Reinitiation of Consultation for the Colowyo Coal Company, L.P. "Colowyo" Mine, Permit C-81-019 – South Taylor/Lower Wilson Mining Area, Permit Revision PR-02

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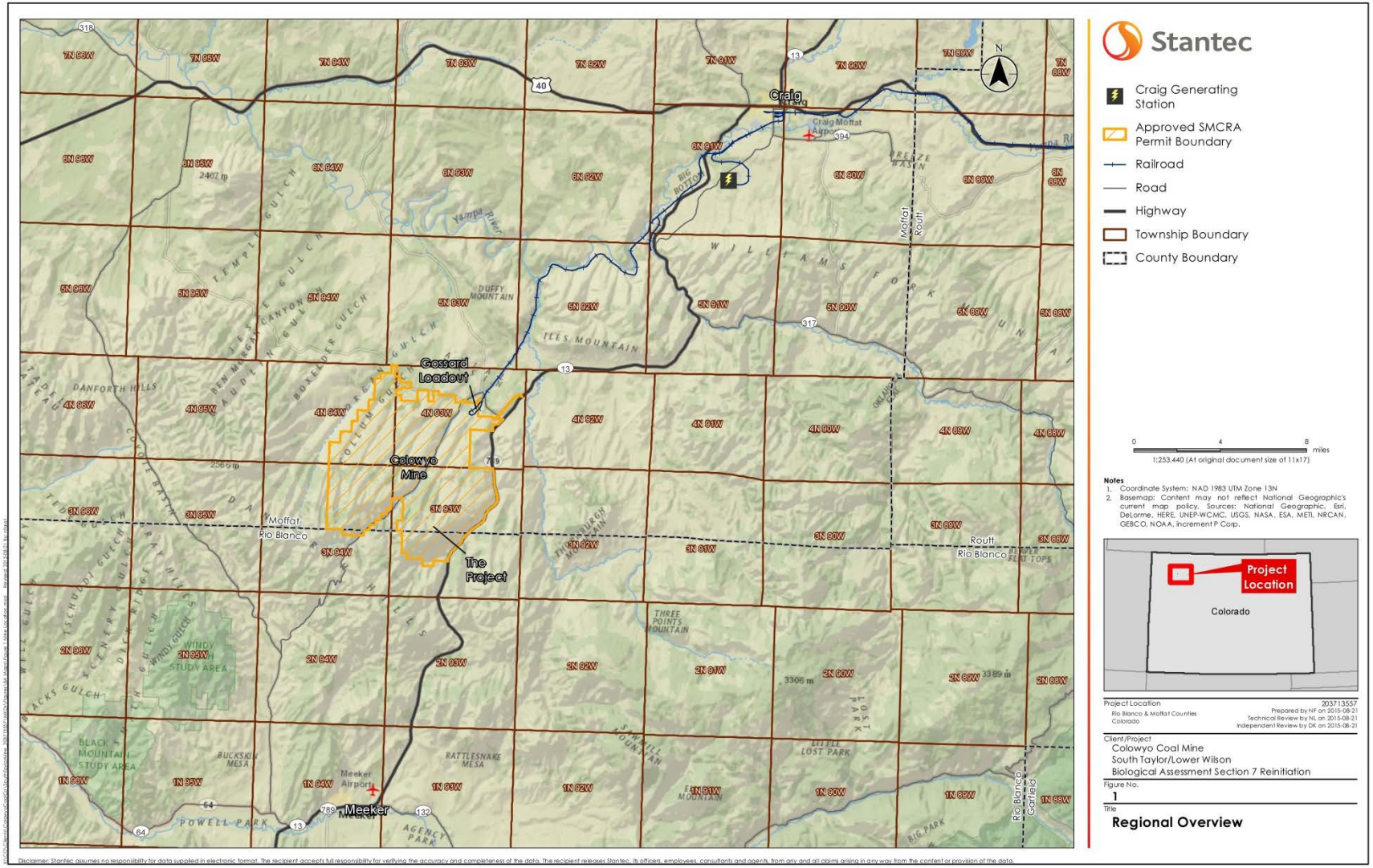
1.0 Introduction

On May 8, 2015, the U.S. District Court for the District of Colorado found various National Environmental Policy Act (NEPA) violations in connection with Department of the Interior's (DOI) 2007 approval of a mining plan modification for the South Taylor/Lower Wilson Expansion Area. See *WildEarth Guardians v. U.S. Office of Surface Mining et al.*, Case 1:13-cv-00518-RBJ (D. Colo. 2015). The court ordered DOI to complete additional NEPA analysis (complete with public participation) within 120 days, indicating that the Secretary's approval of the 2007 mining plan modification for Colowyo Coal Company (Colowyo) would be vacated if DOI does not timely complete the required analysis. In addition, the court determined that the combustion of coal at the Craig Generating Station is a reasonably foreseeable indirect effect of Office of Surface Mining Reclamation and Enforcement's (OSMRE) approval of a 2007 mine plan modification for the South Taylor/Lower Wilson Permit Expansion Area, proposed by Colowyo.

As a result, OSMRE has identified a need for it to re-evaluate its previous mining plan modification recommendation for this area based, in part, on the Permit Application Package submitted to OSMRE and the Colorado Division of Reclamation, Mining and Safety (CDRMS) and for the Assistant Secretary of Land and Minerals Management (ASLM) to issue a new decision whether to approve, disapprove, or approve the mining plan modification with conditions (30 CFR 746.14). To support the mining plan modification recommendation OSMRE is reevaluating the environmental impacts from a mining plan modification for the South Taylor/Lower Wilson Permit Expansion Area and reinitiating consultation with the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the Endangered Species Act (ESA). OSMRE is now reevaluating the environmental impacts for a mining plan modification for the South Taylor/Lower Wilson Permit Expansion Area that will replace the 2007 mining plan modification. Specifically, this reevaluation is examining the impacts associated with ongoing mining and reclamation operations at the mine and the indirect impacts related to the combustion of coal from the South Taylor/Lower Wilson Permit Area at the Craig Generating Station (**Figure 1**).

The Proposed Action includes future mining at the South Taylor/Lower Wilson Expansion Area and was developed to incorporate all interrelated and interdependent activities. The Court in *WildEarth Guardians* determined that coal combustion at the Craig Generating Station was a reasonably foreseeable indirect effect of the South Taylor/Lower Wilson mine plan authorization. Therefore, the effects of burning the coal mined from the South Taylor/Lower Wilson area at the Craig Generating Station are included in this Biological Assessment (BA)

Figure 1. Colowyo Mine Location



The impacts associated with ongoing mining and reclamation operations at the South Taylor/Lower Wilson Permit Expansion area (Permit Revision [PR]-02) were originally consulted on in 2006. The USFWS responded on November 6, 2006, with a preliminary Biological Opinion (BO) (USFWS 2006) and a final BO on March 9, 2007, (USFWS 2007) for the South Taylor/Lower Wilson component. Those BOs are included in Appendix A.

Reinitiation of consultation with USFWS for the South Taylor/Lower Wilson project at the Colowyo Mine is requested by OSRME at this time to discuss impacts to the Colorado River Fish (Colorado Pikeminnow [*Ptychocheilus lucius*], razorback sucker [*Xyrauchen texanus*], bonytail chub [*Gila elegans*], and humpback chub [*Gila cypha*]) from combustion of coal at the Craig Power Station in Craig, Colorado, which was not considered in previous consultations and is being analyzed as an indirect effect of mining. OSMRE finds that combustion of the coal mined at the Colowyo Mine is a reasonably foreseeable future action, however, the Colowyo Mine and the Craig Generating Station are independent operations with independent utility. The reinitiation of consultation for the South Taylor/Lower Wilson component of the Project will also include potential project related effects to the Ute ladies'-tresses orchid (*Spiranthes diluvialis*), a threatened species. This species was not included in the previous consultations. Finally, this BA will also include potential impacts from coal combustion and subsequent mercury deposition on the yellow-billed cuckoo (*Coccyzus americanus).* Recent data indicate that mercury deposition may be impacting this species. The previous consultations did not include a discussion on this potential impact. Appendix B includes the species list for the Project Area taken from the USFWS Information for Planning and Conservation website (fttps://ecos.fws.gov/ipac). The Project Area for this BA includes the South Taylor/Lower Wilson area.

2.0 Proposed Action

2.1 South Taylor/Lower Wilson Permit Expansion (PR-02) as Originally Proposed

As described in the 2006 BO (USFWS 2006), the previous Proposed Action added approximately 6,050 acres to the approved Colowyo Mine permit boundary to recover coal from parts of federal coal leases COC 012347601, COC 029225, and COC 029226 by surface mining methods from nine coal seams in the Williams Fork Formation. The 2007 PR-02 as originally proposed would have disturbed a total of 1,562 acres. However, 261 acres would have occurred on lands previously disturbed from ongoing mining operations and 115 acres of land that were under partial or full reclamation leaving a total of 1,186 acres of disturbance occurring on lands that were previously undisturbed. The 2006 BA stated that 905 acres of total disturbance would occur on lands added under PR-02. The BA did not distinguish between the amount of disturbance on previously disturbed or undisturbed lands. However, it is stated that the 905 acres was solely on lands added by PR-02. The remaining 281 acres would occur on lands that were previously permitted to Colowyo.

Mining in the South Taylor/Lower Wilson Permit Expansion area commenced in 2008 and has continued uninterrupted since then. Mining is a dynamic process that requires continual collection, interpretation,

and analysis of new geologic and engineering data as mining progresses. The process results in constant refinement of the geologic and engineering models that are the basis for mine operation decisions. To account for these changes, the mining permit may be altered through the Minor Revision or Technical Revision process. Those revisions are defined in the CDRMS state regulations as follows:

“Minor revision" means a modification in permit provisions to reflect minor alterations in the location of roads or other facilities within the permit area, minor alterations in the timing or sequencing of mining or reclamation plans approved in accordance with the requirements of these Rules or other minor alterations in surface coal mining and reclamation operations which shall not cause a significant alteration in the permittee's reclamation plan.” (CDRMS 1980, revised 2005).

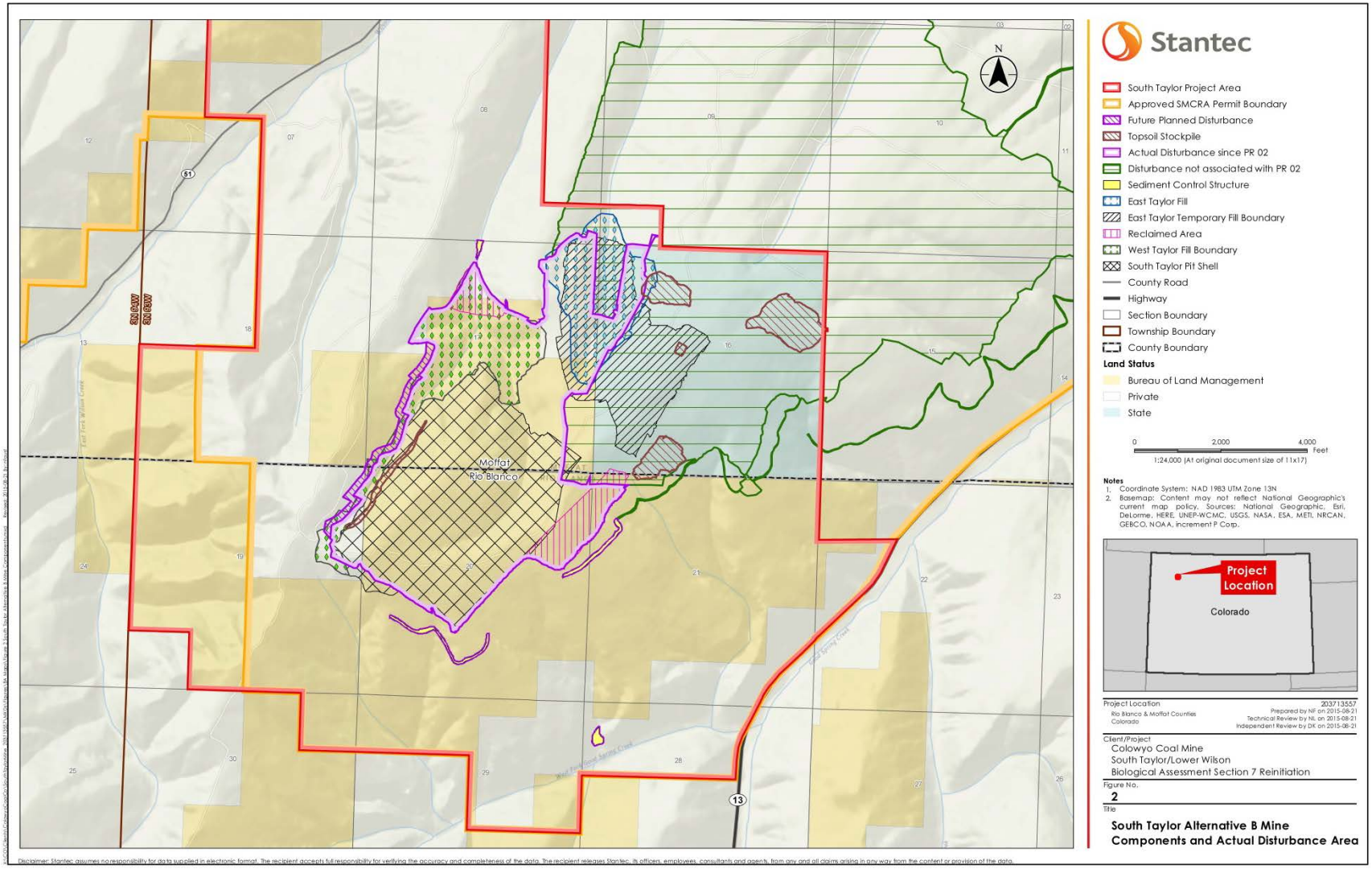
“Technical revision" means a minor change, including incidental permit boundary revisions, to the terms or requirements of a permit issued under these Rules, which change shall not cause a significant alteration in the operator's reclamation plan. The term includes, but is not limited to, increases in coal production, reduction or termination of approved environmental monitoring programs, or design changes for regulated structures or facilities.” (CDRMS 1980, revised 2005).

As a result of these changes, from 2008 to 2014, the South Taylor pit has produced approximately 10.3 million tons of coal at an average rate of 1.47 million tons per year (mtpy). From 2008 to 2014, there have been a total of 45 minor revisions and 34 technical revisions on PR-02.

2.2 South Taylor/Lower Wilson Permit Expansion (PR-02) as Currently Proposed

The revision process has resulted in a number of changes to the mining operations for the Project, the most significant being the overall reduction in the disturbance footprint from 1,562 to 1,250 acres. Of these, 441 acres of disturbance has occurred on previously disturbed area so the overall disturbance on undisturbed land is a total of 809 acres (**Figure 2**). This is a reduction of 312 acres of the total disturbance footprint between what was originally proposed and what has occurred and a reduction of 397 acres of disturbance on previously undisturbed land between the two. Along with the reduction in the acres disturbed, the revisions have resulted in the reduction of the total amount of coal to be mined and amount of coal produced each year. The amount of coal to be mined has been reduced to a total of 23 million tons with approximately 12.7 million tons remaining to be mined. However, reducing the amount of coal produced each year has extended the life of the South Taylor pit by approximately two years from the original estimated end date of 2017 to 2019. Under the South Taylor/Lower Wilson Permit Expansion as currently proposed, lease COC 012347601 in the Lower Wilson Area is not presently planned for any disturbance and was therefore not included in Colowyo’s permit application. As a result, no surface disturbance, mining or related operations have or are planned to occur on Federal lease COC 012347601, and it is not included in as part of this project as proposed.

Figure 2. South Taylor/Lower Wilson Project Components



The mining components that make up the Project include:

- One open pit, the South Taylor pit, to access the coal seams;
- Two permanent and two temporary spoil stockpile areas to store spoil material permanently and during mining for use in backfilling the open pit during reclamation;
- Dispersed facilities necessary to conduct mining operations including:
  - Temporary light use roads;
  - Temporary topsoil stockpile areas to store topsoil removed from disturbed areas for use in reclamation;
  - A 69 kilovolt (kV) power line and associated power poles within the area of mining operations to power the dragline and shovel;
  - Temporary berms;
  - Waterline and storage tank**;**
  - Parking lot, first aid building and a fuel island.
- Sediment ponds and diversion ditches.

For this BA, the Proposed Action will consist of the remaining life of the mine (i.e. 2015-2019 operations). Under the proposed action, nearly all ground-disturbing activities have occurred and all of the facilities have been constructed. All disturbance related to the actual mining of coal has already occurred (789 acres), however, approximately 20 acres of disturbance will occur during future reclamation activities in order to match the pit to the contour of the surrounding landscape.

2.3 Coal Combustion at the Craig Generating Station

Much of the coal produced at the Colowyo Mine (South Taylor and West pits) since 2008 has been sent to the Craig Generating Station in Craig, CO. The Craig Generating Station is a coal burning power plant that was constructed between 1974 and 1984 (Units 1, 2, and 3 were completed in 1980, 1979, and 1984 respectively). It generates approximately 1,303 megawatts at peak capacity.

Combustion of coal releases the following pollutants:

- Sulfur dioxide;
- Particulate matter;
- Nitrogen oxides;
- Mercury;
- Selenium; and
- Carbon dioxide.

Coal combustion occurring in an uncontrolled manner is inconsistent with current air quality regulations. The Craig Generating Station, along with all coal fired power plants, now have measures in place that reduce mercury and other emissions. Environmental control equipment at the station includes:

- Wet limestone scrubbers on Units 1& 2 to remove sulfur dioxide;
- Fabric filter "baghouse" on all Units to control particulate matter;
- Dry lime scrubber on Unit 3 to remove sulfur dioxide;
- Low nitrogen oxide burners with over fire air on all three Units;
- Mercury emission control on Unit 3. Units 1 and 2 do not require mercury controls as they qualify as low emitters under the MATS rule;
- Selective Catalytic Reduction (SCR) emission controls to be constructed on Units 1 and 2 for Nitrogen Oxide (NOx) reduction by 2021 and 2018, respectively. While not specific to mercury, the SCRs will provide the additional benefit of capturing some mercury before it is emitted. However, the amount captured is not known;
- Selective Non-Catalytic Reduction to be installed on Unit 3 for NOx reduction by 2018.

