722,560	3.2%	23.5%
Crook[1, 2]	1,720,551	1,811,200	8.1%	98.7%
Sheridan	-	423,040	1.9%	26.2%
Weston[1, 4]	-	170,240	0.8%	11.1%
Total Affected Area	6,239,058	22,463,360	100.00%	9.06%

Notes:
1. Portions of county under existing MOAs or ATCAAs.
2. Proposed training airspace 50 to 75 percent ATCAA.
3. Proposed training airspace 10 to 20 percent ATCAA.
4. Proposed training airspace all ATCAA.
5. Includes total affected area within the state.

POPULATION CHARACTERISTICS

Population data for the ROI are presented in Table 3.9-2. The total 2008 population for the 29 counties in the ROI was 355,681 persons, representing 12 percent of the total population of the four affected states of 2.9 million persons. This number of persons includes the population in all the counties in Table 3.9-1. Of these 355,681 persons, a total of approximately 54,403 persons would be under the expanded PRTC MOAs. This includes persons under the existing Powder River A/B MOAs. An estimated total of 84,420 persons would be located under the proposed PRTC MOAs and ATCAAs. This includes persons under the existing MOAs and ATCAAs.

Population change during the eight years, from 2000 to 2008, varied greatly across the affected counties. The population in many counties decreased during the time period (see Table 3.9-2). The Treasure County, MT population decreased 26 percent, while the population of Golden Valley County in ND decreased nearly 15 percent. Several other affected counties in ND and SD decreased in population by 10 percent or more. Some counties in the ROI also experienced moderate to high rates of population growth. The population in Campbell County, WY, increased over 23 percent. Other affected counties experienced population growth ranging from 0.9 percent to 10 percent. In general, there has been a concentration of rural population from smaller farms or communities to larger communities within the ROI.

Counties currently under the existing Powder River MOAs and ATCAAs which would continue to be under the proposed PR-2 MOA/ATCAA include portions of Carter, Custer, and Powder River in MT; Harding, Butte, and Lawrence in SD; and Campbell and Crook in WY. Table 3.9-3 presents the population under the existing Powder River A and B MOAs and the population under the proposed PR-1A, PR-1B, PR-2, PR-3, and PR-4 MOA/ATCAAs. Persons under the existing Powder River A and B MOAs (most of the proposed PR-2) are in areas of existing low-altitude overflight. Persons under the proposed PR-1A, PR-1B, PR-3, and PR-4 MOAs and associated Gap MOAs would be in areas where low-level overflight would occur to 500 feet AGL. Table 3.9-3 presents the estimated number of persons under the existing Gateway ATCAA which has a floor of FL180 (18,000 feet MSL). Persons under the proposed Gateway East and West ATCAAs are also estimated in Table 3.9-3. These individuals would not be expected to experience training aircraft in the proposed PRTC below 18,000 feet MSL.

Population density in the affected areas under the proposed MOAs ranged from 0.4 persons per square mile in Carter County to 31.9 persons per square mile in Pennington County (see Table 3.9-2). The average population density in the ROI counties including urban areas outside the affected area is 5.3 persons per square mile. Population density is 7.6 persons per square mile in the combined four-state area. Population density in the U.S. overall is 79.6 persons per square mile.

The rural nature of the affected area is evident by reviewing the detailed Census data for lands under the proposed PRTC airspace, as presented in Table 3.9-4. The average population density under the affected airspace is 2.8 persons per square mile, substantially lower than the 29-county ROI average density of 5.3 persons per square mile.

Table 3.9-2. Population and Population Change by ROI County

	Population		Percent Change, 2000-2008	Population Density, 2000 (per mile^2)
	2000	2008		
MT	902,195	967,440	7.2%	6.2
Big Horn	12,671	12,841	1.3%	2.5
Carter[1]	1,360	1,234	-9.3%	0.4
Custer[1]	11,696	11,149	-4.7%	3.1
Fallon	2,837	2,716	-4.3%	1.8
Powder River[1]	1,858	1,694	-8.8%	0.6
Rosebud	9,383	9,190	-2.1%	1.9
Treasure	861	637	-26.0%	0.9
ND	642,200	641,481	-0.1%	9.3
Adams	2,593	2,244	-13.5%	2.6
Billings	888	811	-8.7%	0.8
Bowman	3,242	3,019	-6.9%	2.8
Golden Valley	1,924	1,640	-14.8%	1.9
Grant	2,841	2,415	-15.0%	1.7
Hettinger	2,715	2,378	-12.4%	2.4
Morton	25,303	26,255	3.8%	13.1
Sioux	4,044	4,232	4.6%	3.7
Slope	767	675	-12.0%	0.6
Stark	22,636	22,575	-0.3%	16.9
SD	754,844	804,194	6.5%	9.9
Butte[1, 2]	9,094	9,593	5.5%	4.0
Corson	4,181	4,136	-1.1%	1.7
Harding[1, 3]	1,353	1,145	-15.4%	0.5
Lawrence[1, 4]	21,802	23,524	7.9%	27.3
Meade[1, 4]	24,253	23,989	-1.1%	7.0
Pennington	88,565	98,533	11.3%	31.9
Perkins[2]	3,363	2,900	-13.8%	1.2
Ziebach	2,519	2,542	0.9%	1.3
WY	493,782	532,668	7.9%	5.1
Campbell[1]	33,698	41,473	23.1%	7.0
Crook[1, 2]	5,887	6,457	9.7%	2.1
Sheridan	26,560	28,662	7.9%	10.5
Weston[1, 4]	6,644	7,022	5.7%	2.8

Notes:
1. Portions of county under existing MOAs or ATCAAs.
2. Proposed training airspace 50 to 75 percent ATCAA.
3. Proposed training airspace 10 to 20 percent ATCAA.
4. Proposed training airspace all ATCAA.

Source: U.S. Census Bureau 2009

Table 3.9-3. Population under Proposed PRTC Airspace by Airspace, 2000

	Population under Affected Airspace	***Percent of Affected Population***
Existing Powder River A/B MOA/ Powder River ATCAA[1]	2,528	7.01%
Existing Crossbow ATCAA/ Existing Gateway ATCAA[2]	33,535	92.99%
Existing Powder River Airspace	36,063	100.00%
PR-1A MOA/ATCAA	7,517	8.90%
PR-1B MOA/ATCAA[3]	9,578	11.35%
PR-2 MOA/ATCAA	3,261	3.86%
PR-3 MOA/ATCAA	6,964	8.25%
PR-4 MOA/ATCAA	9,897	11.72%
Gap A MOA/ATCAA	335	0.40%
Gap B MOA/ATCAA	1,373	1.63%
Gap C MOA/ATCAA	693	0.82%
Gateway East ATCAA	1,003	1.19%
Gateway West ATCAA	43,799	51.88%
Proposed Powder River Training Complex	84,420	100.00%

Notes: 1. Powder River ATCAA overlies Powder River A/B MOAs.
2. Crossbow ATCAA overlies Powder River ATCAA and existing Gateway ATCAA.
3. PR-1B ATCAA overlies and is slightly larger than PR-1B MOA; PR-1B MOA has an estimated 349 fewer persons than under the PR-1B ATCAA.

The estimated resident population under the proposed PRTC MOA and ATCAA airspace is 84,420 persons (Table 3.9-4). This estimate was derived using Census Tract and Block Group data from the 2000 Census. The 2000 Census is the latest data available at the Census Tract and Block Group level. The total populations of Carter County and Powder River County, MT; Adams County and Bowman County, ND; Butte County and Harding County, SD; and Crook County, WY are included under the affected airspace. An additional three counties have 90 percent or more of their respective populations included under the affected airspace. Table 3.9-3 presents estimated population under each of the proposed PRTC airspace units. Nearly all persons under the PR-2 MOA/ATCAA are currently under the existing Powder River A and B MOAs. Approximately three-quarters of the persons under the proposed Gateway East and West ATCAAs are currently under the existing Gateway ATCAA.

Lawrence County, under the existing Gateway ATCAA, is the most densely populated area under the airspace. The Gateway ATCAA overlies approximately 24.7 percent of the total population of Lawrence County.

Table 3.9-4. Population Under the Proposed PRTC Airspace by County (2000)

	Population under Affected Airspace	*Percent of Affected Population*	*Percent of Total County Population*	*Population Density under Affected Airspace (per mile^2)*
MT	22,625	26.8%	2.5%	1.6
Big Horn	10,187	12.1%	80.4%	3.9
Carter[1]	1,359	1.6%	99.9%	0.4
Custer[1]	254	0.3%	2.2%	0.2
Fallon	2,728	3.2%	96.2%	2.0
Powder River[1]	1,857	2.2%	99.9%	0.6
Rosebud	6,169	7.3%	65.7%	3.3
Treasure	71	0.1%	8.2%	0.3
ND	10,731	12.7%	1.7%	1.9
Adams	2,592	3.1%	100.0%	2.6
Billings	7	0.0%	0.8%	0.2
Bowman	3,237	3.8%	99.9%	2.8
Golden Valley	35	0.0%	1.8%	0.4
Grant	2,698	3.2%	95.0%	1.8
Hettinger	1,313	1.6%	48.4%	2.2
Morton	125	0.1%	0.5%	1.1
Sioux	156	0.2%	3.9%	0.5
Slope	567	0.7%	73.9%	0.6
Stark	1	0.0%	0.0%	0.3
SD	43,402	51.4%	5.7%	4.3
Butte[1, 2]	9,089	10.8%	99.9%	4.0
Corson	759	0.9%	18.1%	0.8
Harding[1, 3]	1,352	1.6%	99.9%	0.5
Lawrence[1, 4]	20,859	24.7%	95.7%	36.0
Meade[1, 4]	8,004	9.5%	33.0%	8.8
Pennington	-	0.0%	0.0%	-
Perkins[2]	3,292	3.9%	97.9%	1.2
Ziebach	48	0.1%	1.9%	0.5
WY	7,662	9.1%	1.6%	1.6
Campbell[1]	403	0.5%	1.2%	0.4
Crook[1, 2]	5,866	6.9%	99.6%	2.1
Sheridan	240	0.3%	0.9%	0.4
Weston[1, 4]	1,154	1.4%	17.4%	4.3

Notes:
1. Portions of county under existing MOAs or ATCAAs.
2. Proposed training airspace 50 to 75 percent ATCAA.
3. Proposed training airspace 10 to 20 percent ATCAA.
4. Proposed training airspace all ATCAA.

Source: U.S. Census Bureau 2008

Housing Characteristics

Housing supply in the ROI is presented in Table 3.9-5. The ROI had a total of 202,064 units in 2000 including urban areas outside the affected area. The 2000 Census is the latest data available for housing in these rural areas. Occupied housing units amounted to 182,115 units, resulting in a housing occupancy rate of about 90 percent. Owner-occupied units account for 70 percent of occupied units, with the remaining 30 percent occupied by renters. The 2000 Census median value of owner-occupied units in the ROI ranged from a low of $21,600 in Corson County, SD to a high in Campbell County, WY of $102,100. Vacancy rates widely vary throughout the ROI. The lowest vacancy rate is in Yellowstone County, WY at 4.5 percent while the highest vacancy rate is 34.7 percent in Harding County, SD. There is an estimated total of 33,398 housing units under the proposed PRTC, as presented in Table 3.9-6.

3.9.2.2 Economic Activity

Employment and Job Composition

Employment in the four states overall increased between 2000 and 2008 by amounts ranging from 5 percent to 11 percent. Employment growth in the ROI counties was not consistent. Several counties experienced a decline in employment ranging from a decrease of 1 percent in Corson County, SD and Weston County, WY to a decrease of 15 percent in Grant County, ND. The majority of counties in the ROI experienced at least nominal employment growth during this period. Sioux County, ND increased in employment approximately 3 percent. Slope County, ND experienced the greatest employment growth with an increase of 80 percent between 2000 and 2008 with the addition of 337 jobs for a total 2008 employment of 756 jobs.

Total employment characteristics of the ROI counties in their respective states are presented in Table 3.9-7. While individual counties may have higher or lower rates of unemployment, the average unemployment rate for the ROI counties was lowest in ND and WY with an average unemployment rate of 2.9 percent in 2008. The highest average unemployment rates were in MT and SD with an average unemployment rate of 4.3 percent and 3.5 percent, respectively. Unemployment in most of the individual counties decreased between 2000 and 2008. For those counties that experienced an increase in the unemployment rate, the increase was nominal, with the largest increase of 1.0 percentage point occurring in Grant County, ND.