As mentioned in Section 1.0, potentially affected threatened and endangered species in the Project Area are the Colorado River fish species. Emissions of sulfur dioxide, nitrogen oxides, and particulates are not expected to affect these species. Consequently, this BA principally focuses on mercury and selenium emissions.

Coal produced at the Colowyo Mine has been sampled for heat content as well as mercury content. It generally has a heat content of 10,275 British thermal units per pound (btu/lb) and a mercury (Hg) emission factor of 2.31 lb/10^6 btu. Therefore, in an estimated 4 million tons of coal from Colowyo Mine, there is a total of 188 pounds (lbs) of mercury. In 5.1 million tons of coal, there is 240 lbs of mercury. As noted above, Craig Generating Station employs mercury emissions controls. In Unit 3 at the Craig Generating Station, there is an emission factor of 1.08 lb/10^9 btu after all processes and controls are included. This indicates that the environmental controls in place at Craig Generating Station remove a large amount of the potential mercury contained in the coal. Based on data from the Environmental Protection Agency (EPA), the Craig Generating Station has emitted between 130 and 30 lbs of mercury annually between 2007 and 2013 with 42.4 lbs emitted in 2013 (the last year data is available) (NAPD 2015). Between 2008 and 2009, the reported amount of mercury emitted dropped significantly due to a change in the method of calculation. Actual data from emissions testing has shown that the previously used EPA emission factors overestimated the amount of mercury emissions being reported.

Not all of the coal combusted at the Craig Generating Station comes from Colowyo or the South Taylor/Lower Wilson Project. Assuming a 4 mtpy maximum of coal combusted at the Craig Generating Station from Colowyo and with the latest emission factors at Craig Station, 36 lbs of mercury would be emitted annually from coal mined at Colowyo from the South Taylor/Lower Wilson Proposed Action. The EA in progress for the South Taylor/Lower Wilson Permit Expansion Project contains a detailed descriptions of how these emissions were calculated.

It is not clear that mercury emissions from the Craig Generating Station would be affected if the South Taylor/Lower Wilson Project did not go forward. Craig Generating Station can access other sources of

coal and has done so in the past. Therefore, the 36 lbs/year of emission estimated to occur should not be interpreted as estimates of a decline in emissions that would result if the South Taylor/Lower Wilson Project did not go forward. Nor should they be interpreted as net increases to regional coal combustion if the South Taylor/Lower Wilson Project proceed as proposed.

A mercury deposition network (MDN) monitoring site is located adjacent to the air quality study area (see **Section 6.1** and **Figure 8** for a definition of the air quality study area) in Routt County just east of Steamboat Springs. This site has provided data to the MDN since 2007. Based on mapped mercury deposition products from the MDN, the region within the regional air quality study area has seen little change in total annual average mercury wet deposition during the period from 2007 through 2013 (**Figures 4 and 5**). Wet deposition is defined as the process of atmospheric particles being deposited on the earth's surface through the scavenging of particulates by hydro-meteors, principally water vapor, water droplets and ice. Given that regional coal combustion is not likely to increase as a result of either proposed action, the total deposition would likely remain consistent with the mapped data from 2013. An interesting occurrence, however, shows that deposition monitoring values for total wet deposition at the Routt Monitoring Station increased approximately 2 micrograms per square meter ($\mu g/m^2$) from 7.8 $\mu g/m^2$ in 2008 to 9.8 $\mu g/m^2$ in 2013 even in the face of declining regional mercury emissions. The cause for increasing mercury wet deposition in the face of decreasing emissions from local sources is not known at this time. One explanation for this could possibly be the increasing amount of mercury emitted from other global or regional sources.

As shown in the **Figures 3** and **4**, mercury at the nearest MDN site had increased between 2008 and 2013 while the average rate in the region had remained relatively steady. This increase occurred during a period when additional controls were put into place at the regional generating stations (within the western United States) as part of the Mercury and Air Toxics Standards required by the Environmental Protection Agency in February 2012. Those controls were installed and came online at the Craig Generating Station in 2014/2015. No information is available on what controls are in place at the Hayden Station.

Apportioning the deposition of mercury based on emissions from multiple emissions sources is a complicated endeavor. Currently no regulatory structure exists for modeling the source apportionment of mercury emissions. Regional scale photochemical modeling that accounts for the simulated transport and dispersion of the atmosphere and the chemical interactions of pollutants in the atmosphere are required for such an effort. See **Section 6.1.5** for a proposal to conduct such modeling.

Figure 3. 2008 Total Wet Mercury Deposition Based on Mercury Deposition Network

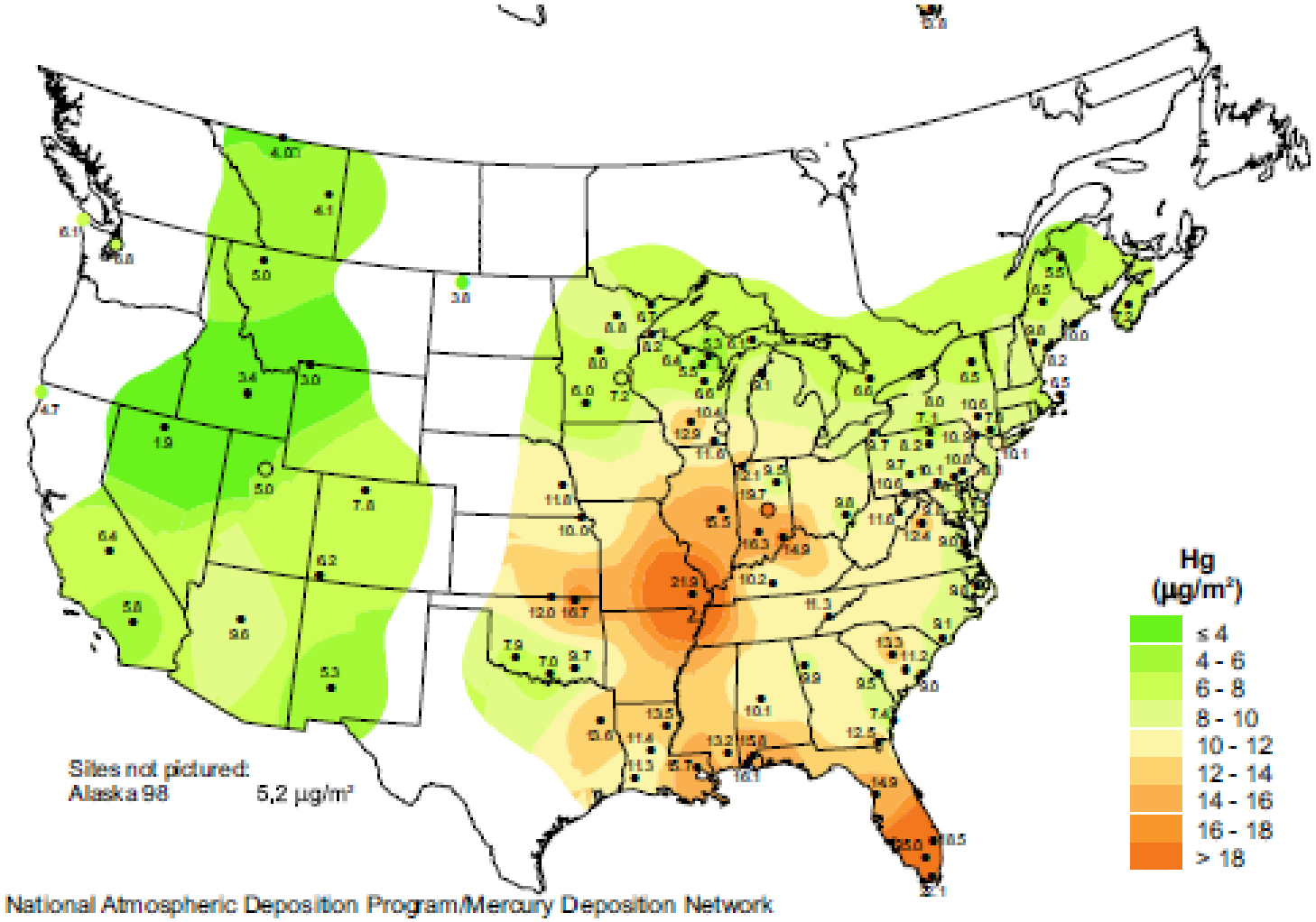
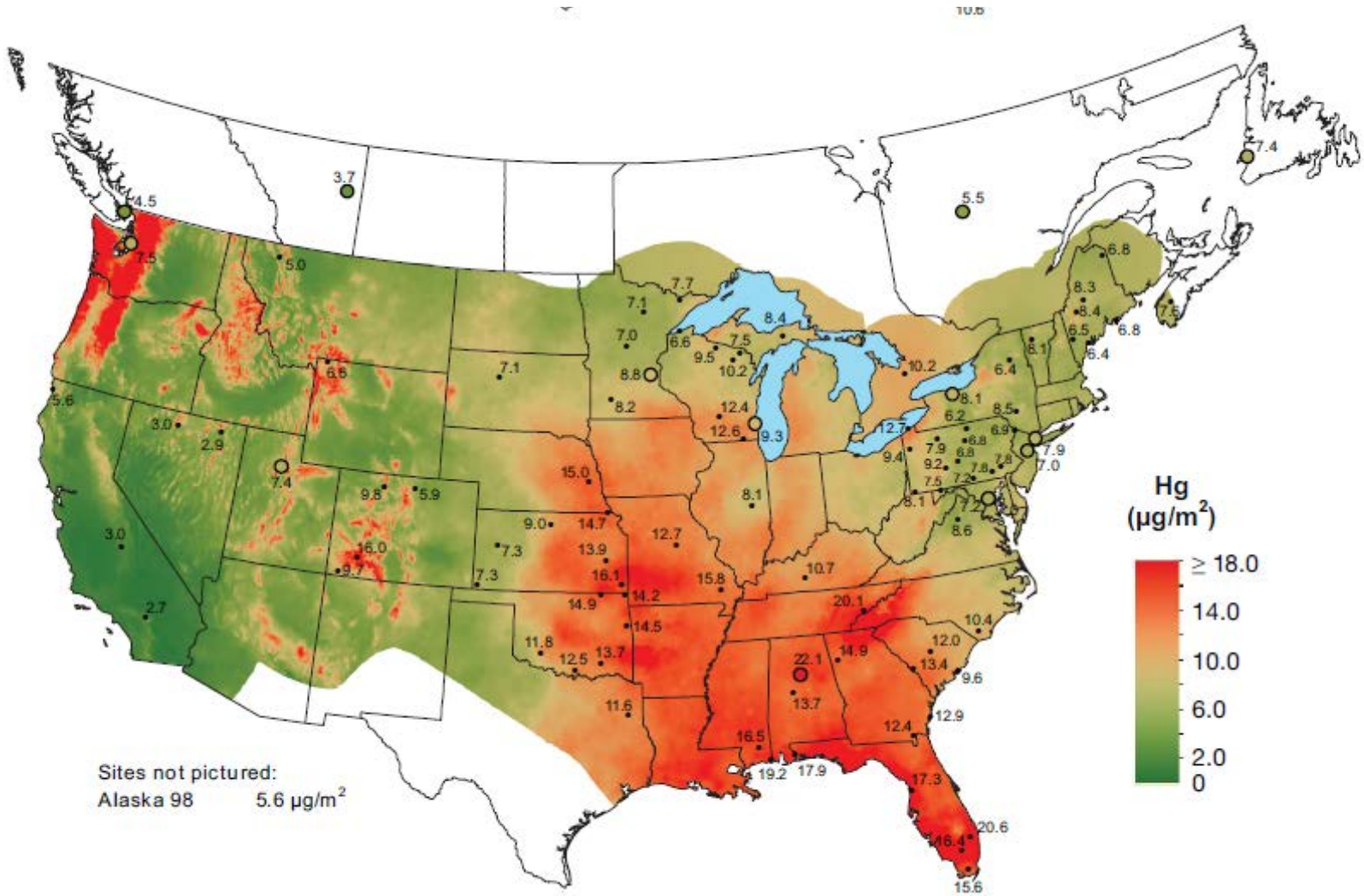


Figure 4. 2013 Total Wet Mercury Deposition Based on Mercury Deposition Network



In addition to mercury deposition from the combustion of coal, another element known to be emitted is selenium. Selenium, a trace element, is a natural component of coal and soils in the area. While it may be released during combustion, it is not monitored at coal combustion stations to the same degree as mercury. Therefore, no estimate as to the amount of selenium emitted annually and potentially deposited into the area is available. However, when the coal was last tested, it contained below 1 microgram of selenium per gram of coal (µg/g), which is the detection limit. It was last tested in March 2015.

3.0 Previous Consultation Species Determination

3.1 South Taylor/Lower Wilson Permit Expansion (PR-02)

In the BA submitted to USFWS on August 28, 2006, and in the BOs issued on November 6, 2006, and March 9, 2007, OSMRE determined, and USFWS concurred with the following effects determinations:

- No Effect for: black-footed ferret (*Mustela nigripes*), Mexican spotted owl (*Strix occidentalis lucida*), Dudley Bluffs bladderpod (*Lesquerella congesta*), Dudley Bluffs twinpod (*Physaria obcordata*), yellow-billed cuckoo (*Coccyzus americanus*), Graham beardtongue (*Penstemon grahamii*), and White River beardtongue (*Penstemon scariosus var. albifluvis*);
- May Affect, but is not Likely to Adversely Affect: bald eagle (*Haliaeetus leucocephalus*) and Canada lynx (*Lynx canadensis*);
- May Affect, Likely to Adversely Affect: Colorado pikeminnow, razorback sucker, bonytail chub, and humpback chub.

The determination of May Affect, Likely to Adversely Affect the four Colorado River fish species was made based on the water depletions to the Yampa River that were calculated as part of PR-02.

4.0 Description of the Permit Area

4.1 Description of the South Taylor/Lower Wilson Area as Originally Proposed

As described in the 2006 BA originally submitted for the South Taylor/Lower Wilson project:

> *The Colowyo surface coal mine is located in Moffat and Rio Blanco Counties, Colorado, approximately twenty-eight (28) miles south of the town of Craig, Colorado on Bureau of Land Management, State, and private lands. The elevation of the mining area is approximately 7,300 feet above sea level. The mining operations use a combination of dragline, truck shovel, and highwall miner mining methods. The average production rate is approximately 4.5 mtpy from eight coal seams of the Williams Fork Formation but could reach a maximum production rate of 9.0 mtpy.*
>
> *The Colowyo mine lies near the edge of the Yampa River drainage and within a few miles of the White River drainage to the south. The permit area is bounded by Good Spring Creek, to the east and*

Wilson Creek to the west, both perennial streams. Taylor Creek an ephemeral stream serves to drain the majority of the central the permit area. All of these drainages flow northeasterly into Milk Creek which flows into the Yampa River approximately nine (9) miles from the Colowyo mine. The topography at the Colowyo mine ranges from approximately 6,600 to 8,200 feet above sea level with approximately 28 percent of the disturbed area having slopes between 15 and 20 degrees and approximately 18 percent of PR-02 having slopes of 20 degrees or more. Valley and gulch slopes are frequently have 15 to 30 degree slopes or greater, but ridge tops are wide and are gently sloping.

Four main vegetation communities dominate the Colowyo mine. The sagebrush community is characterized by almost complete dominance of the overstory by big sage (Artemisia tridentata) and snowberry (Symphoricarpos oreophilus). The mountain shrub community is characterized by varying densities of serviceberry (Amelanchier alnifolia), Gambell's oak (Quercus gambelii), and chokecherry (Prunus virginiana). The juniper community is dominated by an open overstory of Utah juniper (Juniperus utahensis) rarely over fifteen feet tall, and is limited to bluffs along the lower portion of Taylor and Good Spring Creeks. The aspen woodland community is characterized by tall dense groves of aspen (Populus tremuloides) as the primary overstory with elements of the mountain shrub community as the secondary overstory. Within the permit area limited areas of a riparian community exists along Taylor and Good Spring Creeks. This community is characterized by a very limited overstory of isolated cottonwoods (Populus angustifolia) and boxelder trees (Acer negundo).

4.2 Description of South Taylor/Lower Wilson Area as Currently Proposed

The EA being developed for the South Taylor/Lower Wilson project (*in preparation*) describes the current Project Area as:

The Project Area is located approximately 22 miles (35.4 km) north of Meeker, Colorado in Moffat and Rio Blanco counties. Nearby Moffat and Rio Blanco County communities include Maybell, Hamilton, Craig, and Meeker.

The climate is semi-arid shrub steppe with a mean annual precipitation of approximately 14 to 16 inches per year. The growing season is approximately 90 days. Prevailing winds are westerly. Vegetative communities in this landscape include sagebrush-perennial grass, and other shrub/woodland types such as oak brush, snowberry, serviceberry, mountain mahogany (Cercocarpus ledifolius), pinyon-juniper, and aspen. Vegetation cover ranges between 35 and 75 percent. Scattered aspen groves grow at the higher elevations and scattered juniper trees occur in the Project Area. Riparian vegetation occurs along the fringes of both Good Spring and Taylor Creeks and their tributaries (OSMRE 2001).

The Project Area is located on the southern edge of the Yampa River Basin north of the Danforth Hills. The elevation ranges from approximately 8,660 feet above mean sea level (amsl) on the southern end of the Project Area to 6,620 feet on the north end. The area consists of gently sloping interfluvial ridges divided by deeply entrenched gulches and drainage valleys. Good Spring Creek to the east and Taylor Creek and Wilson Creek to the west are perennial streams. All of these drainages flow northeasterly to Milk Creek, a tributary of the Yampa River. Valley bottoms are generally

narrow with very steep sides. Valley and gulch slopes are frequently 30 to 60 percent grade or steeper, but ridgetops are wide and gently sloping.

5.0 Species Information

As described above, the effects determinations for the black-footed ferret, Mexican spotted owl, Dudley Bluffs bladderpod, Dudley Bluffs twinpod, White River beardtongue, bald eagle, and Canada lynx have not changed from the original BAs. Therefore, those species will not be discussed further. The bald eagle was delisted in 2007 although it remains protected under the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act. The Colorado River fish species, while previously analyzed, will be discussed in this BA in relation to potential effects from mercury and selenium from the combustion of coal, which was not addressed in previous BAs. The range and what constitutes potential habitat for Ute ladies'-tresses has expanded since completion of the last consultation for the South Taylor/Lower Wilson component. Therefore, the Ute ladies'-tresses will be addressed here as it was not covered in the 2006 BA. Finally, recent research indicates that mercury may be affecting the yellow-billed cuckoo. As mercury impacts to this species have not been previously addressed, those impacts will be addressed in this BA.