Table 3.9-5. Housing Characteristics by ROI County (2000)

	Household Size, 2000	*Total Housing Units, 2000*	*Occupied Housing Units*	*Owner-Occupied Units*	*Renter-Occupied Units*	*Median Value of Owned Units*
MT	***2.45***	***412,633***	***358,667***	***247,723***	***110,944***	***$99,500***
Big Horn	3.17	4,655	3,924	2,535	1,389	$61,400
Carter[1]	2.47	811	543	406	137	$34,600
Custer[1]	2.36	5,360	4,768	3,349	1,419	$63,100
Fallon	2.45	1,410	1,140	882	258	$48,000
Powder River[1]	2.48	1,007	737	544	193	$59,800
Rosebud	2.81	3,912	3,307	2,218	1,089	$66,700
Treasure	2.41	422	357	255	102	$40,700
Yellowstone	2.43	54,563	52,084	36,026	16,058	$101,900
ND	***2.41***	***289,677***	***257,152***	***171,299***	***85,853***	***$74,400***
Adams	2.24	1,416	1,121	797	324	$37,500
Billings	2.43	529	366	281	85	$56,500
Bowman	2.32	1,596	1,358	1,078	280	$53,600
Golden Valley	2.38	973	761	594	167	$40,600
Grant	2.3	1,722	1,195	948	247	$23,500
Hettinger	2.3	1,419	1,152	963	189	$30,300
Morton	2.51	10,587	9,889	7,464	2,425	$74,800
Sioux	3.63	1,216	1,095	507	588	$48,000
Slope	2.45	451	313	272	41	$23,900
Stark	2.44	9,722	8,932	6,276	2,656	$70,400
SD	***2.5***	***323,208***	***290,245***	***197,940***	***92,305***	***$79,600***
Butte[1, 2]	2.55	4,059	3,516	2,575	941	$60,200
Corson	3.29	1,536	1,271	755	516	$21,600
Harding[1, 3]	2.5	804	525	386	139	$47,100
Lawrence[1, 4]	2.33	10,427	8,881	5,754	3,127	$87,700
Meade[1, 4]	2.66	10,149	8,805	6,006	2,799	$82,200
Pennington	2.49	37,249	34,641	22,930	11,711	$90,900
Perkins[2]	2.31	1,854	1,429	1,094	335	$33,200
Ziebach	3.4	879	741	440	301	$38,300
WY	***2.48***	***223,854***	***193,608***	***135,514***	***58,094***	***$96,600***
Campbell[1]	2.73	13,288	12,207	8,989	3,218	$102,900
Crook[1, 2]	2.51	2,935	2,308	1,845	463	$85,400
Sheridan	2.31	12,577	11,167	7,689	3,478	$102,100
Weston[1, 4]	2.42	3,231	2,624	2,045	579	$66,700

Notes: 1. Portions of county under existing MOAs or ATCAAs.
2. Proposed training airspace 50 to 75 percent ATCAA.
3. Proposed training airspace 10 to 20 percent ATCAA.
4. Proposed training airspace all ATCAA.

Source: U.S. Census Bureau 2008

Table 3.9-6. Housing under the Proposed PRTC Airspace (2000)

	Housing under Affected Airspace
MT	7,958
Big Horn	3,214
Carter[1]	550
Custer[1]	108
Fallon	1,114
Powder River[1]	749
Rosebud	2,195
Treasure	29
ND	4,638
Adams	1,157
Billings	3
Bowman	1,395
Golden Valley	15
Grant	1,173
Hettinger	571
Morton	50
Sioux	43
Slope	231
Stark	0
SD	17,736
Butte[1, 2]	3,564
Corson	231
Harding[1, 3]	541
Lawrence[1, 4]	8,952
Meade[1, 4]	3,009
Pennington	-
Perkins[2]	1,425
Ziebach	14
WY	3,065
Campbell[1]	148
Crook[1, 2]	2,337
Sheridan	104
Weston[1, 4]	477

Notes:
1. Portions of county under existing MOAs or ATCAAs.
2. Proposed training airspace 50 to 75 percent ATCAA.
3. Proposed training airspace 10 to 20 percent ATCAA.
4. Proposed training airspace all ATCAA.

Table 3.9-7. Employment Characteristics in ROI

	2000			**2008**		
	Civilian Labor Force	***Employment***	***Unemployment Rate***	***Civilian Labor Force***	***Employment***	***Unemployment Rate***
MT ROI Counties	90,986	86,896	4.5%	100,111	96,437	3.7%
ND ROI Counties	35,336	34,301	2.9%	37,985	36,858	3.0%
SD ROI Counties	82,126	79,896	2.7%	90,930	88,229	3.0%
WY ROI Counties	41,135	39,683	3.5%	49,785	48,526	2.5%

Source: U.S. Bureau of Labor Statistics 2008

Table 3.9-8 shows employment by industry in the ROI. Farm employment accounts for approximately 3.5 percent and 3.9 percent for the ROI counties in SD and WY in 2008, respectively. In the ROI counties in MT and ND, agriculture accounts for over 12 percent of total employment. Retail trade is another industry that comprises a large share of total employment in each of the ROI areas with a share of employment ranging between nearly 10 percent up to nearly 13 percent. State and local government accounts for over 19 percent in the ROI counties of MT. In the ROI counties in SD, state and local government comprises over 9.5 percent of total employment and over 13 percent in the counties in ND and over 12 percent in the ROI counties of WY (Table 3.9-8).

The industrial employment for the ROI counties is affected by the larger communities outside the potentially affected airspace but with portions of the counties potentially affected by the proposed MOA low-level airspace training boundaries. This means that employment for cities such as Miles City, Gillette, and Rapid City is represented in Table 3.9-8. As explained by participants at scoping meetings, employment under the airspace is generally more rural than the urban areas with more agricultural, recreational-oriented, and localized mining operations. Many scoping participants specifically noted the non-urban aspects of their lifestyle as key reasons why they chose to live in the rural areas of the potentially affected counties.

Table 3.9-9 presents a representative view of existing rural employment which reflects the scoping inputs. The employment distribution under these counties demonstrates the greater proportion of farm and forestry employment when compared with the overall ROI county employment in Table 3.9-8.

Income and Earnings

Per capita income and earnings per job for the ROI counties in each state in the years 2000 and 2007 are presented in Table 3.9-10. Per capita income in the WY ROI counties increased approximately 68 percent between 2000 and 2007 an increase of over $18,558. During the same time period, per capita income increased approximately 42 percent, an increase of nearly $8,385, in the ROI counties of SD.

Table 3.9-11 presents the distribution of the earnings by industry in the ROI counties. A large portion of the earnings in the region were generated through state and local government and retail trade. Mining is also a large source of earnings, particularly in the ROI counties of WY where earnings from the mining industry comprised over 31 percent of total earnings. Other staple industries include manufacturing, and construction.

Table 3.9-8. Distribution of ROI Employment by Industry (2007)

	ROI Counties, MT		*ROI Counties, ND*		*ROI Counties, SD*		*ROI Counties, WY*	
Total Employment	24,682	100.0%	42,073	100.0%	110,368	100.0%	62,408	100.0%
Farm employment	3,120	12.6%	5,075	12.1%	4,275	3.9%	2,157	3.5%
Forestry, fishing, related activities, and other	201	0.8%	-	0.0%	336	0.3%	467	0.7%
Mining	1,164	4.7%	940	2.2%	343	0.3%	10,449	16.7%
Utilities	-	0.0%	119	0.3%	574	0.5%	314	0.5%
Construction	1,002	4.1%	2,272	5.4%	8,401	7.6%	6,954	11.1%
Manufacturing	152	0.6%	2,369	5.6%	4,648	4.2%	1,547	2.5%
Wholesale trade	115	0.5%	1,839	4.4%	3,027	2.7%	1,973	3.2%
Retail Trade	2,346	9.5%	4,490	10.7%	13,851	12.5%	6,140	9.8%
Transportation and warehousing	443	1.8%	616	1.5%	2,850	2.6%	2,669	4.3%
Information	260	1.1%	634	1.5%	1,573	1.4%	458	0.7%
Finance and insurance	479	1.9%	1,172	2.8%	4,930	4.5%	1,420	2.3%
Real estate and rental and leasing	339	1.4%	638	1.5%	2,797	2.5%	1,990	3.2%
Professional and technical services	469	1.9%	712	1.7%	4,136	3.7%	2,619	4.2%
Management of companies and enterprises	36	0.1%	127	0.3%	366	0.3%	276	0.4%
Administrative and waste services	364	1.5%	731	1.7%	3,061	2.8%	1,693	2.7%
Educational services	84	0.3%	69	0.2%	1,415	1.3%	248	0.4%
Health care and social assistance	1,355	5.5%	1,096	2.6%	9,943	9.0%	3,457	5.5%
Arts, entertainment, and recreation	572	2.3%	491	1.2%	3,199	2.9%	668	1.1%
Accommodation and food services	1,411	5.7%	2,210	5.3%	11,219	10.2%	3,855	6.2%
Other services, except public administration	1,279	5.2%	2,036	4.8%	6,916	6.3%	2,926	4.7%
Government and government enterprises	5,829	23.6%	6,861	16.3%	17,499	15.9%	8,868	14.2%
Federal, civilian	927	3.8%	706	1.7%	3,009	2.7%	859	1.4%
Military	179	0.7%	478	1.1%	4,051	3.7%	508	0.8%
State and local	4,698	19.0%	5,663	13.5%	10,432	9.5%	7,501	12.0%

Note: Columns may not total as information is not available in some counties due to confidentiality of information but these jobs are included in the total employment.

Source: U.S. Bureau of Economic Analysis 2009a

Table 3.9-9. Representative County Employment under the Proposed PRTC MOAs by Industry (2007)

	Total	*Farm and Forestry*	*Mining, Manufacturing, and Construction*	*Trade and Transportation*	*Professional*	*Education and Health*	*Recreation*	*Government*
MT								
Big Horn	6,539	937	889	539	466	(D)	733	2,323
Carter	920	393	41	51	43	(D)	(D)	119
Fallon	2,240	398	(D)	310	105	158	132	272
Powder River	1,180	384	(D)	119	47	20	150	212
Rosebud	5,945	526	958	504	248	32	775	1,695
ND								
Adams	1,813	411	139	265	22	375	86	176
Bowman	2,551	417	387	433	288	255	122	264
Grant	1,813	674	48	163	(D)	226	66	194
Hettinger	1,712	531	43	191	(D)	161	(D)	205
Slope	521	292	12	16	10	(L)	(D)	35
SD								
Harding	1,062	321	118	72	19	49	(D)	120
Perkins	2,395	584	128	370	69	(D)	260	304
WY								
Crook	4,303	713	1,055	485	112	192	373	732
Representative County Totals	32,994	6,581	3,818	3,518	1,429	1,468	2,697	6,651
Representative County Percentages		20%	12%	11%	4%	4%	8%	20%

Note: 1. (D) Not shown to avoid disclosure of confidential information but the estimates for this item are included in the totals.
(L) Less than ten jobs but the estimates for this item are included in the totals

Source: U.S. Bureau of Economic Analysis 2009a

Farm and forestry products are produced under the existing Powder River airspace and under the proposed PRTC.

Table 3.9-10. ROI Income and Earnings

	2000		2007	
	Per Capita Income	***Earnings per Job***	***Per Capita Income***	***Earnings per Job***
MT ROI Counties	$19,064	$20,557	$27,792	$27,681
ND ROI Counties	$21,385	$21,461	$31,980	$31,189
SD ROI Counties	$20,157	$20,311	$28,542	$26,966
WY ROI Counties	$27,261	$26,466	$45,819	$39,493

Source: U.S. Bureau of Economic Analysis 2009b

Persons employed at the Northern Cheyenne Health Center, designed to improve wellness for Native American residents, are part of the regional services employment..

Table 3.9-11. ROI Earnings Distribution by Industry in Thousands (2007)

	ROI Counties, MT		*ROI Counties, ND*		*ROI Counties, SD*		*ROI Counties, WY*	
Total Earnings	$821,310	100.0%	$1,450,781	100.0%	$3,786,766	100.0%	$2,958,838	100.0%
Farm earnings	$24,193	2.9%	$129,822	8.9%	$52,618	1.4%	$(11,467)	-0.4%
Forestry, fishing, related activities, and other	$3,270	0.4%	$-	0.0%	$9,430	0.2%	$10,528	0.4%
Mining	$96,356	11.7%	$93,980	6.5%	$22,003	0.6%	$928,047	31.4%
Utilities	$803	0.1%	$13,278	0.9%	$60,167	1.6%	$31,090	1.1%
Construction	$41,553	5.1%	$85,361	5.9%	$281,696	7.4%	$328,758	11.1%
Manufacturing	$5,091	0.6%	$141,341	9.7%	$235,224	6.2%	$97,262	3.3%
Wholesale trade	$3,640	0.4%	$81,309	5.6%	$145,885	3.9%	$131,624	4.4%
Retail Trade	$43,267	5.3%	$96,135	6.6%	$330,106	8.7%	$156,093	5.3%
Transportation and warehousing	$22,445	2.7%	$50,727	3.5%	$100,244	2.6%	$177,844	6.0%
Information	$8,709	1.1%	$25,654	1.8%	$74,408	2.0%	$19,985	0.7%
Finance and insurance	$18,563	2.3%	$42,234	2.9%	$185,643	4.9%	$55,529	1.9%
Real estate and rental and leasing	$5,074	0.6%	$8,961	0.6%	$48,594	1.3%	$31,923	1.1%
Professional and technical services	$14,841	1.8%	$34,228	2.4%	$155,505	4.1%	$133,258	4.5%
Management of companies and enterprises	$2,856	0.3%	$4,568	0.3%	$23,233	0.6%	$31,184	1.1%
Administrative and waste services	$4,410	0.5%	$21,169	1.5%	$73,384	1.9%	$43,645	1.5%
Educational services	$962	0.1%	$1,225	0.1%	$32,223	0.9%	$3,215	0.1%
Health care and social assistance	$43,747	5.3%	$34,563	2.4%	$498,108	13.2%	$132,920	4.5%
Arts, entertainment, and recreation	$8,417	1.0%	$4,075	0.3%	$84,634	2.2%	$11,339	0.4%
Accommodation and food services	$17,858	2.2%	$29,543	2.0%	$176,658	4.7%	$64,163	2.2%
Other services, except public administration	$20,419	2.5%	$40,481	2.8%	$130,877	3.5%	$82,041	2.8%
Government and government enterprises	$266,746	32.5%	$275,345	19.0%	$955,118	25.2%	$469,245	15.9%
Federal, civilian	$77,476	9.4%	$52,717	3.6%	$233,896	6.2%	$81,065	2.7%
Military	$7,453	0.9%	$18,515	1.3%	$301,402	8.0%	$19,446	0.7%
State and local	$181,817	22.1%	$204,066	14.1%	$419,820	11.1%	$368,734	12.5%