Information on the Colorado River fish species was taken primarily from the 2012 BA OSMRE prepared for the PR-03 mine expansion project (OSMRE 2012), the Final Programmatic Biological Opinion on the Management Plan for Endangered Fishes in the Yampa River Basin (USFWS 2005), and supplemented with the 2014 Sufficient Progress Report (USFWS 2014a). It should be noted that the Yampa River is considered a component of the larger Green River Basin. Information on the Ute ladies'-tresses was taken from the Rangewide Status Review of the Ute Ladies'-tresses (Fertig et al. 2005).

5.1 Humpback chub

5.1.1 Species Description

The humpback chub is a streamlined minnow with a concave skull and a prominent nuchal hump at the occiput, the back end of its head marked by a line separating scaleless and scaled portions of epidermis with a caudal peduncle, thin but not long snout that overhangs its upper lip and scales often minute or absent on keel. Adults are dark on top and light below and fins rarely have yellow-orange pigment near their base. Adults usually range from 12-16 inches long and weigh ¾ to 2 pounds.

5.1.2 Life History

Unlike Colorado pikeminnow and razorback sucker, which are known to make extended migrations of up to several hundred miles to spawning areas in the Yampa River, humpback chubs do not appear to make extensive migrations (Karp and Tyus 1990). Radio-telemetry and tagging studies on other humpback chub populations have revealed strong fidelity by adults for specific locations with little movement to areas outside of home canyon regions. Humpback chubs in Black Rocks (Valdez and Clemmer 1982), Westwater Canyon (Chart and Lentsch 1999a), and Desolation and Gray Canyons (Chart and Lentsch 1999b) do not migrate to spawn.

Generally, humpback chub show fidelity for canyon reaches and move very little (Miller et al. 1982a; Archer et al. 1985; Burdick and Kaeding 1985; Kaeding et al. 1990). Movements of adult humpback chub in Black Rocks on the Colorado River were essentially restricted to a 1-mile reach. These results were based on the recapture of Carlin-tagged fish and radiotelemetry studies conducted from 1979 to 1981 (Valdez et al. 1982) and 1983 to 1985 (Archer et al. 1985; USFWS 1986; Kaeding et al. 1990).

In the Green River and upper Colorado River, humpback chubs spawned in spring and summer as flows declined shortly after the spring peak (Valdez and Clemmer 1982; Valdez et al. 1982; Kaeding and Zimmerman 1983; Tyus and Karp 1989; Karp and Tyus 1990; Chart and Lentsch 1999a, 1999b). Similar spawning patterns were reported from Grand Canyon (Kaeding and Zimmerman 1983; Valdez and Ryel 1995, 1997). Little is known about spawning habitats and behavior of humpback chub. Although humpback chub are believed to broadcast eggs over mid-channel cobble and gravel bars, spawning in the wild has not been observed for this species. Gorman and Stone (1999) reported that ripe male humpback chubs in the Little Colorado River 37 aggregated in areas of complex habitat structure (i.e., matrix of large boulders and travertine masses combined with chutes, runs, and eddies, 0.5–2.0 m deep) and were associated with deposits of clean gravel.

5.1.3 Population Dynamics

Monitoring humpback chub populations is ongoing, and sampling protocols and reliability of population estimates are being assessed by the USFWS and cooperating entities. The demographic criteria of the Recovery Goals (USFWS 2002c) for downlisting the humpback chub to “threatened,” call for maintaining the six populations and at least one core population in both the Upper and Lower Colorado River Basins of >2,100 adults that are self-sustaining with recruitment.

Low numbers of humpback chub have been captured in Whirlpool Canyon and Split Mountain Canyon in Dinosaur National Monument; however, these fish were considered part of the Yampa River population in the Recovery Goals (USFWS 2002c), and not separate populations.

This species was listed as endangered by the USFWS in 1967 and given full protection under the ESA in 1973.

Downlisting and delisting criteria for this species has been identified as:

- Six self-sustaining fish populations reach the required numbers as identified in **Table 1** below;
- Essential habitats, including required stream flows and necessary water quality, are legally protected;
- Other identifiable threats that could significantly affect the population are removed.

Table 1. Downlisting and Delisting Criteria for the Humpback Chub

Downlisting	Delisting
Over a five year monitoring period: • Maintain the six populations ("no net loss"); • One core population in upper basin > 2,100 adults; • One core population in lower basin > 2,100.	For three years beyond downlisting: • Maintain the six populations ("no net loss"); • Two core populations in upper basin > 2,100 adults; • One core population in lower basin > 2,100 adults.

The humpback chub Recovery Goals (USFWS 2002c) provided the following preliminary population estimates for adults in the six populations:

- Black Rocks, Colorado River, Colorado-900–1,500;
- Westwater Canyon, Colorado River, Utah-2,000–5,000;
- Yampa Canyon, Yampa River, Colorado-400–600;
- Desolation/Gray Canyons, Green River, Utah-1,500;
- Cataract Canyon, Colorado River, Utah-500;
- Grand Canyon, Colorado River and Little Colorado River, Arizona-2,000–4,700.

5.1.4 Status and Distribution

Today, five self-sustaining populations of humpback chub occur in the Upper Colorado River Basin. Two to three thousand adults can occur in the Black Rocks and Westwater Canyon core population in the Colorado River near the Colorado/Utah border. Several hundred to more than 1,000 adults may occur in the Desolation/Gray Canyon core population in the Green River. Populations in Yampa and Cataract canyons are small, each consisting of up to a few hundred adults (Upper Colorado River Endangered Fish Recovery Program [UCREFRP] 2015). The Yampa Canyon population is the closest to Colowyo, approximately 27 miles northeast of the mine.

The population of humpback chub in the Yampa River was estimated to be 400 wild adults in 1998-2000. Subsequent sampling only caught 13 fish in the Yampa River which was too small to estimate population size. In 2007, 400 Gila spp. fish were brought into captivity as a research activity and approximately 15 percent were preliminarily identified as humpbacks. Subsequent genetic testing has shown that these individuals were in fact hybrids of humpback and roundtail chubs (*Gila robusta*). Currently, it is not known if there are any pure humpback chubs in the Yampa River. Researchers are taking fin clip samples from all suspected humpback chubs for genetic analysis (USFWS 2014a).

The largest known population of humpback chub is in the Lower Colorado River (LCR) Basin in the Grand Canyon -- primarily in the LCR and its confluence with the main stem of the Little Colorado River. In 2009, the U.S. Geological Survey announced that this population increased by about 50 percent from 2001 to 2008. The agency estimates that the number of adults is between 6,000 and 10,000, with the most likely number being 7,650 individuals (UCREFRP 2015).

During the 2011 status review of this species, the USFWS reported that 60 percent of the recovery objectives have been addressed to varying degrees. Remaining threats to be addressed include nonnative fish species and dealing with water contamination resulting from spills and pipelines (USFWS 2014a).

5.1.5 Critical Habitat

Critical habitat for this species was designated in 1994 and occurs in the portion of the Yampa River that is within the Dinosaur National Monument, approximately 51 miles west of Craig and 37 miles northwest of the Project Area (**Figure 5**).

5.1.6 Identified Threats

The primary threats to humpback chub are stream flow regulation and habitat modification; competition with and predation by nonnative fishes; parasitism; hybridization with other native Gila species; and pesticides and pollutants (USFWS 2002c). The existing habitat, altered by these threats, has been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering. The threats to humpback chub in relation to flow regulation and habitat modification, predation by nonnative fishes, and pesticides and pollutants are essentially the same threats identified for Colorado pikeminnow.

The humpback chub population in the Grand Canyon is threatened by predation from nonnative trout in the Colorado River below Glen Canyon Dam. This population is also threatened by the Asian tapeworm reported in humpback chub in the Little Colorado River (USFWS 2002c). No Asian tapeworms have been reported in the upper basin populations.

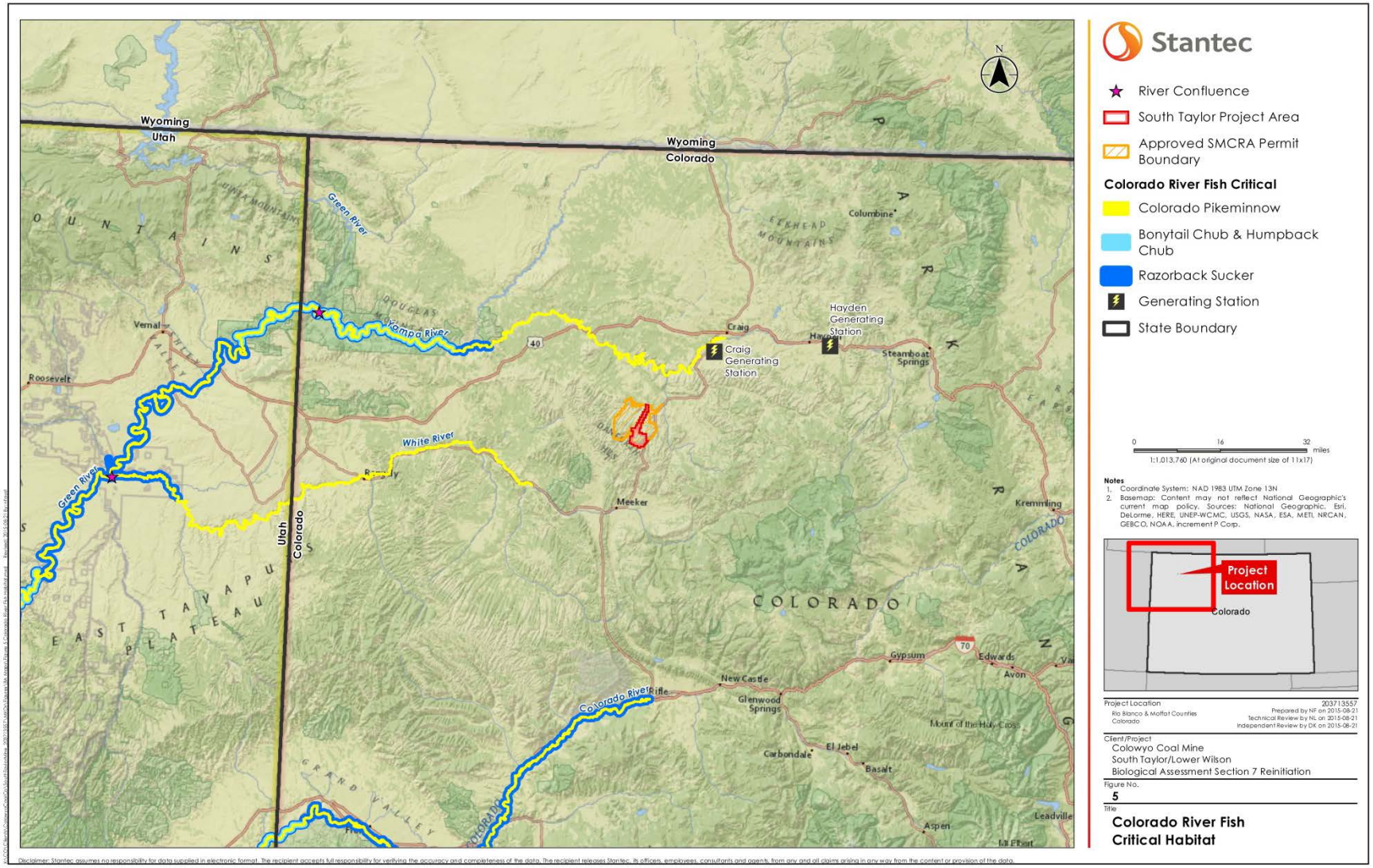
Hybridization with roundtail chub and bonytail chub, where they occur with humpback chub, is recognized as a threat to humpback chub. A larger proportion of roundtail chub have been found in Black Rocks and Westwater Canyon during low flow years (Kaeding et al. 1990; Chart and Lentsch 2000), which increase the chances for hybridization.

5.2 Colorado pikeminnow

5.2.1 Species Description

The Colorado pikeminnow is the largest cyprinid fish (minnow family) native to North America and evolved as the main predator in the Colorado River system. It is an elongated pike-like fish that during predevelopment times may have grown as large as 6 feet in length and weighed nearly 100 pounds (Behnke and Benson 1983). Today, Colorado pikeminnow rarely exceed 3 feet in length or weigh more than 18 pounds; such fish are estimated to be 45-55 years old (Osmundson et al. 1997). The mouth of this species is large and nearly horizontal with long slender pharyngeal teeth (located in the throat), adapted for grasping and holding prey. The diet of Colorado pikeminnow longer than 3 or 4 inches consists almost entirely of other fishes (Vanicek and Kramer 1969). Males become sexually mature earlier and at a smaller size than do females, though all are mature by about age 7 and 500 mm (20 inches) in length (Vanicek and Kramer 1969, Seethaler 1978, Hamman 1981). Adults are strongly countershaded with a dark, olive back, and a white belly. Young are silvery and usually have a dark, wedge-shaped spot at the base of the caudal fin.

Figure 5. Colorado River Fish Critical Habitat



5.2.2 Life History

The following excerpt from the Colorado pikeminnow recovery goals (USFWS 2002a) provides a summary of Colorado pikeminnow life history.

The Colorado pikeminnow is a long-distance migrator; adults move hundreds of miles to and from spawning areas, and require long sections of river with unimpeded passage. Adults require pools, deep runs, and eddy habitats maintained by high spring flows. These high spring flows maintain channel and habitat diversity, flush sediments from spawning areas, rejuvenate food production, form gravel and cobble deposits used for spawning, and rejuvenate backwater nursery habitats. Spawning occurs after spring runoff at water temperatures typically between 18 and 23 °C. After hatching and emerging from spawning substrate, larvae drift downstream to nursery backwaters that are restructured by high spring flows and maintained by relatively stable base flows. Flow recommendations have been developed that specifically consider flow-habitat relationships in habitats occupied by Colorado pikeminnow in the upper basin, and were designed to enhance habitat complexity and to restore and maintain ecological processes. The following is a description of observed habitat uses in the Upper Colorado River Basin.

Colorado pikeminnow live in warm-water reaches of the Colorado River mainstem and larger tributaries, and require uninterrupted stream passage for spawning migrations and dispersal of young. The species is adapted to a hydrologic cycle characterized by large spring peaks of snow-melt runoff and low, relatively stable base flows. High spring flows create and maintain in-channel habitats, and reconnect floodplain and riverine habitats, a phenomenon described as the spring flood-pulse (Junk et al. 1989; Johnson et al. 1995). Throughout most of the year, juvenile, subadult, and adult Colorado pikeminnow use relatively deep, low-velocity eddies, pools, and runs that occur in nearshore areas of main river channels (Tyus and McAda 1984; Valdez and Masslich 1989; Tyus 1990, 1991; Osmundson et al. 1995). In spring, however, Colorado pikeminnow adults use floodplain habitats, flooded tributary mouths, flooded side canyons, and eddies that are available only during high flows (Tyus 1990, 1991; Osmundson et al. 1995). Such environments may be particularly beneficial for Colorado pikeminnow because other riverine fishes gather in floodplain habitats to exploit food and temperature resources, and may serve as prey. Such low-velocity environments also may serve as resting areas for Colorado pikeminnow. River reaches of high habitat complexity appear to be preferred.

Because of their mobility and environmental tolerances, adult Colorado pikeminnow are more widely distributed than other life stages. Distribution patterns of adults are stable during most of the year (Tyus 1990, 1991; Irving and Modde 2000), but distribution of adults changes in late spring and early summer, when most mature fish migrate to spawning areas (Tyus and McAda 1984; Tyus 1985, 1990, 1991; Irving and Modde 2000). High spring flows provide an important cue to prepare adults for migration and also ensure that conditions at spawning areas are suitable for reproduction once adults arrive. Specifically, bankfull or much larger floods mobilize coarse sediment to build or reshape cobble bars, and they create side channels that Colorado pikeminnow sometimes use for spawning (Harvey et al. 1993).

Colorado pikeminnow spawning sites in the Green River subbasin have been well documented. The two principal locations are in Yampa Canyon on the lower Yampa River and in Gray Canyon on the lower Green River (Tyus 1990, 1991). These reaches are 42 and 72 km long, respectively, but most spawning is

believed to occur at one or two short segments within each of the two reaches. Another spawning area may occur in Desolation Canyon on the lower Green River (Irving and Modde 2000), but the location and importance of this area has not been verified. Although direct observation of Colorado pikeminnow spawning was not possible because of high turbidity, radiotelemetry indicated spawning occurred over cobble-bottomed riffles (Tyus 1990). High spring flows and subsequent post-peak summer flows are important for construction and maintenance of spawning substrates (Harvey et al. 1993).

5.2.3 Population Dynamics

Preliminary population estimates presented in the Recovery Goals (USFWS 2002a) for the three Colorado pikeminnow populations (Green River Subbasin, Upper Colorado River Subbasin, San Juan River Subbasin) ranged from 6,600 to 8,900 wild adults. These numbers provided a general indication of the total wild adult population size at the time the Recovery Goals were developed, however, it was also recognized that the accuracy of the estimates vary among populations. Monitoring of Colorado pikeminnow populations is ongoing, and sampling protocols and the reliability of the population estimates are being assessed by the USFWS and cooperating entities. A recent draft report on the status of Colorado pikeminnow in the Green River Basin (Bestgen et al. 2004) presented population estimates for adult (>450 mm total length (TL)) and recruit-sized (400 – 449 mm TL) Colorado pikeminnow. The USFWS recognizes that at this time, the report is draft and the analysis of the data is preliminary, however, the USFWS finds this is the best scientific information available regarding current population status in the Green River Basin. The draft report suggests that over the study period (2001 to 2003) there was a decline in abundance of Colorado pikeminnow in the Green River Basin from 3,338 (95 percent confidence interval, 2815 to 3861) animals in 2001 to 2,324 (95 percent confidence interval 1395 to 3252) animals in 2003. In the Yampa River estimates of adult abundance declined from 322 animals in 2000 to 250 animals in 2003. Adult abundance estimates in the White River declined from 1,115 animals in 2000 to 465 animals in 2003 and recruit-sized estimates declined from 44 animals in 2000 to zero in 2003. In the middle Green River (Yampa River confluence to Desolation Canyon) abundance estimates for adults ranged from 1,629 animals in 2000 to 747 animals in 2003 and estimates of abundance of recruit-sized fish ranged from 103 animals in 2000 to 50 animals in 2003. Estimates for the Desolation-Gray Canyon reach of the Green River ranged from 681 adults in 2001 to 585 adults in 2003 and recruit-sized estimates ranged from 162 animals in 2001 to 64 animals in 2003. In the lower Green River (Green River, Utah to the confluence of the Colorado River) abundance estimates were 366 adults in 2001 and 273 adults in 2003 and recruit-sized estimates ranged from 70 in 2001 to 104 in 2003. Studies indicate that significant recruitment of Colorado pikeminnow may not occur every year, but occurs in episodic intervals of several years (Osmundson and Burnham 1998).