Note: Columns may not total as information is not available in some counties due to confidentiality of information but the earnings from these industries are included in the total earnings.

Source: U.S. Bureau of Economic Analysis 2009b

AGRICULTURE

Agriculture, represented by farm, forestry, and related activities, is an important component of the economy in the region under the proposed PRTC. Farming employment and related food processing and food service jobs comprise approximately 6 percent of the ROI's combined employment. A variety of agricultural commodities are produced on farms and ranches in the ROI, including hay and grass silage, wheat, barley, sugar beets, sunflower seeds, cattle, and sheep. In addition to its direct contributions to output and employment in the ROI, agricultural activity also supports a number of secondary industries, including those associated with farm equipment, feed, and fertilizer.

The U.S. Census of Agriculture, taken at 5-year intervals, provides a detailed description of agricultural operations and provides the most comprehensive published data on farm and ranch activity in the ROI. The most recent published agricultural census is dated 2007.

The 2007 Census of Agriculture identified a total of 12,745 farms and ranches in the ROI counties containing approximately 35.8 million acres of land (Table 3.9-12). The average farm in the ROI is 3,625 acres in size, ranging from an average of 444 acres in Lawrence County, SD to 6,334 acres in Harding County, SD. Cropland, including pastureland, comprises over 22 percent of the land in farms in the ROI and irrigated land comprises less than 1 percent of the land in farms. Pastureland and other uses account for 72 percent of land in farms in the ROI.

The 2007 Census of Agriculture provides numbers of livestock on farms by county, summarized within the ROI by state in Table 3.9-13. Beef cattle, with some milk cows, represent the greatest proportion of livestock in the ROI, accounting for 71 percent of all livestock. Sheep and lambs account for 23 percent, horses account for 4.7 percent and the remaining 0.5 percent is comprised of hogs and pigs.

Livestock in the ROI counties represents a portion of the statewide livestock inventory for each of the four states. The beef cows in the ROI counties in MT comprise approximately 13.5 percent of the total inventory of beef cows in the state. The beef cow inventory in the ROI states of ND and WY also comprise 25 percent and 17 percent of the total inventory in the respective states. The number of milk cows in the ND ROI counties comprises over 33 percent of the total number of milk cows in the state.

ENERGY RESOURCE DEVELOPMENT

MT, ND, SD, and WY all have large reserves of natural resources that are in demand for energy development. In particular, oil, natural gas, and coal are prevalent throughout the area and comprise a large part of the growth economies. Wind energy is also becoming more common as the technology is further developed and more wind farms are proposed in these states.

Natural gas, oil, and coal are produced throughout the region under the proposed PRTC airspace.

Eastern MT and western ND overlies the Williston-Basin which contains two of the 100 largest oil fields in the U.S. MT is also a leading producer of coal which is largely extracted from several surface mines in the Powder River Basin located on the MT-WY border (see Table 3.9-14). In 2008, MT was producing approximately 44.8 million short tons of coal with reserves of over 925 billion short tons (Energy Information Administration 2010). Large coal deposits are located on the Crow Native American Reservation in the Powder River Basin. The Crow Tribe is currently planning to extract the coal and build a coal-to-liquids plant to process the coal into diesel or other fuels as part of an economic development initiative (Brown 2008). As a result of the large coal deposits in the area, the city of Colstrip in Rosebud

County has the largest coal-fired power plant west of the Mississippi (personal communication, Atchison 2008).

Table 3.9-12. General Agricultural Data for ROI Counties (2007)

	Farms	*Land in Farms (Acres)*	*Average Size of Farm*	*Total Cropland (Acres)*	*Irrigated Land (Acres)*	*Market Value of Products*
MT	29,524	61,388,462	2,079	18,241,710	2,013,167	$2,803,062
Big Horn	695	2,899,620	4,172	383,588	231	$94,853
Carter[1]	308	1,698,363	5,514	267,216	7,104	$42,812
Custer[1]	411	2,127,013	5,175	186,726	31,352	$73,205
Fallon	296	978,818	3,307	247,773	1,536	$35,938
Powder River[1]	319	162,008	5,079	178,104	10,039	$40,960
Rosebud	478	2,714,024	5,678	238,852	34,623	$56,823
Treasure	101	461,790	4,572	36,103	20,344	$30,377
ND	426	626,663	1,471	407,315	-	$70,542
Adams	243	724,532	2,982	120,203	(D)	$23,750
Billings	353	720,756	2,042	371,877	920	$77,682
Bowman	243	570,210	2,347	231,840	896	$43,102
Golden Valley	528	1,058,178	2,004	510,893	1,895	$79,870
Grant	546	707,833	1,296	582,789	-	$93,560
Hettinger	836	1,165,098	1,394	548,569	6,616	$117,251
Morton	204	730,306	3,580	148,797	(D)	$32,319
Sioux	238	768,938	3,231	269,563	460	$47,645
Slope	865	837,143	968	529,062	1,009	$96,812
Stark	31,169	43,666,403	1,401	19,094,311	1,627	$6,570,450
SD	584	1,140,405	1,953	163,375	47,701	$55,443
Butte[1, 2]	392	1,283,038	3,273	372,883	1,193	$65,475
Corson	252	1,596,101	6,334	207,638	976	$163,695
Harding[1, 3]	301	133,503	444	30,531	3,775	$11,620
Lawrence[1, 4]	879	2,208,880	2,513	520,398	6,647	$78,408
Meade[1, 4]	655	1,185,055	1,809	280,265	7,893	$56,038
Pennington	432	1,829,157	4,234	427,292	611	$59,485
Perkins[2]	234	1,058,403	4,523	258,548	-	$37,481
Ziebach	11,069	30,169,526	2,726	2,576,017	1,550,723	$1,157,535
WY	633	2,345,915	3,706	170,423	4,023	$41,141
Campbell[1]	457	1,569,912	3,435	166,553	4,552	$43,983
Crook[1, 2]	599	1,224,625	2,044	91,424	56,325	$48,662
Sheridan	237	1,328,294	5,605	49,282	6,593	$26,501
Weston[1, 4]	29,524	61,388,462	2,079	18,241,710	2,013,167	$2,803,062

Notes:
1. Portions of county under existing MOAs or ATCAAs.
2. Proposed training airspace 50 to 75 percent ATCAA.
3. Proposed training airspace 10 to 20 percent ATCAA.
4. Proposed training airspace all ATCAA.
5. (D) = data withheld to avoid disclosing data for individual farms.

Source: U.S. Department of Agriculture 2009.

Table 3.9-13. Number of Livestock on ROI Farms (2007)

	Beef Cows	*Milk Cows*	*Hogs/Pigs*	*Sheep/Lambs*	*Horses/Ponies*
MT Counties	205,489	56	279	63,632	13,759
ND Counties	230,711	8,833	2,489	29,204	8,781
SD Counties	257,539	1,516	2,466	124,322	16,963
WY Counties	126,559	21	728	52,844	15,598

Source: U.S. Department of Agriculture 2009

Table 3.9-14. Statewide Reserves and Production of Energy Resources

Reserves	*Crude Oil (Million Barrels)*	*Dry Natural Gas (Billion Cubic Feet)*	*Natural Gas Liquids (Million Barrels)*	*Recoverable Coal at Producing Mines (Million Short Tons)*
MT	321	1,000	11	925
ND	573	541	55	1,225
SD	N/A	N/A	N/A	N/A
WY	556	31,143	1,121	7,010
Production	***Crude Oil (Thousand Barrels)***	***Natural Gas-Marketed (Million Cubic Feet)***	***Coal (Thousand Short Tons)***	***Total Energy (Trillion Btu)***
MT	2,220	112,529	44,786	1,215
ND	7,411	61,437	29,627	752
SD	141	1,644	N/A	144
WY	4,287	2,274,850	467,644	10,290

Source: Energy Information Administration 2010

MT has a number of wind farms that produce wind energy from large wind turbines located around the state. Currently, the state of MT has 272 wind turbines with the power capacity of over 375 megawatts of energy (American Wind Energy Association 2009).

In 2008, ND was ranked 7th in oil production out of 31 oil-producing states and two federal offshore areas (ND State Data Center 2009). In that same year, ND produced approximately 63 million barrels comprising 3.5 percent of the total production in the U.S. (ND State Data Center 2009). Bowman County is the largest producer of oil in ND in 2008 with production of approximately 16.4 million barrels. Billings County and Stark County were also large producers within the state with production of 4.4 million and 1.4 million, respectively.

Wind energy is becoming a growing source of energy in ND. As of 2009 there were 876 wind turbines in ND with a capacity of 1,202 megawatts. Additional wind energy projects are under construction with 33 wind turbines that are projected to add approximately 80 megawatts in power capacity (American Wind Energy Association 2009).

SD has fewer discovered fossil fuel reserves, such as oil and natural gas, than the other ROI states. Most of the electricity generated in SD is produced from coal power plants or hydroelectric power plants. As of 2009, SD had produced 141,000 barrels of crude oil and in 2006 produced 1,644 million cubic feet of natural gas. Sources of renewable energy utilized by the state of SD includes ethanol, wind, and geothermal.

As of 2009, SD has 197 wind turbine units with the capacity to produce over 313 megawatts. Additional wind turbines are under construction with a total of 66 wind turbines and the potential capacity of 99 megawatts once they are completed.

As compared to SD, WY has several large fossil fuel reserves. The Powder River Basin partially located in northeastern WY is the largest coal-producing region in the U.S. Natural gas from WY accounts for approximately one-tenth of the natural gas production in the U.S. and oil from WY accounts for approximately 3 percent of the total oil production in the U.S. In 2008, coal reserves in the state were approximately 7.01 billion short tons while crude oil reserves were 556 million barrels. At the same time, coal production was over 467 million short tons and crude oil production was over 4.2 million barrels (Table 3.9-14).

Wind energy is also being developed in WY as a renewable energy source. As of 2009 there were 777 wind turbines located throughout the state with the power capacity of over 1,101 megawatts. There are 184 additional turbines under construction with the potential capacity of 311 megawatts (Table 3.9-15).

Table 3.9-15. Statewide Wind Energy (2009)

	Units	*Power Capacity-Existing Projects (megawatts)*	*Power Capacity-Under Construction (megawatts)*
MT	272	375.03	-
ND	876	1202.53	75.9
SD	197	313.16	99.00
WY	777	1101.06	311.2

Source: American Wind Energy Association 2009

Civil Aviation

Several economic and related factors contribute to the importance of civil aviation within the areas under the proposed PRTC. As described by participants at scoping, the rural nature of the area combined with the large agricultural operations, the growing energy industry, and the sheer distances involved make reliance on the airplane greater than might be experienced in other parts of the country.

This section focuses on the lower altitude civil aviation generally occurring below commercial traffic. Section 3.1, Airspace, provides expanded discussion of civil aviation at airports within the ROI and civil aviation flying in the proposed PRTC airspace.

There are 33 public airports and 30 private airfields reported under the proposed PRTC MOAs and ATCAAs. The private airfields include ranch and medical services. Table 3.9-16 summarizes the information on the public airports and private airfields and includes details on the reported based aircraft types. Section 3.1.3.3 presents the public airports and private airfields and regional airspace use. Many of the airports provide fuel and services to pilots transiting the area and most of the airports and airfields have permanently based aircraft at the airfields (Table 3.9-16).

Table 3.9-17 presents the estimated daily operations by airports and airfields under the existing (approximately the same area as PR-2) and proposed MOAs. Scoping comments referenced a number of pilots who flew private aircraft as part of their recreation. A review of FAA data did not identify a greater number of aircraft in the MOAs during the weekends as compared with weekdays. This means that the numbers of reported annual operations from public airports and private airfields presented in Table 3.9-17 are not concentrated on weekends but appear to be distributed evenly across the weekdays and weekends.