The estimate of adult Colorado pikeminnow associated with the spawning site in Yampa Canyon in the lower 32 km of the Yampa River is approximately 1,400 fish. The estimate for the Three Fords spawning site in Gray Canyon in the lower Green River is approximately 1,000 adults (Crowl and Bouwes 1998). Because some Colorado pikeminnow from the Green River migrate into the Yampa River to spawn, the Colorado pikeminnow in the Yampa River are considered part of the Green River subbasin population.

5.2.4 Status and Distribution

Based on early fish collection records, archaeological finds, and other observations, the Colorado pikeminnow was once found throughout warmwater reaches of the entire Colorado River Basin down to the Gulf of California, and including reaches of the upper Colorado River and its major tributaries, the Green River and its major tributaries, and the Gila River system in Arizona (Seethaler 1978). Colorado pikeminnow apparently were never found in colder, headwater areas. The species was abundant in suitable habitat throughout the entire Colorado River Basin prior to the 1850s (Seethaler 1978). By the 1970s they were extirpated from the entire lower basin (downstream of Glen Canyon Dam) and portions of the upper basin as a result of major alterations to the riverine environment. Having lost some 75 to 80 percent of its former range due to habitat loss, the Colorado pikeminnow was federally listed as an endangered species in 1967 (Miller 1961, Moyle 1976, Tyus 1991, Osmundson and Burnham 1998); full protection under the Act of 1973, occurred on January 4, 1974.

Colorado pikeminnow are presently restricted to the Upper Colorado River Basin and inhabit warm water reaches of the Colorado, Green, and San Juan rivers and associated tributaries. The Colorado pikeminnow recovery goals (USFWS 2002a) identify occupied habitat of wild Colorado pikeminnow as follows: the Green River from Lodore Canyon to the confluence of the Colorado River; the Yampa River downstream of Craig, Colorado; the Little Snake River from its confluence with the Yampa River upstream into Wyoming; the White River downstream of Taylor Draw Dam; the lower 89 miles of the Price River; the lower Duchesne River; the upper Colorado River from Palisade, Colorado, to Lake Powell; the lower 34 miles of the Gunnison River; the lower mile of the Dolores River; and 150 miles of the San Juan River downstream 20 from Shiprock, New Mexico, to Lake Powell.

Population estimates of the Green River sub-basin (which includes the Yampa and White Rivers) have shown a decreasing trend between 2001 and 2002 followed by an increasing trend between 2006 and 2008. The latest population estimates are still being analyzed but seem to indicate a decline throughout the entire Green River sub-basin. This includes estimate made in the Yampa River were result from 2011 and 2012 indicate this portion of the population is low and may also be in decline (USFWS 2014a). The USFWS likened the persistent low densities of pikeminnow in the Yampa River to persistent high densities of nonnative predators (e.g. smallmouth bass and northern pike. To combat this, a program has been initiated to remove these species from the Yampa River (USFWS 2014a).

This species does not occur in streams within the Project Area. However, there are known populations of this species occurring in the Yampa River, approximately seven miles north of the Colowyo Mine and adjacent to the Craig Station.

To be considered for downlisting from endangered to threatened and for future delisting from the ESA, the Colorado pikeminnow mush meet the following conditions:

- Self-sustaining fish populations reach the required numbers in areas of the Green, Colorado and/or San Juan rivers as identified in **Table 2** below.

- The threat of significant "fragmentation" of the population has been removed. (Fragmentation refers to separation between fish populations caused by geographical distance or physical barriers).
- Essential habitats, including primary migration routes and required stream flows are legally protected.
- Other identified threats that could significantly affect the populations are removed.

Table 2. Downlisting and Delisting Criteria for the Colorado Pikeminnow

Downlisting	Delisting
Over a five year monitoring period: • Maintain the upper basin metapopualtion; • Maintain population in Green River and upper Colorado River subbasins ("no net loss"); • Upper Colorado River sub-basin population >700 adults; • Establish 1,000 age 5+ subadults in San Juan River.	For seven years beyond downlisting: • Maintain the upper basin metapopulations; • Maintain populations in Green River and upper Colorado River subbasins ("no net loss"); • Green River subbasin population > 2,600 adults; • Upper Colorado River subbasin population > 1,000 adults or Upper Colorado River subbasin population >700 adults and San Juan River population > 800 adults.

During a 5-year status review of this species in 2011, the USFWS determined that while a good portion of the recovery factor criteria were being addressed; nonnative species continue to be a problem for recovery. At the time, the USFWS also speculated that mercury may be posing a greater threat to this species than previously thought. However, they did note that mercury is a global pollutant and remediation for this factor was beyond the scope of the recovery program (USFWS 2014a).

5.2.5 Critical Habitat

Critical habitat for this species was designated in 1994 and occurs in portions of the Yampa River immediately west of Craig, CO (6.5 miles north of the Project Area) through the Utah border. Critical habitat also occurs approximately 20 miles southwest of the Colowyo Mine in the White River from Rio Blanco Lake (16 miles west of Meeker, CO) into Utah (**Figure 5**).

5.2.6 Identified Threats

The primary threats to Colorado pikeminnow are stream flow regulation and habitat modification; competition with and predation by nonnative fishes; and pesticides and pollutants (USFWS 2002a). The existing habitat, altered by these threats, has been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering.

In the Upper Basin, 435 miles of Colorado pikeminnow habitat has been lost by reservoir inundation from Flaming Forge Reservoir on the Green River, Lake Powell on the Colorado River, and Navajo Reservoir on the San Juan River. Cold water releases from these dams have eliminated suitable habitat

for native fishes, including Colorado pikeminnow, from river reaches downstream for approximately 50 miles below Flaming Gorge Dam and Navajo Dam. In addition to main stem dams, many dams and water diversion structures occur in and upstream from critical habitat that reduce flows and alter flow patterns, which adversely affect critical habitat. Diversion structures in critical habitat divert fish into canals and pipes where the fish are permanently lost to the river system. It is unknown how many endangered fish are lost in irrigation systems, but in some years, in some river reaches, majority of the river flow is diverted into unscreened canals. High spring flows maintain habitat diversity, flush sediments from spawning habitat, increase invertebrate food production, form gravel and cobble deposits important for spawning, and maintain backwater nursery habitats (McAda 2000; Muth et al. 2000). Peak spring flows in the Green River at Jensen, Utah, have decreased 13–35 percent and base flows have increased 10–140 percent due to regulation by Flaming Gorge Dam (Muth et al. 2000).

Predation and competition from nonnative fishes have been clearly implicated in the population reductions or elimination of native fishes in the Colorado River Basin (Dill 1944, Osmundson and Kaeding 1989, Behnke 1980, Joseph et al. 1977, Lanigan and Berry 1979, Minckley and Deacon 1968, Meffe 1985, Propst and Bestgen 1991, Rinne 1991). Data collected by Osmundson and Kaeding (1991) indicated that during low water years nonnative minnows capable of preying on or competing with larval endangered fishes greatly increased in numbers. More than 50 nonnative fish species were intentionally introduced in the Colorado River Basin prior to 1980 for sportfishing, forage fish, biological control and ornamental purposes (Minckley 1982, Tyus et al. 1982, Carlson and Muth 1989). Nonnative fishes compete with native fishes in several ways. The capacity of a particular area to support aquatic life is limited by physical habitat conditions. Increasing the number of species in an area usually results in a smaller population of most species. The size of each species population is controlled by the ability of each life stage to compete for space and food resources and to avoid predation. Some life stages of nonnative fishes appear to have a greater ability to compete for space and food and to avoid predation in the existing altered habitat than do some life stages of native fishes. Tyus and Saunders (1996) cite numerous examples of both indirect and direct evidence of predation on eggs and larvae by nonnative species.

Threats from pesticides and pollutants include accidental spills of petroleum products and hazardous materials; discharge of pollutants from uranium mill tailings; and high selenium concentration in the water and food chain (USFWS 2002a). Accidental spills of hazardous material into critical habitat can cause immediate mortality when lethal toxicity levels are exceeded. Pollutants from uranium mill tailings cause high levels of ammonia that exceed water quality standards. High selenium levels may adversely affect reproduction and recruitment (Hamilton and Wiedmeyer 1990; Stephens et al. 1992; Hamilton and Waddell 1994; Hamilton et al. 1996; Stephens and Waddell 1998; Osmundson et al. 2000a).

5.3 Bonytail chub

5.3.1 Species Description

Bonytail chub are medium-sized (less than 600 mm) fish in the minnow family. Adult bonytail chub are gray or olive colored on the back with silvery sides and a white belly. The adult bonytail chub has an

elongated body with a long, thin caudal peduncle. The head is small and compressed compared to the rest of the body. The mouth is slightly overhung by the snout and there is a smooth low hump behind the head that is not as pronounced as the hump on a humpback chub.

5.3.2 Life History

The bonytail chub is considered a species that is adapted to mainstem rivers, where it has been observed in pools and eddies (Vanicek 1967; Minckley 1973). Spawning of bonytail chub has never been observed in a river, but ripe fish were collected in Dinosaur National Monument during late June and early July suggesting that spawning occurred at water temperatures of about 18 °C (Vanicek and Kramer 1969). Similar to other closely related Gila species, bonytail chub probably spawn in rivers in spring over rocky substrates; spawning has been observed in reservoirs over rocky shoals and shorelines.

5.3.3 Population Dynamics

Bonytail chub are so rare that it is currently not possible to conduct population estimates. A stocking program is being implemented to reestablish populations in the upper Colorado River basin. This species would be considered eligible for downlisting and for removal from the ESA when all the following conditions are met:

- Self-sustaining fish populations reach the required numbers in areas of the Green and Upper Colorado River sub-basin and the Lower Colorado River Basin, and a genetic refuge is established in the Lower Basin as identified in **Table 3** below.
- Essential habitats, including required stream flows, are legally protected.
- Other identifiable threats that could significantly affect the population are removed.

Table 3. Downlisting and Delisting Criteria for the Bonytail Chub

Downlisting	Delisting
Over a five year period: • Maintain reestablished populations in Green River and upper Colorado River subbasins, each > 4,400 adults; • Maintain established genetic refuge of adults in lower basin; • Maintain two reestablished populations in lower basin, each > 4,400 adults.	For three years beyond delisting: • Maintain populations in Green River and upper Colorado River subbasins, each > 4,400 adults; • Maintain genetic refuge of adults in lower basin; • Maintain two populations in lower basin, each > 4,400 adults.

5.3.4 Status and Distribution

The bonytail chub is the rarest native fish in the Colorado River. Little is known about its specific habitat requirements or cause of decline, because the bonytail chub was extirpated from most of its historic range prior to extensive fishery surveys. It was listed as endangered on April 23, 1980. Currently, no documented self-sustaining populations exist in the wild. Formerly reported as widespread and abundant in mainstem rivers (Jordan and Evermann 1896), its populations have been greatly reduced. Remnant populations presently occur in the wild in low numbers in Lake Mohave and several fish have

been captured in Lake Powell and Lake Havasu (USFWS 2002d). The last known riverine area where bonytail chub were common was the Green River in Dinosaur National Monument, where Vanicek (1967) and Holden and Stalnaker (1970) collected 91 specimens during 1962-1966. From 1977 to 1983, no bonytail chub were collected from the Colorado or Gunnison rivers in Colorado or Utah (Wick et al. 1979, 1981; Valdez et al. 1982; Miller et al. 1984). However, in 1984, a single bonytail chub was collected from Black Rocks on the Colorado River (Kaeding et al. 1986). Several suspected bonytail chub were captured in Cataract Canyon in 1985-1987 (Valdez 1990).

Current stocking plans for bonytail chub identify the middle Green River and the Yampa River in Dinosaur National Monument as the highest priority for stocking in Colorado and the plan calls for 2,665 fish to be stocked per year over the next six years (Nesler et al. 2003). Since 1996, over 380,000 bonytail chub subadults have been stocked in the Green and upper Colorado River sub-basins. At first, very few individuals were recaptured and those that were, were in poor physical condition. However, since 2009, an increasing number of released bonytail chubs have been detected at several locations throughout the upper Colorado River Basin (USFWS 2014a).

The USFWS status review of the bonytail chub completed in 2012 reported that 72 percent of the recovery factor criteria have been addressed to varying degrees (USFWS 2014a).

5.3.5 Critical Habitat

Critical habitat for this species occurs in the portion of the Yampa River that occurs within Dinosaur National Monument, 37 miles from the Colowyo Mine and 51 miles from Craig Station, and is the same as the humpback chub (**Figure 5**).

5.3.6 Identified Threats

The primary threats to bonytail chub are stream flow regulation and habitat modification; competition with and predation by nonnative fishes; hybridization with other native Gila species; and pesticides and pollutants (USFWS 2002d). The existing habitat, altered by these threats, has 40 been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering. The threats to bonytail chub in relation to flow regulation and habitat modification, predation by nonnative fishes, and pesticides and pollutants are essentially the same threats identified for Colorado pikeminnow. Threats to bonytail chub in relation to hybridization are essentially the same threats identified for humpback chub.

5.4 Razorback sucker

5.4.1 Species Description

Like all suckers (family Catostomidae), meaning “down mouth”, the razorback sucker has a ventral mouth with thick lips covered with papillae and no scales on its head. In general, suckers are bottom browsers, sucking up or scraping off small invertebrates, algae, and organic matter with their fleshy, protrusible lips (Moyle 1976). The razorback sucker is the only sucker with an abrupt sharp-edged dorsal keel behind its head. The keel becomes more massive with age. The head and keel are dark, the back is olive-colored, the sides are brownish or reddish, and the abdomen is yellowish white (Sublette et al.

1990). Adults often exceed 3 kg (6 pounds) in weight and 600 mm (2 feet) in length. Like pikeminnow, razorback suckers are long-lived, living 40-plus years.

5.4.2 Life History

McAda and Wydoski (1980) and Tyus (1987) reported springtime aggregations of razorback suckers in off-channel habitats and tributaries; such aggregations are believed to be associated with reproductive activities. Tyus and Karp (1990) and Osmundson and Kaeding (1991) reported off-channel habitats to be much warmer than the mainstem river and that razorback suckers presumably moved to these areas for feeding, resting, sexual maturation, spawning, and other activities associated with their reproductive cycle. Prior to construction of large mainstem dams and the suppression of spring peak flows, low velocity, off-channel habitats (seasonally flooded bottomlands and shorelines) were commonly available throughout the Upper Basin (Tyus and Karp 1989; Osmundson and Kaeding 1991). Dams changed riverine ecosystems into lakes by impounding water, which eliminated these off-channel habitats in reservoirs. Reduction in spring peak flows eliminates or reduces the frequency of inundation of off-channel habitats. The absence of these seasonally flooded riverine habitats is believed to be a limiting factor in the successful recruitment of razorback suckers in their native environment (Tyus and Karp 1989; Osmundson and Kaeding 1991). Wydoski and Wick (1998) identified starvation of larval razorback suckers due to low zooplankton densities in the main channel and loss of floodplain habitats which provide adequate zooplankton densities for larval food as one of the most important factors limiting recruitment.

While razorback suckers have never been directly observed spawning in turbid riverine environments within the Upper Basin, captures of ripe specimens (in spawning condition), both males and females, have been recorded (Valdez et al. 1982a; McAda and Wydoski 1980; Tyus 1987; Osmundson and Kaeding 1989; Tyus and Karp 1989; Tyus and Karp 1990; Osmundson and Kaeding 1991; Platania 1990) in the Yampa, Green, Colorado, and San Juan rivers. Sexually mature razorback suckers are generally collected on the ascending limb of the hydrograph from mid-April through June and are associated with coarse gravel substrates (depending on the specific location).

Outside of the spawning season, adult razorback suckers occupy a variety of shoreline and main channel habitats including slow runs, shallow to deep pools, backwaters, eddies, and other relatively slow velocity areas associated with sand substrates (Tyus 1987; Tyus and Karp 1989; Osmundson and Kaeding 1989; Valdez and Masslich 1989; Osmundson and Kaeding 1991; Tyus and Karp 1990).

5.4.3 Population Dynamics

The largest concentration of razorback suckers in the Upper Basin exists in low-gradient flat-water reaches of the middle Green River between and including the lower few miles of the Duchesne River and the Yampa River (Tyus 1987; Tyus and Karp 1990; Muth 1995; Modde and Wick 1997; Muth et al. 2000). This area includes the greatest expanse of floodplain habitat in the Upper Colorado River Basin, between Pariette Draw at river mile (RM) 238 and the Escalante Ranch at RM 310 (Irving and Burdick 1995).

Lanigan and Tyus (1989) used a demographically closed model with capture-recapture data collected from 1980 to 1988 and estimated that the middle Green River population consisted of about 1,000

adults (mean, 948; 95 percent confidence interval, 758–1,138). Based on a demographically open model and capture-recapture data collected from 1980 to 1992, Modde et al. (1996) estimated the number of adults in the middle Green River population at about 500 fish (mean, 524; 95 percent confidence interval, 351–696). That population had a relatively constant length frequency distribution among years (most frequent modes were in the 505–515 mm-TL interval) and an estimated annual survival rate of 71 percent. Bestgen et al. (2002) estimated the current population of wild razorback sucker in the middle Green River to be about 100, based on data collected in 1998 and 1999.