Table 3.9-16. Summary of Public Airports, Private Airfields, and Based Aircraft by Alternative (Page 1 of 2)

Proposed Airspace	*Total Airports and Airfields*	*Total Based Aircraft*	Aircraft Type					
			Single Engine	*Multi Engine*	*Jet*	*Helicopter*	*Military*	*Glider/ Ultralight*
Alternative A MOAs[1]								
Public Airport Totals Under and Near Alternative A	26	687	504	126	22	14	17	4
Public Airport Totals Under Alternative A	14	134	122	8	1	2	0	1
Private Airfield Totals Under and Near Alternative A	21	36	33	2	0	0	0	1
Private Airfield Totals Under Alternative A	12	19	16	2	0	0	0	1
Alternative A ATCAAs								
PR-1A/B, PR-2, PR-3, PR-4, and Gap ATCAAs Airports and Airfields included Under respective MOAs								
Airports and Airfields Under and Near Gateway ATCAAs (below)	16	269	205	36	4	4	10	10
Alternative B MOAs[2]								
Public Airport Totals Under and Near Alternative B	20	375	305	38	10	3	17	2
Public Airport Totals Under Alternative B	12	113	103	6	1	2	0	1
Private Airfield Totals Under and Near Alternative B	18	35	32	2	0	0	0	1
Private Airfield Totals Under Alternative B	11	19	16	2	0	0	0	1
Alternative B ATCAAs								
PR-2, PR-3, PR-4, and Gap Airports and Airfields included Under respective MOAs								
Airports and Airfields Under and Near PR-1A/B ATCAAs and Gap A ATCAA	9	313	200	88	12	11	0	2
Airports and Airfields Under and Near Gateway ATCAAs (below)	16	269	205	36	4	4	10	10
Alternative C MOAs[3]								
Public Airport Totals Under and Near Alternative C	15	449	320	100	14	12	0	3
Public Airport Totals Under Alternative C	8	77	68	6	1	1	0	1
Private Airfield Totals Under and Near Alternative C	16	29	26	2	0	0	0	1
Private Airfield Totals Under Alternative C	10	16	13	2	0	0	0	1

Table 3.9-16. Summary of Public Airports, Private Airfields, and Based Aircraft by Alternative (Page 2 of 2)

Proposed Airspace	*Total Airports and Airfields*	*Total Based Aircraft*	Aircraft Type					
			Single Engine	*Multi Engine*	*Jet*	*Helicopter*	*Military*	*Glider/ Ultralight*
Alternative C ATCAAs								
PR-1A/B, PR-2, PR-3, and Gap A and B ATCAA Airports and Airfields Under respective MOAs								
Airports and Airfields Under and Near PR-4 ATCAA and Gap C ATCAA	16	245	191	26	8	2	17	1
Airports and Airfields Under and Near Gateway ATCAAs (below)	16	269	205	36	4	4	10	10
Proposed Gateway ATCAAs[4]								
Public Airport Totals Under and Near Proposed Gateway ATCAAs	7	255	193	36	4	4	10	8
Public Airport Totals Under Proposed Gateway ATCAAs	5	121	106	8	0	0	0	7
Private Airfield Totals Under and Near Proposed Gateway ATCAAs	9	14	12	0	0	0	0	2
Private Airfield Totals Under Proposed Gateway ATCAAs	8	11	9	0	0	0	0	2

Notes:
1. Includes PR-1A/B, PR-2, PR-3, PR-4, and all Gap MOAs
2. Includes PR-2, PR-3, PR-4, and Gap B and Gap C MOAs
3. Includes PR-1A/B, PR-2, PR-3, and Gap A and Gap B MOAs
4. Included in all Alternatives

Table 3.9-17. Estimated Daily Traffic in the Proposed MOAs

Proposed MOA	Daily Average Operations			
	FAA Reported Operations[1]	***Public Airports under Airspace Reported Operations[2]***	***Private Airfields under Airspace Estimated Operations[3]***	***Estimated Total Daily Average Civilian Operations***
PR 1A/1B (includes Gap A)	25	34	2	61
PR-2 (Approximately existing airspace)	6	17	2	25
PR-3 (includes Gap B)	5	43	18	66
PR-4 (includes Gap C)	19	67	4	90

Notes; 1. Refer to data in Table 3.1-9
2. Refer to data in Table 3.1-6
3. Refer to data in Table 3.1-7

A large number of public airports and private airfields located under the affected airspace support ranchers, farmers, and others who often use small aircraft for agricultural aerial application (crop dusting), predator control, and checking on livestock and fences that are spread over large areas of land not easily accessible by vehicles. Some private airfields belong to hospitals or other emergency medical facilities as well as fire departments or federal agencies.

Civil aviation includes commercial aviation. FAA data captures all civil aviation and especially commercial aviation in Class A airspace. The data available for this EIS do not make it possible to separate commercial aircraft from other ATCAA traffic. During scoping for this EIS commercial airlines explained that they were normally above FL260. Data presented in Figures 3.1-17, 3.1-18, 3.1-23, and 3.1-24 demonstrate the concentrated traffic above FL260. Table 3.1-11 demonstrates that the medium ATCAA airspace above FL260 to FL370 and the higher ATCAA airspace above FL370 have 5 to 15 times as much civilian traffic as the airspace above FL180 to FL260. Commercial aviation regularly overflies the Powder River airspace and the proposed PRTC airspace at altitudes above FL260.

During public scoping meetings, participants explained how rural area aircraft are often used for emergency medical and firefighting purposes. Civil aircraft are used for aerial photography to monitor biological and wetland resources, for cloud seeding, and for related activities which require quick response to weather or related circumstances. Nearly all of the land under the proposed PRTC PR-2 MOA is currently under the Powder River A and B MOAs. A variety of procedures have been established by Ellsworth AFB to support emergency and related monitoring activities under the existing Powder River A and B MOAs. Communication has been the key to avoiding or reducing the potential for impacts.

Public airports throughout the ROI support general aviation and provide access for economic pursuits, which include oil, gas, agricultural, and hunting.

In cases of emergency, such as air ambulance or law enforcement, which require ATC clearance, the Air Force immediately responds to ATC direction and temporarily raises the floor of the Powder River A and/or B MOAs for B-1 and B-52 training to an altitude which permits emergency activity below the training aircraft. If necessary, to support the emergency activity, the Air Force terminates training within the airspace and either relocates for training or terminates training and returns to base.

Firefighting activities are covered under the existing Memorandum of Agreement between Ellsworth AFB and the Bureau of Land Management.

Related aircraft activities which require special conditions within the Powder River A or B MOAs include regional requirements for airspace use. In addition to fire monitoring and related emergency activities, state or federal agencies provide digital aerial photography for wetlands surveys and wildlife monitoring. This photography requires that aircraft be flown at specific altitudes over specific areas under specific visibility conditions. These seasonal activities can occur for one to two week periods. Ellsworth AFB airspace schedulers work with monitoring organizations to coordinate B-1 training operations and schedule MOA usage to support monitoring activities. This requires additional communication and scheduling. The requirement for civil aircraft involved in emergency and related services and military training aircraft is the need for communication. This permits B-1s and B-52s to relocate to another altitude in response to emergency conditions.

3.10 Environmental Justice and Protection of Children

3.10.1 Definition of the Resource

For the purpose of the environmental justice analysis, minority and low-income populations and the population of children are defined as:

- *Minority Populations*: All persons identified by the Census of Population and Housing to be of Hispanic or Latino origin, regardless of race, plus non-Hispanic persons who are Black or African American, Native American and Alaskan Native, Asian, Native Hawaiian and Other Pacific Islander, Some Other (i.e., non-white) Race or Two or More Races.
- *Low-Income Populations*: All persons who fall within the statistical poverty thresholds published by the U. S. Census Bureau in the Current Population Survey are considered to be low-income. For the purposes of this analysis, low-income populations are defined as persons living below the poverty level ($16,895 for a family of four with two children, adjusted based on household size and number of children), as reported in the 2000 Census. The percentage of low-income persons is calculated as the percentage of all persons for whom the Census Bureau determines poverty status, which is generally a slightly lower number than the total population of those who fall within the statistical poverty thresholds since it excludes institutionalized persons, persons in military group quarters and college dormitories, and unrelated individuals under 15 years old.
- *Children*: All persons identified by the Census of Population and Housing to be under the age of 18 years.

The ROI for environmental justice consists of 29 counties across four states where all or portions of the county underlie the proposed PRTC. The ROI refers to the aggregate 29 counties in their entirety. The affected area, by comparison, refers to the precise land area under the proposed PRTC airspace boundaries. Of the 29 counties containing affected lands, there are eight in which over 90 percent of the counties' land area is included under the proposed airspace (see Table 3.9-1).

Environmental justice data for the four states, the aggregate ROI, and the 29 individual counties will be used for comparison in identifying potential disproportionate environmental justice populations in the specific affected areas. For the purposes of this analysis, environmental justice data was assessed for the ROI, for the specific affected areas, and for each proposed PRTC airspace element.

3.10.2 Regulatory Setting

In 1994, EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations (Environmental Justice)*, was issued to focus the attention of federal agencies on human health and environmental conditions in minority populations and low-income populations. This EO was also established to ensure that, if there were disproportionately high and adverse human health or environmental effects of federal actions on these populations, those effects would be identified and addressed. The environmental justice analysis addresses the characteristics of race, ethnicity and poverty status for populations residing in areas potentially affected by implementation of the proposed action.

In 1997, EO13045, *Protection of Children from Environmental Health Risks and Safety Risks* (*Protection of Children*), was issued to identify and address anticipated health or safety issues that affect children. The protection of children analysis addresses the distribution of population by age in areas potentially affected by implementation of the proposed action.

3.10.3 Existing Conditions

Environmental justice data for the four relevant states and 29 ROI counties are presented in Table 3.10-1. Minority persons account for 11.8 percent of the 29-county ROI population, compared to 10.5 percent for the combined four states of MT, ND, SD, and WY. Counties with the highest minority populations are those that contain substantial Native American reservations lands; these counties include Big Horn (65 percent minority) and Rosebud (37 percent) in MT, Sioux (86 percent) in ND, and Corson (63 percent) and Ziebach (74 percent) in SD. Native Americans comprise the predominant minority group in the ROI. The names and locations of the four affected Native American Reservations are displayed in Figure 3.7-1.

The population of the ROI is 12.4 percent low-income, meaning one out of every eight persons in the 29-county region lives below the U.S. designated poverty level. The population of the combined four states exhibits a comparable poverty status, with 12.6 percent of the population identified as low-income. The low-income population in the individual counties ranges from a low of 7.6 percent in Campbell County, WY, to a high of 49.9 percent in Ziebach County, SD.

Children under the age of 18 years constitute 26.9 percent of the 29-county ROI population, compared to 25.9 percent for the combined four-state region. There is an unusually wide variation in the youth population among the ROI counties, ranging from a low of 23.1 percent in Lawrence County, SD, to a high of 40.6 percent in Sioux County, ND. Nationally, the youth population typically accounts for 23 to 28 percent of a given county's population.

Table 3.10-1. Environmental Justice Data for the ROI by County

ROI Counties	2000 Population	Minority Population		Low-Income Population		Youth Population	
		Number	Percent	Number	Percent	Number	Percent
MT	**902,195**	**94,372**	**10.5**	**128,355**	**14.6**	**230,062**	**25.5**
Big Horn	12,671	8,214	64.8	3,632	29.2	4,534	35.8
Carter	1,360	21	1.5	242	18.1	361	26.5
Custer	11,696	468	4.0	1,700	15.1	2,939	25.1
Fallon	2,837	47	1.7	349	12.5	724	25.5
Powder River	1,858	55	3.0	235	12.9	494	26.6
Rosebud	9,383	3,424	36.5	2,063	22.4	3,143	33.5
Treasure	861	38	4.4	125	14.7	239	27.8
ND	**642,200**	**53,051**	**8.3**	**73,457**	**11.9**	**160,849**	**25.0**
Adams	2,593	43	1.7	262	10.4	601	23.2
Billings	888	14	1.6	113	12.8	221	24.9
Bowman	3,242	47	1.4	259	8.2	780	24.1
Golden Valley	1,924	54	2.8	276	15.3	545	28.3
Grant	2,841	95	3.3	565	20.3	666	23.4
Hettinger	2,715	34	1.3	393	14.8	624	23.4
Morton	25,303	1,142	4.5	2,386	9.6	6,823	27.0
Sioux	4,044	3,467	85.7	1,564	39.2	1,630	40.3
Slope	767	3	0.4	130	16.9	194	25.3
Stark	22,636	714	3.2	2,691	12.3	5,781	25.5
SD	**754,844**	**90,259**	**12.0**	**95,900**	**13.2**	**202,649**	**26.8**
Butte	9,094	537	5.9	1,147	12.8	2,575	28.3
Corson	4,181	2,630	62.9	1,692	41.0	1,544	36.9
Harding	1,353	46	3.4	277	21.1	440	32.5
Lawrence	21,802	1,171	5.4	3,073	14.8	5,045	23.1
Meade	24,253	2,041	8.4	2,195	9.4	6,877	28.4
Pennington	88,565	12,768	14.4	9,967	11.5	23,565	26.6
Perkins	3,363	118	3.5	561	16.9	811	24.1
Ziebach	2,519	1,855	73.6	1,256	49.9	1,023	40.6
WY	**493,782**	**54,983**	**11.1**	**54,777**	**11.4**	**128,873**	**26.1**
Campbell	33,698	1,997	5.9	2,544	7.6	10,456	31.0
Crook	5,887	158	2.7	529	9.1	1,581	26.9
Sheridan	26,560	1,438	5.4	2,775	10.7	6,412	24.1
Weston	6,644	346	5.2	628	9.9	1,598	24.1

Source: U.S. Census 2000

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