There are no current population estimates of razorback sucker in the Yampa River due to low numbers captured in recent years.

5.4.4 Status and Distribution

The lower Yampa River provides adult habitat, spawning habitat, and potential nursery areas occur downstream in the Green River (USFWS 1998). Modde and Smith (1995) reported that adult razorback suckers were collected between RM 13 and RM 0.1 of the Yampa River. They also reported only one juvenile razorback sucker has been collected in the Yampa River. The single fish (389 mm) was collected at RM 39 in June 1994. The Green River from the confluence with the Yampa River to Sand Wash has the largest existing riverine population of razorback sucker (Lanigan and Tyus 1989, Modde et al. 1996). Razorback suckers are rarely found upstream as far as the confluence with the Little Snake River (McAda and Wydoski 1980 and Lanigan and Tyus 1989). Tyus and Karp (1990) located concentrations of ripe razorback suckers at the mouth of the Yampa River during the spring in 1987-1989. Ripe fish were captured in runs associated with bars of cobble, gravel, and sand substrates in water averaging 0.63 m deep and mean velocity of 0.74 m/s.

Razorback suckers are permanent residents of the Green River below its confluence with the Yampa River and are reliant on in-channel habitat for spawning and flooded off-channel habitats for several aspects of their life history. In turn, these habitats are created and maintained by the natural hydrology and sediment transport provided by the Yampa River.

Restocking of razorback suckers have been occurring in the Green and Colorado Rivers. Since 1995, over 334,000 subadult razorbacks have been stocked. Many of the recovered individuals from these basins have been recaptured in reproductive condition and often spawning in groups. While few larvae survive into their first year, some occasional captures of juveniles indicate that survival of early life stages is occurring. In 2011, researchers documented spawning by razorback suckers in the White River for the first time. Overall, while the estimates may be imprecise, they provide confirmation that stocked fish are surviving in the wild (USFWS 2014a).

The razorback sucker was listed as endangered under the ESA in 1991. Recovery goals for downlisting and eventually delisting this species has been set forth as (UCREFRP 2015):

- Self-sustaining fish populations reach the required numbers in areas of the Green River subbasin and either the Colorado River subbasin or San Juan Rivers, and the Lower Colorado River Basin, and a genetic refuge is maintained in Lake Mojave as identified in **Table 4** below;

- The threat of significant “fragmentation” of the population has been removed (Fragmentation refers to separation between fish populations caused by geographical distance or physical barriers);
- Essential habitat, including primary migration routes and required stream flows are legally protected;
- Other identifiable threats that could significantly affect the population are removed.

Table 4. Downlisting and Delisting Criteria for the Razorback Sucker

Downlisting	Delisting
Over a five year monitoring period: • Maintain reestablished populations in Green River subbasin and either in upper Colorado River subbasin or in San Juan River, each > 5,800 adults; • Maintain established genetic refuge of adults in Lake Mojave; • Maintain two reestablished populations in lower basin, each > 5,800 adults.	For three years beyond downlisting: • Maintain populations in Green River subbasin and either in upper Colorado River subbasin or in San Juan River, each > 5,800 adults; • Maintain genetic refuge of adults in Lake Mojave; • Maintain two populations in lower basin, each > 5,800 adults.

The USFWS status review of this species conducted in 2012 reported that 85 percent of the downlisting recovery factor criteria have been addressed to varying degrees. However, nonnative fish species continue to be problematic (USFWS 2014a).

5.4.5 Critical Habitat

Critical habitat for this species was designated in 1994 and includes portions of the Yampa River beginning approximately 8.5 miles upstream from Dinosaur National Monument (44 miles west of Craig and 30 miles northwest of the Project Area) and continuing into Utah (**Figure 5**).

5.4.6 Identified Threats

The primary threats to razorback sucker are stream flow regulation and habitat modification; competition with and predation by nonnative fishes; and pesticides and pollutants (USFWS 2002b). The existing habitat, altered by these threats, has been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering. The threats to razorback sucker are essentially the same threats identified for Colorado pikeminnow.

5.5 Ute ladies’-tresses

5.5.1 Species Description

The Ute ladies' -tresses orchid is a perennial, terrestrial orchid with stems 8 to 20 inches tall, arising from tuberous thickened roots. Its narrow 0.39 inch leaves can reach 11 inches long. Basal leaves are the longest and become reduced in size up the stem. The flowering stalk consists of numerous small white or ivory flowers clustered into a spike arrangement at the top of the stem. The species is characterized

by whitish, stout, ringent (gaping at the mouth) flowers. It blooms, generally, from late July through August.

5.5.2 Life History

Habitat for the Ute ladies'-tresses has expanded since the 1992 listing, which includes moist meadows associated with perennial stream terraces, floodplains, and oxbows at elevations between 4,300 to 6,850 feet; seasonally flooded river terraces, sub-irrigated or spring-fed abandoned stream channels and valleys, and lakeshores; and areas along irrigation canals, berms, levees, irrigated meadows, excavated gravel pits, roadside barrow pits, reservoirs, and other human-modified wetlands. Over one-third of all known Ute ladies'-tresses populations are found on alluvial banks, point bars, floodplains, or ox-bows associated with perennial streams.

5.5.3 Population Dynamics

In the January 1992 final listing rule, Ute ladies'-tresses was reported from 10 extant populations and 7 historical localities in Colorado, Utah, and Nevada (USFWS 1992). Since then, nearly 100 additional locations have been discovered or relocated in Colorado and Utah as well as Idaho, Montana, Nebraska, Washington, and Wyoming (Bjork 1997, Fertig 2000, Franklin 1993, Hartman and Nelson 1994, Hazlett 1996, Heidel 1996, 1998, Hildebrand 1998, Moseley 1997, 1998a, 2000, Murphy 2001a, Stone 1993). Many of these "element occurrences" (as recognized by state natural heritage programs) fall within the same drainage or are otherwise in close proximity. In 2004, Susan Spackman and Dave Anderson of the Colorado Natural Heritage Program developed standardized criteria for delineating S. diluvialis populations for the entire network of natural heritage programs. Under this system (NatureServe 2004), occurrences within 8.05 km (5 miles) in the same river or stream system are considered part of one natural, interbreeding metapopulation, as are upland meadow areas separated by less than 1.61 km (1 mile). Based on these new criteria, there are currently 61 Ute ladies'-tresses populations recognized rangewide, of which 52 are extant.

5.5.4 Status and Distribution

This species was listed as threatened in 1992. Recovery goals for the Ute ladies'-tresses that must be met for delisting include:

- Viable populations throughout its historic range and representative of its genetic endowment are maintained in riparian habitats of streams in a state of dynamic equilibrium;
- Wet meadow, seep and spring habitats are protected and managed so as to sustain viable populations.

Through 2004, there were an estimated 52 extant populations throughout its range totaling an estimated 85,316 number of plants. In Colorado through 2004, there were a total of 8 extant populations with an estimated 24,166 individuals. Colorado populations of Ute ladies'-tresses may be found within north-central and central Colorado and the upper Colorado River basin, particularly in the Uinta Basin as well as along the Front Range.

There are no known populations of this species occurring within or near the Colowyo Mine or the Craig Generating Station (CNHP 2015). The nearest known populations are located in northwestern Moffat County, approximately 65 miles from the Colowyo Mine. Populations have also been located in Garfield and Eagle Counties, approximately 65 miles southeast of the Colowyo Mine (**Figure 6**).

While there are some wetlands and other riparian areas within each of the two Project Areas, no areas of perennial streams rivers or lakeshore habitat exist where disturbance would occur. The mapped wetlands and riparian areas are generally small in size and not likely to support populations of this species. Recently, surveys were conducted approximately three miles south of Craig, CO for a water pipeline project and did not find any Ute ladies'-tresses (EDM 2014). Previous surveys in the two Project Areas similarly did not find any individuals (Colowyo 2007, 2011).

5.5.5 Critical Habitat

No critical habitat has been designated for this species.

5.5.6 Identified Threats

Threats to this species have been identified as the following in order of the greatest threats to the most populations to the least populations (Fertig et al 2005):

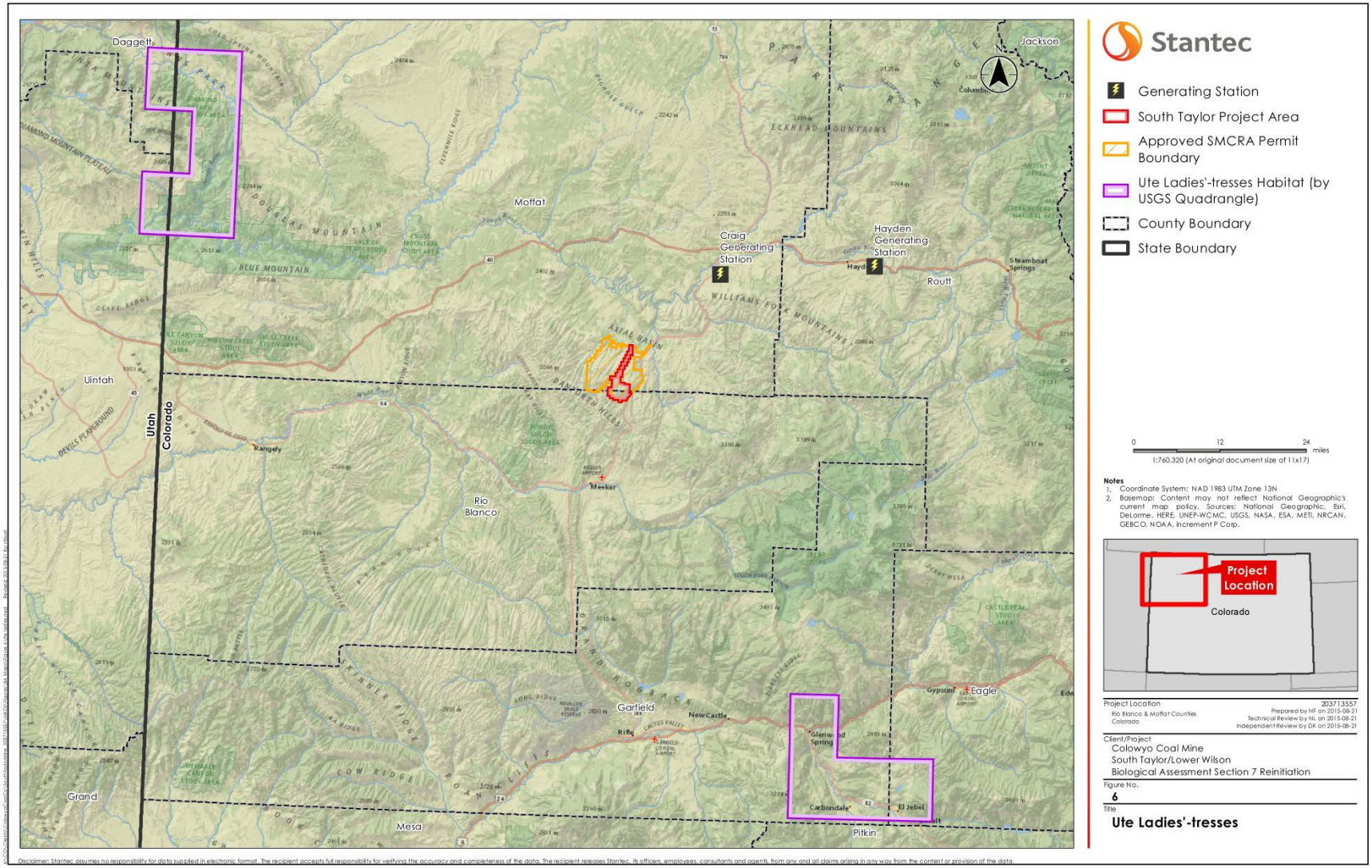
- Competition from invasive species;
- Vegetation succession;
- Road and other construction;
- Hydrology change;
- Grazing by livestock;
- Recreation;
- Urbanization;
- Flooding;
- Haying/mowing;
- Natural herbivory;
- Loss of pollinators;
- Drought.

5.6 Yellow-billed cuckoo

5.6.1 Species Description

The yellow-billed cuckoo is a member of the avian family Cuculidae and order Cuculiformes. The approximate 128 members of Cuculidae share the common feature of a zygodactyl foot, in which two toes point forwards and two toes point backwards. Most species have moderate to heavy bills, somewhat elongated bodies, a ring of colored bare skin around the eye, and loose plumage. Six species of Cuculidae breed in the U.S.; two of these species breed west of the Continental Divide - yellow-billed cuckoo and the greater roadrunner (USFWS 2011b).

Figure 6. Ute Ladies'-tresses Locations



The yellow-billed cuckoo is a medium-sized bird of about 12 inches (30 cm) in length, and weighing about 2 ounces (57 grams [g]). The species has a slender, long-tailed profile, with a fairly stout and slightly downcurved bill, which is blue-black with yellow on the basal half of the lower mandible. Plumage is grayish-brown above and white below, with rufous primary flight feathers. The tail feathers are boldly patterned with large white spots on a black background on the underside of the tail. The legs are short and bluish-gray, and adults have a narrow, yellow eye ring. Juveniles resemble adults, except the tail patterning is less distinct, and the lower bill may have little or no yellow. Males and females differ slightly. Males tend to have a slightly larger bill and the white in the tail tends to form oval spots, whereas in females the white spots tend to be connected and less distinct (USFWS 2011b).

5.6.2 Life History

Western cuckoos breed in large blocks of riparian habitats, particularly woodlands with cottonwoods (*Populus fremontii*) and willows (*Salix* spp.). Dense understory foliage appears to be an important factor in nest site selection, while cottonwood trees are an important foraging habitat in areas where the species has been studied in California. In the Lower Colorado River this species occupies riparian areas that have higher canopies, denser cover in the upper layers of the canopy, and sparser shrub layers when compared to unoccupied sites. Although this species is generally associated with breeding and nesting in large wooded riparian areas dominated by cottonwood trees, they have been documented nesting in salt cedar between Albuquerque and Elephant Butte Reservoir and along the Pecos River in southeastern New Mexico. At the landscape level, the amount of cottonwood-willow-dominated vegetation cover in the landscape and the width of riparian habitat appeared to influence cuckoo distribution and abundance.

Nesting sites are generally selected in locations near water. Clutch size is usually two or three eggs, and development of the young is very rapid, with a breeding cycle of 17 days from egg-laying to fledging of young. Although yellow-billed cuckoos usually raise their own young, they are facultative brood parasites, occasionally laying eggs in the nests of other yellow-billed cuckoos or of other bird species (USFWS 2011b). Currently it is not known if yellow-billed cuckoos show breeding site fidelity. In some instances, individuals in Arizona and California returned to the same sites in successive years. Conversely, dramatic fluctuations in breeding pair numbers at long-term study sites indicate that pairs of cuckoos will use different breeding areas (78 FR 61621).

Diet of this species consists of caterpillars, lepidopterans, and often supplemented with beetles, ants, and spiders. They also take advantage of the annual outbreaks of cicadas, katydids, and crickets, and will forage for small frogs and lizards. In summer and fall, cuckoos forage on small wild fruits, including: elderberries, blackberries, and wild grapes. In winter, fruit and seeds become a larger part of the diet.

5.6.3 Population Dynamics

Since 1980, statewide surveys from New Mexico, Arizona, and California indicate an overall estimated 52 percent decline with numbers too low to establish trends from Idaho, Montana, Utah, Nevada, and Colorado. Trend information is also lacking from west Texas and Mexico. Yellow-billed cuckoo has been extirpated as a breeding bird in Washington, Oregon, and British Columbia (USFWS 2011b). Comparisons of historic and current information suggest that the western yellow-billed cuckoo's range and

population numbers have declined substantially across much of the western U.S. over the past 50 years. Analysis of population trends is difficult because quantitative data, including historic population estimates, are generally lacking. However, rough extrapolations based on both observed densities of yellow-billed cuckoos and historic habitat distribution indicate that western populations were once substantial (Johnson et al. 2007).

Although the overall population size of this species remains large, western populations in many areas have decreased dramatically. Major declines among western populations in the 20th century are attributed to habitat loss and fragmentation. Although once considered a common nester in Arizona river bottoms, fewer than 50 pairs were estimated present in the state in the early 1990s. The greatest declines have been in California, from an estimated 15,000 pairs in the late 19th century to a few dozen pairs by the mid-1980s (New Mexico Partners in Flight 2014).

5.6.4 Status and Distribution

Yellow-billed cuckoo in the western U.S. was accorded candidate status in July 2001. On October 3, 2014, the Western U.S. Distinct Population Segment (DPS) of yellow-billed cuckoo was formally listed as a threatened species under the ESA (79 FR 59991). This designation applies to the western DPS that occurs in the following states: Washington, Oregon, California, Idaho, Nevada, Montana, Wyoming, Utah, Arizona, Colorado, New Mexico, and Texas (USFWS 2011b). The area for the western DPS of yellow-billed cuckoo is west of the crest of the Rocky Mountains. For the northern tier of Rocky Mountain states (Montana, Wyoming, northern and central Colorado), the crest coincides with the Continental Divide. In the southern tier of Colorado and New Mexico, the crest coincides with the eastern boundary of the upper Rio Grande drainage, including the Sangre de Cristo Mountains and excluding the drainage of the Pecos River. In west Texas, the DPS boundary is the line of mountain ranges that form a southeastern extension of the Rocky Mountains to the Big Bend area of west Texas, and that form the western boundary of the Pecos River drainage (USFWS 2011b).

Based on historic accounts, the species was widespread and locally common in California and Arizona, locally common in a few river reaches in New Mexico, locally common in Oregon and Washington, generally local and uncommon in scattered drainages of the arid and semiarid portions of western Colorado, western Wyoming, Idaho, Nevada, and Utah, and probably uncommon and local in British Columbia (USFWS 2011b).

In Colorado west of the Continental Divide, the species is now extremely rare (Kingery 1998). The yellow-billed cuckoo is an uncommon summer resident of Colorado. Within the species western DPS west of the Rocky Mountains, yellow-billed cuckoos were found along the Colorado River in Palisade, near Grand Junction (Mesa County) annually through the 1950s and 1960s (Righter et al. 2004). Cuckoos were also regularly detected as recently as the mid-1980s along the Uncompahgre and Gunnison Rivers near Delta (Delta County) (Rich Levad 2010). In 1998, the Colorado Breeding Atlas (1998) gave the general status of the yellow-billed cuckoo in Colorado as nearly extirpated in the West with once common eastern populations becoming uncommon to rare. During the 1987 to 1994 period covered by the Atlas, only three cuckoos were recorded on the western slope, with one confirmed nesting observation that occurred along the Yampa River near Hayden in 1988. Other confirmed nesting records

(mid-1980s) were associated with outbreaks of caterpillar infestations in box elders in the Four Corners Region/Durango area, although subsequent actions were taken to limit box elder infestations (Colyer 2001). National Park Service surveys in southwest Colorado from 1988 through 1995 for the Colorado Bird Breeding Atlas provided no records of yellow-billed cuckoo. In 1998, biologists surveyed 242 miles of lowland river riparian habitat along six rivers in west-central Colorado for cuckoos. They found one cuckoo, representing a probable nesting pair (Dexter 1998).

Since 2000, detections of the western yellow-billed cuckoo DPS have been limited in western Colorado. Consistent cuckoo observations have been recorded at only two locations in the range of the western DPS of the yellow-billed cuckoo in western Colorado. They have been detected annually in the San Luis Valley of south-central Colorado since 2001 in Conejos County; breeding is suspected, but not confirmed (Banks and Lucero 2004, Beason 2010a). Since 2003 they have also been detected annually at the North Fork of the Gunnison River valley of west-central Colorado in Delta County; breeding was confirmed in 2008 near Hotchkiss (Beason 2010b).

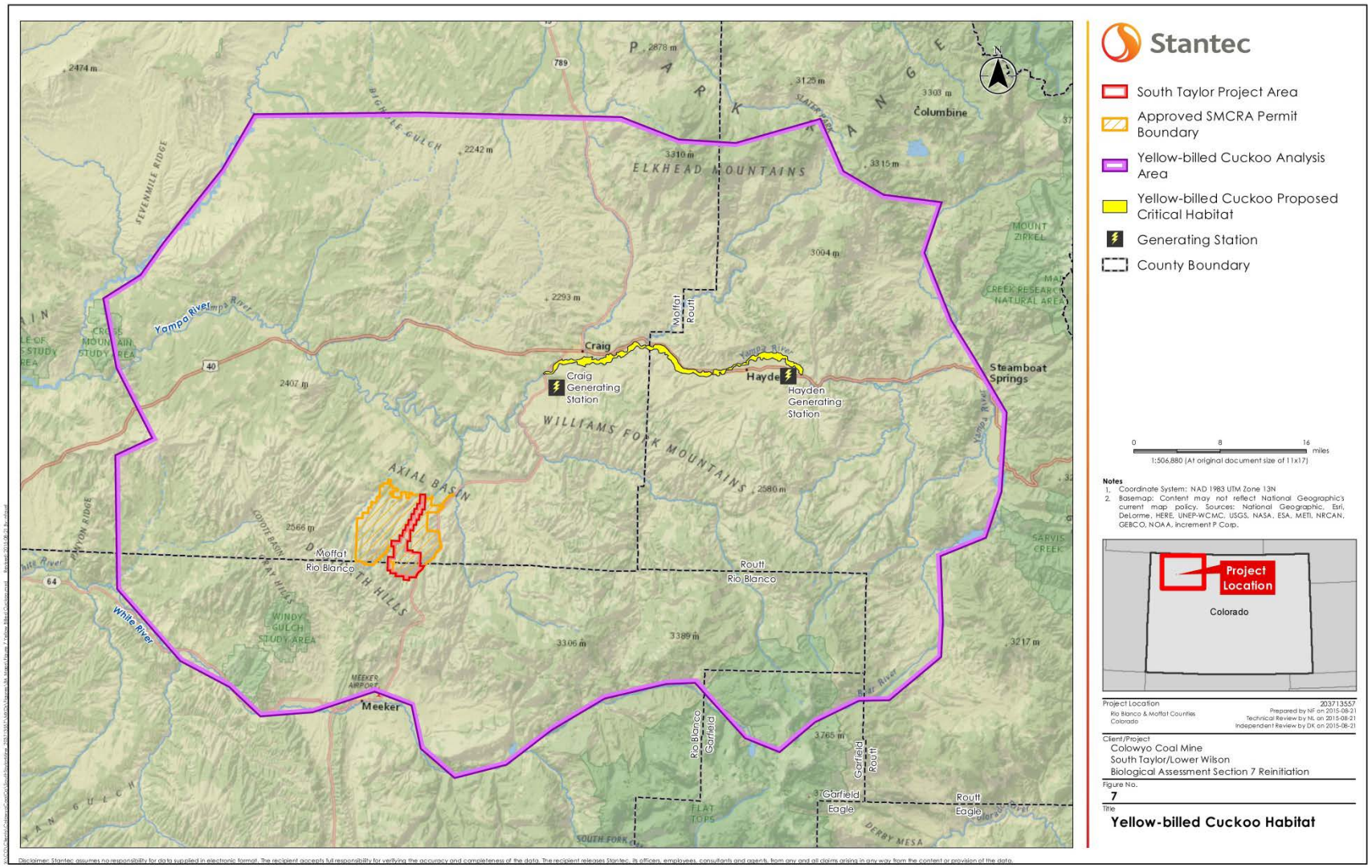
Reports of single yellow-billed cuckoos have come primarily from the Grand Junction area and Mesa County in 2001, 2002, 2005, and 2008, with a report of more than one cuckoo at Orchard Mesa Wildlife Area in 2006 (Arnold 2010; Beason 2010a; Wright 2010). More recently, cuckoos have been observed or heard by USFWS staff and include one along the Gunnison River in Grand Junction in 2013, one along the Colorado River in 2014, and one along the North Fork of the Gunnison River in 2015. It is unknown if these birds were nesting (C. Clayton USFWS pers. comm. August 4, 2015). Additional reports include a cuckoo south of Montrose in Montrose County near the Uncompahgre River in 2009, a cuckoo along the Gunnison River near Gunnison in 2007 (Hicks 2010), and detections by the Rocky Mountain Bird Observatory along the Yampa River near Craig in 2007 and 2008, and in far western Colorado near Nucla in 2005 and 2008 (Beason 2010a; Beason 2010b; Dexter 2010). The detections near Craig and Nucla in 2008 resulted from surveys completed by the Rocky Mountain Bird Observatory in five western Colorado counties. However, surveys repeated in two of the counties in 2009 failed to detect birds. Surveys by the Rocky Mountain Bird Observatory in 2010 were conducted near historical detections and at sites with suitable habitat in Archuleta, Conejos, Montezuma, and Rio Grande counties in south-central and southwest Colorado; no cuckoos were detected (Beason 2010b). Survey results to date are insufficient to determine population size or trend.

To date, the last known sighting of the cuckoo along the Yampa River occurred in 2008 and was within the proposed critical habitat. No information is available to indicate if the birds observed were nesting in the area or in the process of migration (C. Clayton, USFWS, pers. Comm. July 28, 2015).

5.6.5 Critical Habitat

Critical habitat for the yellow-billed cuckoo was proposed in 2014 and includes a portion of the riparian area around the Yampa River between Craig, CO and Hayden, CO (79 FR 48548). The critical habitat is located approximately 16 miles northeast of Colowyo Mine and 1.3 miles north of the Craig Generating Station (**Figure 7**).

Figure 7. Yellow-billed Cuckoo Critical Habitat



5.6.6 Identified Threats

Overall threats and factors affecting yellow-billed cuckoo can be grouped into five major categories (USFWS 2014b): present or threatened destruction, modification, or curtailment of habitat or range; overutilization for commercial, recreational, scientific, or educational purposes; disease or predation, inadequacy of existing regulatory mechanisms, and other natural or man-made factors.

Threatened destruction, modification, or curtailment of habitat or range identifies the following factors as threats: clearing and removal of riparian forest for agriculture, urban development, water diversion and impoundment, flood control, stream channelization and stabilization, livestock grazing, ORV use, recreational uses, and unquantified threats associated with migration and winter range stresses caused by a number of human related factors including insufficient stopover habitat as a direct result of tropical deforestation within the wintering and migration corridors. Under the overutilization category the following threats have been identified: commercial exploitation, recreational exploitation, scientific exploitation, and educational exploitation. Under the disease or predation category both West Nile Virus and predation are identified as contributing factors. Under the lack of regulatory mechanisms category the following regulations were identified as providing protection to the species: Migratory Bird Treaty Act, Federal Land Policy and Management Act, Federal Water Pollution Act of the Clean Water Act, National Environmental Policy Act, Federal Power Act, State regulatory mechanisms, and Canadian, Mexican, and other international laws. Under the other natural or man-made factors category the following factors were identified: small and widely separate habitat patches and pesticide use.

Currently, the primary threat to the yellow-billed cuckoo is the loss or degradation of riparian habitat (78 FR 61621).

6.0 Effects of the Proposed Action on Listed Species and Critical Habitats

Effects of the actions means the direct and indirect effects of an action on the species or designated critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by a proposed action and are later in time, but are still reasonably certain to occur. If a proposed action includes off-site measures to reduce or offset net adverse effects by improving habitat conditions and survival, the USFWS will evaluate the net combined effects of that proposed action and the off-site measures as interrelated actions.

Interrelated actions are those that are part of a larger action and depend on the larger action for the justification; ‘interdependent actions’ are those that have no independent utility apart from the action under consideration (50 CFR 402.02). Future federal actions that are not a direct effect of the action under consideration, and not included in the environmental baseline or treated as indirect effects, are not considered in this BA.

6.1 Colorado River Fish

As there is no designated habitat for the Colorado River fish in the Project Area, impacts from the Proposed Action would be limited to indirect impacts. The analysis area for the Colorado River fish is the topographic mercury deposition airshed and the area between the Yampa and White Rivers to their confluences with the Green River to the east (**Figure 8).** The topographic airshed encompasses the Project Area and Craig Generating Station and was delineated using topographic features. Defining the air quality region of impact through a topographic airshed methodology allows for an assessment that utilizes the theoretical motion of the atmosphere, the blocking features of local topography and the location of emissions sources. This method most accurately defines the region of impact and helps to limit the analysis to a region with the greatest opportunity for impacts.

This airshed was used in the development of the EA associated with the proposed action (Section 5.4.1.1 of the South Taylor/Lower Wilson EA). Meeker represents the southwest corner of the affected airshed. Heading northwest along Route 64, the western edge is defined by Sagebrush Draw, Elk Spring Ridge, and Cross Mountain. The northwest corner runs through Ninemile Basin just northwest of Godiva Rim. The boundary follows the Little Snake River northeast until approximately Shaffer's Draw. The northern boundary extends east across the Great Divide ridge, past Highway 13 and the Elkhead Mountains. Sand Mountain represents the northeast corner of the air boundary. It heads southeast to the town of Clark. The eastern edge is Steamboat Springs. Heading south through the town of Yampa and into Garfield County is the southeastern edge. Big Ridge and Oak Ridge back to Meeker encompasses the southern boundary (**Figure 8**).

6.1.1 Water Depletion

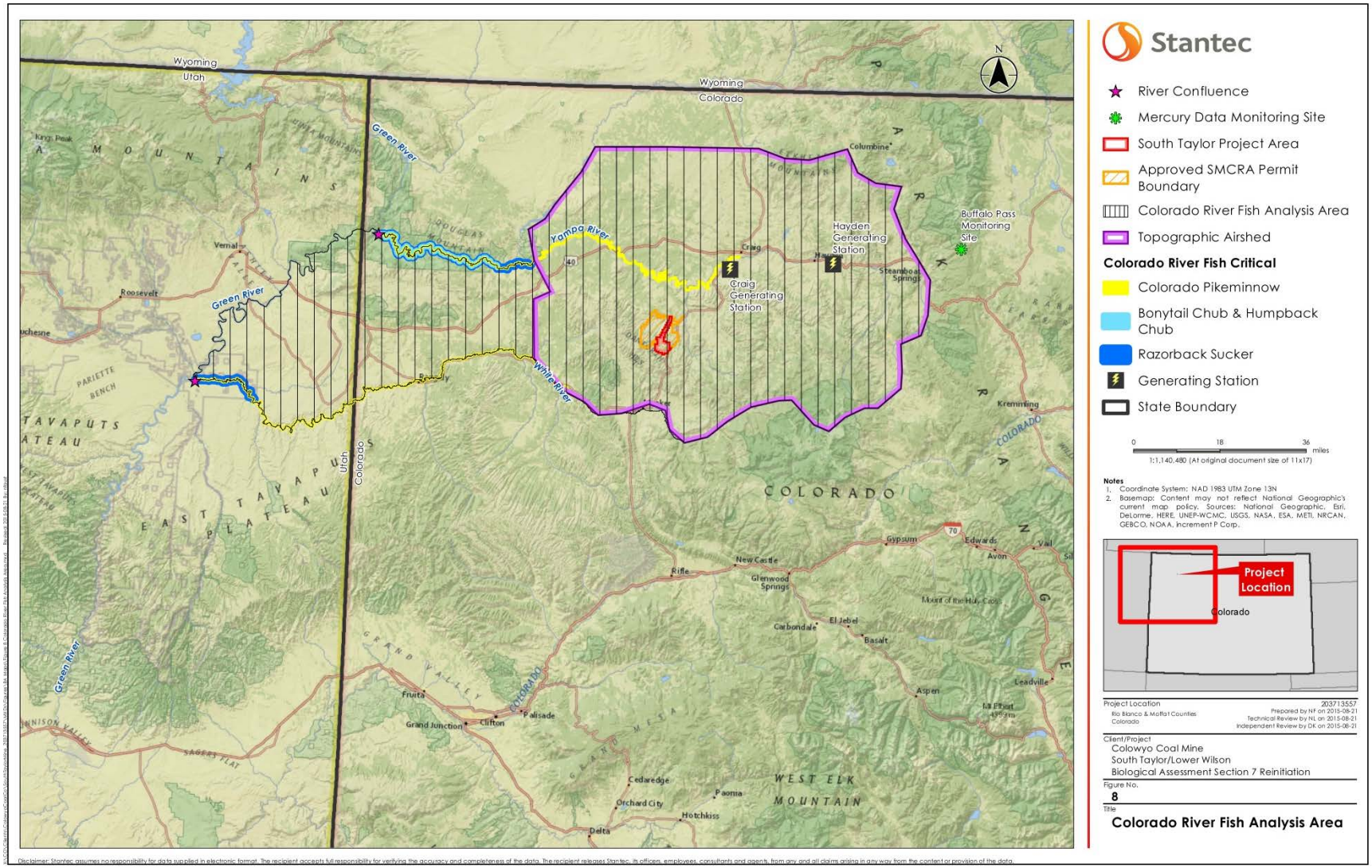
Impacts from water depletion resulting from operations at the South Taylor pit and associated activities were described in the 2006 BA and subsequent BOs. Those BOs are included in **Appendix A**.

6.1.2 Mercury

6.1.2.1 Mercury from Coal Combustion

Not analyzed previously are the potential impacts to the Colorado River federally listed fish species from the combustion of coal at the Craig Generating Station. The primary impact from coal combustion to the Colorado River fish is the emission and subsequent deposition of mercury. It should be noted that while the impacts of mercury on fish has been described in a few studies, the specific impacts to the Colorado River fish from mercury in the Yampa and White Rivers is highly uncertain. It is not known to what extent the level of mercury in these systems may be impacting these species on a population level. Additionally, given the longer life of the Colorado pikeminnow and their predatory nature, mercury would likely disproportionately affect this species more than the razorback sucker, bonytail chub, or humpback chub. This is due to the fact that pikeminnow would have a greater chance to bioaccumulate mercury longer and quicker than the other species because it is a top predator where the bonytail chub and humpback chubs are middle feeders and the razorback sucker is a bottom feeder.

Figure 8. Mercury Deposition Airshed and Colorado River Fish Analysis Area



Mercury is a naturally occurring element. It can be found in soils and the atmosphere, as well as water bodies. Atmospheric transport and deposition is an important mechanism for the global deposition of mercury (EPRI 2014), as it can be transported over large distances from its source regions and across continents. It is considered a global pollutant. Atmospheric mercury is primarily inorganic and is not biologically available. However, once this mercury is deposited to the earth, it can be converted into a biologically available form, methylmercury (MeHg), through a process known as methylation. MeHg bioaccumulates in food chains, and particularly in aquatic food chains, meaning that organisms exposed to MeHg in their food can build up concentrations that are many times higher than the ambient concentrations in the environment.

Inorganic atmospheric mercury occurs in three forms:

- Elemental mercury vapor (Hg(0)), also referred to as gaseous elemental mercury (GEM);
- Gaseous divalent mercury, Hg(II), also referred to as reactive gaseous mercury (RGM) or gaseous oxidized mercury;
- Particulate mercury, Hg(p), also referred to as particle bound mercury (PBM); PBM can be directly emitted or can form when RGM adsorbs on atmospheric particulate matter.

In the global atmosphere, Hg(0) accounts for more than 90 percent of total mercury, on average, while both RGM and PBM typically account for less than 5 percent (EPRI 2014). The reactive form of mercury is often deposited to land or water surfaces much closer to their sources due to its chemical reactivity and high water solubility. PBM is transported and deposited at intermediate distances depending on aerosol diameter or mass. Within the atmosphere, numerous physical and chemical transformations of mercury can occur depending on many factors.

The various forms of mercury have very different physical and chemical characteristics, resulting in large differences in their removal rates from the atmosphere, and consequently, in their atmospheric lifetimes (EPRI 2014). GEM has a lifetime of the order several months to more than a year because of its low reactivity, low water solubility, and slow deposition rate. Thus, it is considered a global pollutant since it is transported over long distances. On the other hand, the lifetimes of both RGM and PBM are much smaller, ranging from a few hours to days, because they are removed efficiently by dry and wet deposition, particularly RGM. Thus, mercury is a pollutant at all scales ranging from global to local.

Mercury is emitted by both natural and anthropogenic sources. Natural sources include volcanoes, geothermal sources, and exposed naturally mercury-enriched geological formations. These sources may also include re-emission of historically deposited mercury as a result of evasion from the surface back into the atmosphere, fires, meteorological conditions, as well as changes in land use and biomass burning. Anthropogenic sources of mercury include burning of fossil fuels, incinerators, mining activities, metal refining, and chemical production facilities.

Data from the Colorado Department of Public Health and Environment, Water Quality Control Division maintains a list of all waters in Colorado that exceed the total maximum daily loads for a variety of contaminants. Maintenance of this list is in accordance with Section 303(d) of the Federal Clean Water

Act. The Water Quality Control Division does not list the Yampa or White Rivers as impaired for mercury levels. It should be noted, however, that impairment under this program relates to human effects and not necessarily to impacts to aquatic species.

Aquatic systems receive mercury by direct deposition from the atmosphere and from overland transport from within the watershed (EPA 1997). Mercury primarily enters aquatic systems in an inorganic form where it can adsorb to suspended solids and settle to the bottom (EPA 1997). It can also be photo reduced in the upper few centimeters of the water's surface and then evade to the atmosphere. RGM at the sediment water boundary can be transformed into MeHg by sulfate-reducing bacteria, but this process can also go the other direction, depending on site-specific conditions. The most important areas for methylation are anoxic areas of the aquatic environment, such as wetlands or poorly mixed areas. The vast majority of mercury in fish tissue is in the form of MeHg (EPA 1997). Rates of methylation processes and bioaccumulation typically vary and depend on many factors.

The effects of mercury on fish are numerous. Lusk (2010) describes the potential affects as:

1. Potent neurotoxin:
    a. Affects the central nervous systems (reacts with brain enzymes, then lesions);
    b. Affects the hypothalamus and pituitary, affects gonadotropin-secreting cells;
    c. Altered behaviors: Reduced predator avoidance, reproduction timing failure;
    d. Reduced ability to feed (emaciation and growth effects).
2. Endocrine disruptor
    a. Suppressed reproduction hormones in male and female fish;
    b. Reduce gonad size and function, reduced gamete production;
    c. Altered ovarian morphology, delayed oocyte development;
    d. Reduced reproductive success;
    e. Transfer of dietary Hg of the maternal adult during oogenesis and into the developing embryo.
3. Inability to grow new brain cells or significantly reduce brain mercury.

Beckvar et al. (2005) suggested a threshold-effect level of ≤ 0.2 micrograms per gram (µg/g) wet weight (WW) mercury in whole body fish as being generally protective of juvenile and adult fish. The USFWS reported that 78 percent of the Colorado pikeminnow collected in Colorado had levels of mercury above the 0.2 µg/g level, including within the Yampa River Basin (Osmundson and Lusk 2012). Samples taken from pikeminnow in the Yampa River in 2006 had levels of mercury between 0.42 and 0.68 µg/g (CDPHE 2015). Osmundson and Lusk (2012) found a range of 0.39 to 0.58 µg/g with a mean level of 0.48 µg/g in Yampa River pikeminnow. The mercury levels reported above are lower than what was reported for pikeminnow that were captured in 1960s from the Yampa River (Lusk 2010). In that study, archived fish samples from museums were tested using similar methods as the pikeminnow captured recently and compared to what was reported by Osmundson and Lusk (2012). That information was presented to the San Juan Recovery Program and indicated that fish collected in 1960 had mercury levels of approximately 0.62 µg/g, approximately 0.10 µg/g higher than current levels. It should be noted that due to the limited number of fish in the Yampa River, sample sizes for these studies is generally low (less

than 10). Therefore, additional study is needed to be able to make an overall statement as to how mercury is currently affecting these species.

Within the White River, Osmundson and Lusk (2012) found that mercury concentrations in pikeminnow were some of the highest observed within occupied critical habitat. Mercury in pikeminnow have been reported at 0.31 to 0.96 µg/g by Krueger (1988). More recent studies have shown a mean concentration of 0.95 µg/g in White River pikeminnow with a range of 0.43 to 1.83 µg/g (Osmundson and Lusk 2012).

Combustion of coal mined at the Colowyo Mine at the Craig Generating Station would likely continue at current levels through the end of the life of the South Taylor pit. Therefore, assuming a constant rate of mining at the Colowyo Mine and combustion at the Craig Generating Station each year, approximately 36 lbs of mercury would be emitted annually through 2019 from the South Taylor Proposed Action (4 mtpy). This would result in a total of 162 lbs of mercury emitted from the Craig Generating Station as a result of the combustion of South Taylor coal over the next 4 years.

While mercury emission and subsequent deposition occurs at varying spatial scales e.g, globally, nationally and regionally, this BA evaluates the potential for mercury emitted from the combustion of Colowyo coal at the Craig Generating Station to impact the Colorado River Fish and their habitat. Within the region, two coal fired power plants exist, the Craig Generating Station and the Hayden Generating Station, located approximately four miles east of Hayden, Colorado and 21 miles east of the Craig Generating Station. In 2013, the last year data is available, the Craig and Hayden Generating Stations emitted 42.4 and 16.5 lbs of mercury, respectively for a total of total of 58.9 lbs. No current data or modeling is available to indicate how much of the mercury emitted by either the Craig Station or the Hayden station is deposited annually within the airshed used in this assessment. However, a recent BA conducted for the Four Corners Power Plant and Navajo Mine Energy Project (FCPP &NMEP) (OSMRE 2014) included detailed modeling on the emissions and deposition of mercury produced at the Four Corners Power Plant. In that modeling, it was determined that approximately 95 percent of all mercury emitted by the Four Corners Power Plant rises high enough into the atmosphere that prevailing wind currents will carry those out of the area analyzed in that BA. It is important to note that it is unknown if this modeling accurately reflects the conditions at the Craig Generating Station as environmental conditions at the two locations are very different.

As mentioned in **Section 2.3**, the MDN has a network of receptors that monitor levels of mercury. The nearest receptor to the Colowyo Mine is the Buffalo Pass-Summit Lake site east of Steamboat Springs, approximately 68 miles east of the Colowyo Mine and 45 miles east of the Craig Generating Station. These monitoring stations measure the levels of mercury that are deposited precipitation events (i.e. wet deposition). Data from this station in 2013 indicated that there was an annual deposition of 9.757 $\mu g/m^2$ of mercury at that location (NAPD 2015). There are no other monitoring sites within the airshed, consequently it would be speculative to accurately determine how much mercury is being deposited throughout the airshed or the spatial variability of the deposition on an annual basis. It should be noted that the MDN clearly indicates that deposition can vary spatially across regional airsheds.

Using the results of the emission and deposition modelling conducted at FCPP as a possible scenario, and assuming that the average annual deposition of 9.757 µg/m^2 of mercury is equally distributed throughout the Yampa and White River watersheds (a combined total of 34,362 km^2); an annual deposition of 335.27 kg of mercury is calculated. The entirety of the Colorado River Fish analysis area is within these two watersheds and is 10,514 km^2. Therefore, assuming an even distribution of mercury deposited, there would be a total of 102.59 kg of mercury deposited annually over the entire analysis area. However, if we use the results of the FCPP & NMEP model, only five percent of all the mercury deposited was determined to be emitted from regional sources and the other 95 percent comes from global or other distant sources, then the amount of mercury deposited annually that comes from the two local generating stations is 5.13 kg over the entire the analysis area. The assumption of an even deposition of mercury is not realistic as prevailing winds from the west to the east likely result in higher amounts of deposition occurring east of the two generating stations. However, barring further detailed modeling and analysis of mercury deposition, no other calculations are available at this time.

Using the latest estimates provided by the EPA, in 2013 the total mercury emitted by the two local generating stations was 58.9 lbs. Of that amount, coal from the Colowyo Mine accounted for 36 lbs, or 61.1 percent of the mercury emitted. Using the same ratio, of the 5.13 kg of annual mercury deposited associated with the two generating stations; 3.13 kg of mercury (five percent of deposition from local sources) annually would come from the Colowyo Mine coal that is combusted at the Craig Generating Station. The amount of mercury deposited annually will vary based on the chemical speciation of the mercury in the atmosphere as well as with climatic conditions and the amount of coal combusted at the two generating stations to meet regional electricity needs. Therefore, the amount of mercury annually deposited that may be attributable to coal from Colowyo is variable.

It is important to note that the calculations above are in reference to wet deposition of mercury. Some research has shown that dry deposition can be equal to or greater than wet deposition. Research has shown this rate to be anywhere from 0.8 to 4.8 times higher in the central and eastern United States. The rate of dry deposition is highly dependent on the meteorological conditions and the chemical speciation of the mercury. No information is available for dry deposition rates in the western United States where the project area occurs as this area of the country has different climatic conditions than in the eastern or central U.S. However, it reasonable to assume that the total amount of deposition of mercury from Colowyo coal combusted at the Craig Generating Station would be higher than the amounts listed above for wet deposition, although no estimate can be made.

In addition to impacts to individual Colorado River fish, impacts would also potentially occur to those species designated critical habitats in the region. As with any other listed species with designated critical habitat, the critical habitat for the four fish species all contain the primary constituent elements (PCEs) that are required to be present and are determined to be necessary for the survival and recovery of the species. All four species' critical habitat contains the following PCEs (50 CFR 13378):

1. Water: This includes a quantity of water of sufficient quality (i.e. temperature, dissolved oxygen, lack of contaminants, nutrients, turbidity, etc.) that is delivered to a specific location in

accordance with a hydrologic regime that is required for the particular life stage for each species;

2. Physical Habitat: This includes areas of the Colorado River system that are inhabited or potentially habitable by fish for use in spawning, nursery, feeding, and rearing, or corridors between these areas. In addition to river channels, these areas also include bottom lands, side channel, secondary channels, oxbows, backwaters, and other areas in the 100-year floodplain, which when inundated provide spawning, nursery, feeding and rearing habitats, or access to these habitats;
3. Biological Environment. Food supply, predation, and competition are important elements of the biological environment and are considered components of this constituent element. Food supply is a function of nutrient supply, productivity, and availability to each life stage of the species. Predation and competition, although considered normal components of this environment, are out of balance due to introduced nonnative fish species in many areas.

Mercury from the combustion of Colowyo coal at the Craig Generating Station that is deposited either directly or indirectly into the designated critical habitat for these species would have the potential to adversely impact the critical habitat. This would occur primarily by increasing the amount of contaminates present in those areas (PCE #1). It is difficult to quantify the level of this impact from the proposed action to critical habitats given the lack of information on where the mercury in the analysis area originates from. However, if it assumed that only five percent of the mercury generated at the local generating stations is deposited into the analysis area, the impact directly from the proposed action may be minor. However, when added to the other regional and global sources of mercury deposited into the area, the proposed action may result in cumulatively adverse impacts.

Of the amount of mercury annually deposited in the analysis area (as well as the larger Yampa and White River Basins), it is reasonable to assume that some portion would deposit directly or indirectly into the Yampa or White Rivers or its tributaries. Some of this mercury would be converted into methyl mercury and thereby has the potential to adversely affect the Colorado River fish. However, because of a lack of data or modelling it is not possible to quantify the amount of mercury that would enter the Yampa and White Rivers, or be converted to methyl mercury. Therefore, at this time it is not possible to accurately predict the impact to the Colorado River fish or their habitat.

Due to the uncertainties in how mercury is potentially affecting the Colorado River fish species, it is difficult to draw a conclusion to impacts from the proposed action as some of the data appears to be contradictory. In a recent study, pikeminnow populations in the Yampa River were reported to be declining but had low mercury concentrations compared to other river segments (Osmundson and Lusk 2012). It should be noted that mercury levels in the Yampa River were still above the: human consumption advisory level of 0.3 µg/g WW set by the EPA; toxicity threshold of 0.2 µg/g WW (Beckvar et al. 2005); and, the 0.1 µg/g WW for the protection of fish eating birds and mammals (Yeardley et al. 1989. Conversely, pikeminnow in the White River had high levels of mercury concentrations but the population was increasing (Osmundson and Lusk 2012). The increase in the pikeminnow population in the White River was attributed to upstream movement of juvenile pikeminnow that originated in downstream Green River reaches during 2006 and 2007 and not from reproduction occurring in the

White River itself (Bestgen et al. 2010). Further studies are required to determine how mercury is affecting species in the Yampa and White Rivers before a conclusion may be drawn between the proposed action and impacts to the Colorado River fish and their critical habitats.

6.1.2.2 Mercury from Mine Discharge

In addition to the potential for mercury to be deposited from coal combustion at the Craig Generating Station, mercury may also be released from water discharges directly from the mine. Water discharge is specifically managed under Colowyo Mine's National Pollutant Discharge Elimination System (NPDES) permit issued by the EPA. However, under NPDES, discharge water is not typically monitored for mercury levels. During the renewal process of the NPDES permit every five years, the EPA may require that a permit holder sample for mercury (or other contaminants not normally sampled for) if cause is shown (e.g. abnormally high levels shown from other sampling such as the CDRMS sampling discussed below). To date, Colowyo has not been required to do so.

The CDRMS, which issues the state mining permit, does not require that discharges from ponds be monitored for mercury. The mining permit does not set limits on the amount of mercury that can be discharged from the ponds. One discharge point with a constant flow drains into Taylor Creek from the West Taylor Pond; the flow is the result of drainage through an underdrain structure below the West Taylor fill, which is immediately upgradient of the pond. The other discharge locations (which are also below sediment ponds) do not exhibit flow under normal conditions. Assuming an even discharge throughout the day, the average flow from the West Taylor Pond discharge point is 0.039 cubic feet per second.

CDRMS does, however, require mercury analyses of samples from points on receiving waters upgradient and downgradient of the mine, when the permit is first written. The operator is required to develop a monitoring plan for receiving waters; this includes background data (before mining), upstream sample points, and downstream sample points, and the same is required for groundwater. Three surface water monitoring stations are in place downstream of potential discharge points from Colowyo Mine. Two of the locations are found in Good Spring Creek (sampling points Lower Good Spring Creek and New Upper Good Spring Creek), and the other is in Taylor Creek (sampling point Lower Taylor Creek). The fourth point is upstream of the mine in the West Fork of Good Spring Creek (sampling point Upper West Fork of Good Spring Creek). When CDRMS staff review annual hydrology reports that contain the data for receiving waters, they compare this data to CDPHE standards (Regulation 31, The Basic Standards and Methodologies for Surface Water). Prolonged or extreme exceedances of the mercury standard could result in the writing of a violation of the permit.

Samples collected at these locations and analyzed for mercury, according to EPA method 245.1, have reported mercury levels of 0.001 milligrams per liter (mg/L). This is also the state mandated detection level for mercury. All reported mercury levels at the four locations, above and below the mine, have been reported at this level since 2008, indicating that actual mercury levels are below this amount. Therefore, it is not possible to quantify the amount of mercury released from the mine that may be impacting the Colorado River fish downstream in the Yampa River. Using these data, it is not possible to determine whether or not there is some amount or no amount of mercury being released, and therefore

it could be stated that mine discharges may be contributing to the amount of mercury in the Yampa River at some amount less than 0.001 mg/L. It should be noted that all permitted discharge points flow into sediment ponds. Taylor Creek is an intermittent stream and therefore any mercury discharged into this waterbody may not reach the Yampa River. Impacts from mercury are discussed above.

6.1.3 Selenium

In addition to mercury, impacts to the Colorado River fish from increases in selenium from the combustion of coal at the Craig Generating Station could occur. Selenium, a trace element, is a natural component of coal and soils in the area and can be released to the environment by the irrigation of selenium-rich soils and the burning of coal in power plants with subsequent emissions to air and deposition to land and surface water. Contributions from anthropogenic sources have increased with the increases of world population, energy demand, and expansion of irrigated agriculture. Selenium, abundant in western soils, enters surface waters through erosion, leaching, and runoff. While required in the diet of fish at very low concentrations (0.1 µg/g) (Sharma and Singh 1984), it is unknown if selenium is adversely affecting endangered fish in the Yampa Basin. Excess dietary selenium causes elevated selenium concentrations to be deposited into developing eggs, particularly the yolk (Buhl and Hamilton 2000). If concentrations in the egg are sufficiently high, developing proteins and enzymes become dysfunctional or result in oxidative stress, conditions that may lead to embryo mortality, deformed embryos, or embryos that may be at higher risk for mortality.

Reporting limits for selenium in water is generally one microgram per liter (µg/L) while the EPA has set the maximum contaminant level goal of 0.05 mg/L (50 µg/L) for human consumption. During sampling of the Yampa River between 1997 and 1998, levels between less than one and 4.8 µg/L were found near Craig, between less than one and 4.9 µg/L near Maybell, and less than one and 3.6 µg/L near Deerlodge Park (USGS 2001). The peak reported levels for these sites all occurred in March, possibly during the beginning of the snow runoff. Concentrations were less than 1 µg/L during May through October. However, it should be noted that selenium in water may be less important than dietary exposure when determining the potential for chronic effects to a species (USFWS 2014b).

Of the four Colorado River fish species, selenium would disproportionately affect the razorback sucker more than the other three species. As with all sucker species, the razorback sucker is a bottom feeder and more likely to ingest selenium that has precipitated to the river bottoms.

While the reportable limit of selenium in water is 1 µg/L, the safe level of selenium for protection of fish and wildlife in water is considered to be below 2 µg/L and chronically toxic levels are considered to be greater than 2.7 µg/L (USFWS 2014b). Excess selenium in fish have been shown to have a wide range of adverse effects including mortality, reproductive impairment, effects on growth, and developmental and teratogenic effects including edema and finfold, craniofacial, and skeletal deformities.

Combustion of coal at the Craig Generating Station could result in some amount of selenium being emitted and subsequently deposited. However, as it is not monitored as it is emitted, unlike mercury, there is no information as to how much is released. When selenium is present in flue gas, it tends to behave much like sulfur and is removed to some extent via the Sulfur dioxide (SO_2) air scrubbers in place

and also absorbs onto alkaline fly ash that is subsequently removed by a fabric filter baghouse (EPRI 2008). Therefore, due to the lack of information available, it is unknown if selenium is impacting Colorado River fish species in the Yampa and White Rivers.

6.1.4 Future Atmospheric Deposition

In the future, mercury and selenium, which are globally transmitted pollutants, would continue to accumulate within the Yampa River and White River Basins whether or not the Craig Generating Station continued to operate and whether or not Colowyo continued to produce coal. A number of studies and international agreements related to future mercury emissions make future trends in global mercury emissions unclear. While concern exists that global mercury emissions will continue to increase over the next 25 years (with China being a particular concern), a recent United Nations report showed that global mercury emissions to the atmosphere were relatively stable between 1990 and 2005, with increased emissions in Asia offset by decreased emissions in Europe and North America (UNEP 2013a) during the same time period resulting a no net increase in global levels of mercury. However, some analysis supports a conclusion that increased mercury emissions since 2005 from China are now offsetting more recent reductions in North America and Europe (UNEP 2013a) resulting in an increase in global mercury levels. In late 2011, China released new national emissions standards to control SO_2, NOx, and particulate emissions, which should result in mercury emissions reduction if successfully implemented (CCICED 2011). On October 10, 2013, China joined 91 other countries in signing the Minamata Convention on Mercury, also known at the Global Mercury Treaty, which includes provisions for controlling mercury releases from large-scale industrial plants, including coal-fired power plants (UNEP 2013b).

6.1.5 Additional Conservation Measures

The following conservation measures would be implemented for the direct and indirect benefit of the Colorado River fish in the Yampa and White River basins. The measures were developed voluntarily but upon approval of this BA and subsequent BO, they will become mandatory commitments. The conservation measures are designed with the goal that they would contribute to the protection of these species. The intent of these measures developed by OSMRE and Colowyo is to improve the overall condition and knowledge base for the Colorado River fish species within the region. The following measures are not project specific mitigation or compensation per se, but part of a larger programmatic approach developed with the ultimate goal of downlisting and delisting these species.

6.1.5.1 Mercury Deposition Modeling

Due to the uncertainty of understanding where the mercury that is being deposited into the Yampa and White River Basins originates from, the Colowyo Mine and their parent organization Tri-State Generation and Transmission Association, Inc., have committed to funding a study to further develop the knowledge of source attribution for future decision making. The overall goal of this effort is to improve the amount of information available to researchers and policy makers regarding mercury in the Yampa and White River basins.

The Electric Research Policy Institute (EPRI) will conduct an air quality deposition modeling analysis to determine the sources of mercury being deposited in the Yampa and White River basins in northwest

Colorado. Mercury is a global pollutant and may undergo atmospheric transport over both short and very long (intercontinental) distances depending on its chemical form. The attribution of sources contributing to mercury deposition in the Yampa and White River Basins will be determined from modeling conducted at multiple geographic scales: global, regional and local. **Figures 9 & 10** below show the regional and local scales of the model. A global mercury model, GEOS-Chem, will be applied to provide concentrations of mercury in the United States due to distant sources. The Community Multi-scale Air Quality model and the Community Multi-scale Air Quality - Advanced Plume Treatment model will be used to simulate emissions and deposition at a finer scale. At the local level individual sources will be modeled to determine their contribution to loading in the analysis area. The atmospheric models keep track of which sources or source categories contribute to eventual deposition by "tagging" or labeling each unit of mercury by where it originated. Tags are carried along with the calculations for deposition so that the analysis of deposited mercury into the local analysis area can show how much and from which sources. Deposition receptors will be identified in the local scale modeling. For comparison, in the modeling EPRI did in the Four Corners region (the San Juan River Basin project), the local scale power plants contributed five percent or less of the atmospheric mercury deposition. The deposition modeling and source attribution analysis for the Yampa and White River basins will be conducted similar to the deposition modeling and source attribution analysis performed for the San Juan River Basin Project. The analysis will consider anthropogenic and natural sources of mercury deposition and will model the transport, chemical transformation and deposition of mercury under both wet and dry conditions. Colowyo Coal Mine will fund the deposition modeling analysis to an amount not to exceed $224,000.00. The modeling effort would be initiated no longer than 30 days after the approval of the mining permit and would be completed within 24 months of beginning.

Information gathered from this modeling effort will fill an obvious gap in the information available for the protection of the Colorado River fish species. Results of the study will also be used as part of the adaptive management process.

6.1.5.2 Species Preservation Funding

Colowyo would contribute $50,000 to the National Fish & Wildlife Foundation who would then distribute the money to the Endangered Fish Recovery Program's Upper Colorado River Fish Recovery Program. This measure would directly benefit the Colorado River fish species in the two rivers impacted by mining and combustion of coal mined at the Colowyo Mine. Funding would be provided within 30 days of receipt of the mining plan approval from OSMRE. The funds are to be directed toward the control of nonnative fish species in both the Yampa and White River's designated critical habitat for the Colorado Pike Minnow, or to support other recovery activities that directly benefit the endangered fish such as habitat improvement.

Figure 9. Regional Scale for the Proposed Modeling.

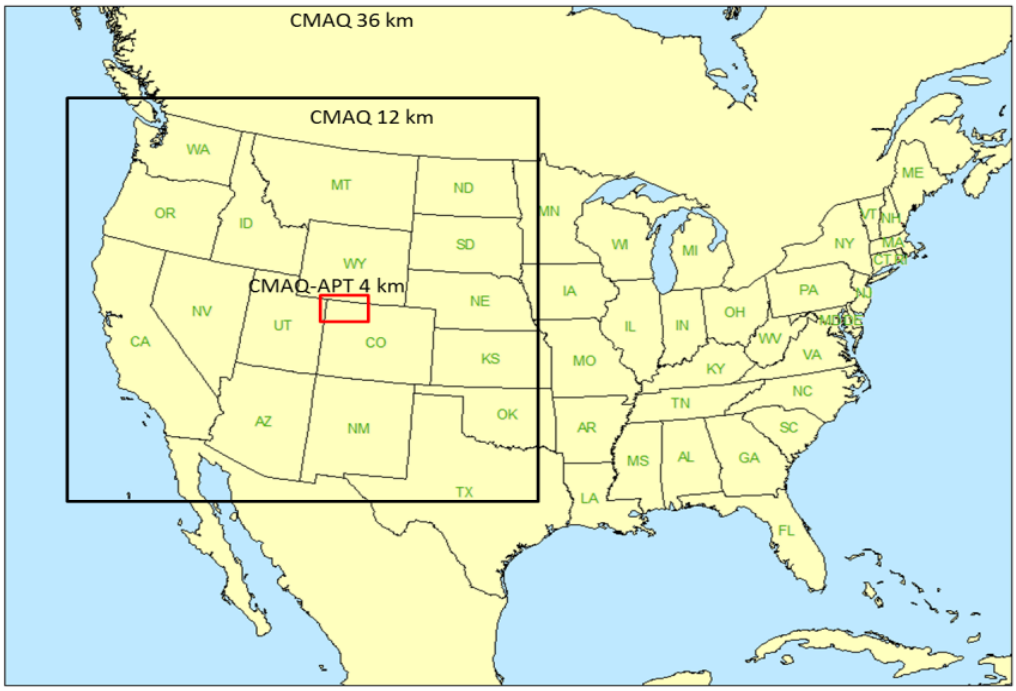
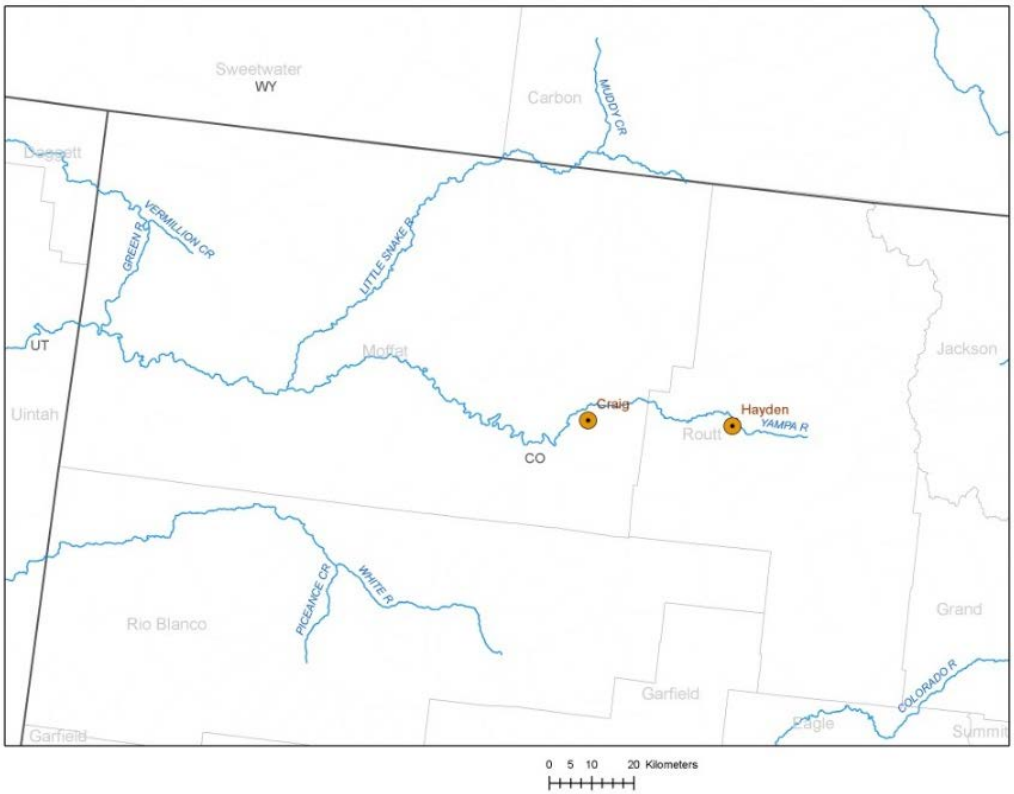


Figure 10. Local Scale for the Proposed Modeling.



6.2 Ute Ladies'-tresses

The analysis area for Ute ladies'-tresses for this BA is the South Taylor/Lower Wilson Project Area. Given the lack of habitat for this species within or near the Project Area (as described in Section 5.5), no impacts are likely to occur from continued mining at the South Taylor pit. Subsequent consultation with USFWS for Colowyo (i.e. PR-03) included the Ute ladies'-tresses and also made the determination that mining at Colowyo would have No Effect on this species.

6.3 Yellow-billed Cuckoo

The yellow-billed cuckoo may potentially be impacted by mercury in the environment. For the yellow-billed cuckoo, as with other riparian birds, mercury is accumulated through the ingestion of aerial insects emerging from benthic life stages in aquatic environments containing mercury or from associated predatory spiders (Cristol et al. 2008; Edmonds et al. 2012; Evers et al. 2012; Buckland-Nicks et al. 2014; Gann et al. 2014). Dietary total Hg concentrations associated with adverse effects to birds are generally greater than 0.1 mg/kg WW (DOI 1998). Once ingested, MeHg rapidly moves into the bird's central nervous system, resulting in behavioral and neuromotor disorders (Tan et al. 2009; Scheuhammer et al. 2007, 2012). The developing central nervous system in avian embryos is especially sensitive to this effect, and permanent brain lesions and spinal cord degeneration are common (DOI 1998, Young 1998; Bryan et al. 2003; Scheuhammer et al. 2007; Heinz et al. 2009). Therefore, adverse effects are described for the eggs, embryos, nestlings and/or fledglings associated with elevated Hg burdens in the female parent and due to foraging.

Uptake of mercury by birds has been shown to generally impact fish eating birds more severely than insectivorous birds (Zolfaghari et al. 2009, Boening 2000). Additionally, Howie (2010) found that the lateral extent of elevated mercury levels in birds and invertebrate prey species varied from approximately 250 to 650 meters from an affected water body. After this distance, mercury levels in the blood and feathers could not be distinguished from background levels, indicating that only those individuals that forage adjacent to affected water bodies show signs of bioaccumulation of mercury.

No information is available on the levels of mercury in the Yampa River invertebrates within the analysis area. However, it could be assumed that given the levels of mercury that currently exist in the Yampa River, that the aquatic invertebrates may contain elevated levels of mercury. However, the amount of mercury that may be present is dependent on the water temperature and hardness (Boening 2000). Any yellow-billed cuckoos present in the analysis area would be at risk for mercury contamination. However, that risk would be low considering that the primary food sources for the cuckoo are generally not aquatic. Therefore, the proposed action for the South Taylor/Lower Wilson project would have the potential to adversely affect this species. However, given the lack of sightings of this species within the analysis area since 2008, it is unknown how many individuals would have the potential to be affected. It is difficult to determine the level of impact given there is no threshold information for yellow-billed cuckoos and mercury as to what may be an acceptable amount of mercury in their systems without adverse symptoms manifesting. Information is also lacking on current, actual amounts of mercury in yellow-billed cuckoos that inhabit the analysis area. Given the low numbers of cuckoos that are thought to reside in the area, it would be difficult to obtain this data.

Given that the yellow-billed cuckoo may not return to the same breeding areas in successive years, it is possible that if any individuals were impacted by mercury in one year, they may travel to a new location in subsequent years that are not impacted by mercury generated from the Craig Generating Station. Similarly, as cuckoos are migrants, they would not be present in the analysis area year-round, further reducing the potential for mercury contamination.

In addition to impacts to individual yellow-billed cuckoos, the proposed critical habitat for this species may also be impacted by the proposed action. The USFWS has designated critical habitat for the western yellow billed cuckoo along the Yampa River in the analysis area that contain the following PCEs (79 FR 48554):

1. Riparian Woodlands: Riparian woodlands with mixed willow-cottonwood vegetation, mesquite-thorn-forest vegetation, or a combination of these that contain habitat for nesting and foraging in contiguous or nearly contiguous patches that are greater than 325 feet (100 meters) in width and 200 acres or more in extent.
2. Adequate Prey Base: Presence of a prey base consisting of large insect fauna (e.g. cicadas, caterpillars, katydids, grasshoppers, large beetles, dragonflies) and tree frogs for adults and young in breeding areas during the nesting season and in post-breeding dispersal areas.
3. Dynamic Riverine Processes: River systems that are dynamic and provide hydrologic processes that encourage sediment movement and deposits that allow seedling germination and promote plant growth, maintenance, health, and vigor.

The proposed action may have the potential to impact critical habitat through adverse impacts to the cuckoo's prey base. Different orders of invertebrates often react to mercury differently although in general insects in the larval stages are most susceptible to mercury. Levels of 1 to 10 µg/L normally cause acute toxicity for the most sensitive developmental stage of many different species of aquatic invertebrates (Boening 2000).

As stated above, the proposed action would result in some level of mercury deposition in the analysis areas. Some of this mercury may affect the invertebrates that make up the cuckoo's prey base, thereby affecting the proposed critical habitat (PCE #2). It should be noted, however, that aquatic insects and amphibians are not the primary food source for cuckoos. It is not known how much of the mercury deposited would be generated from Colowyo coal burned at the Craig Generating Station. The proposed modeling (**Section 6.1.5.1)** would aid in determining this. Therefore, it is not possible to determine the severity of this impact to the proposed critical habitat.

Mercury is not anticipated to affect the cottonwoods or other riparian vegetation that comprises the majority of habitat for this species as wood plants are generally insensitive to the harmful effects of mercury (Boening 2000).

6.3.1 Additional Conservation Measures

The conservation measure is designed with the goal that it would contribute to the protection of the yellow-billed cuckoo. The intent of the measure developed by OSMRE and Colowyo is to improve the knowledge base for the yellow-billed cuckoo within the region. The following measure is not project

specific mitigation or compensation per se, but part of a larger programmatic approach developed with the ultimate goal of delisting this species.

While critical habitat has been proposed, there is a lack of specific information as to how much of the proposed critical habitat represents actual, high quality breeding/nesting habitat and how much represents foraging habitat for the western yellow-billed cuckoo. Colowyo will fund an effort to delineate which portions of the proposed critical habitat along the Yampa River in the analysis area contain the key habitat suitability components for the cuckoo. Colowyo will have a habitat mapping methodology developed and implemented in coordination with the USFWS. The relevant scientific literature would be reviewed to determine the vegetation component, distance to water, and patch size requirements for the western yellow-billed cuckoo. Data to be used in this effort would come from existing data sets already developed and available including aerial imagery, Southwest Regional Gap Analysis habitat data, The Nature Conservatory, and CPW habitat suitability data, and any other currently available agency data. A ground-truth effort on publically accessible land would be conducted to facilitate the assessment of vertical integration of the mid-story vegetation layers that are difficult to detect remotely. The final product of this effort would include reporting on established methods, results, and GIS mapping of the proposed critical habitat into areas of "good," "moderate," and "unsuitable" habitat classifications. Colowyo will fund the above effort at a cost not to exceed $10,000.00. Every effort would be made to complete a preliminary map by June 15, 2016 to allow the information to be used in the 2016 field season. The final product would be completed no later than August 31, 2016. Field review does require foliage to be leafed out.

6.4 Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the Action Area. Future federal actions that are unrelated to the Proposed Action are not considered in the cumulative effects section because they would require separate consultation pursuant to Section 7 consultation under the ESA.

6.4.1 Colorado River Fish

Future water depletions from the Yampa River not related to a federal action would include increased irrigation for agricultural purposes should there be an increase in these activities. If populations increased in Moffat County as projected (CDLA 2015), there would also have the potential to draw water from the Yampa River as well. Increased populations would also have the potential to increase development and urbanization in the historic floodplain that can result in reduced peak flows because of the flooding threat. Development in the floodplain makes it more difficult to transport large quantities of water that would overbank and create low-velocity habitats that these species require for various life history stages.

Contamination from runoff (i.e. sewage treatment plants, feedlots, residential and agricultural development, and atmospheric deposition of contaminants) could affect water quality in the Yampa River. A decrease in water quality could adversely affect Colorado River fish and their critical habitat.

Increased recreational use (boating, fishing, off road vehicle use, and camping) in the Yampa River is expected to increase as the human population increases both in Colorado and in Moffat County (CDLA 2015). Potential effects include angling pressure, non-point source population, increased fire risk and harassment of native fishes.

Combustion of coal at the two regional generating stations will continue into the future. A portion of the coal that is combusted there may come from private coal reserves and therefore is not a federal action. While the amount of coal to be combusted is unknown, it would emit mercury and selenium which could result in cumulative impacts to the Colorado River fish species.

6.4.2 Ute Ladies'-tresses

As there are no known populations of Ute Ladies'-tresses within or near the analysis area, no cumulative effects to this species are anticipated to occur. As stated previously, the nearest known populations to Colowyo are approximately 65 miles away. The South Taylor/Lower Wilson Project is not likely to contribute to cumulative impacts to this species.

6.4.3 Yellow-billed Cuckoo

Increases in development in the historic floodplain would affect the cuckoo by potentially reducing peak flows because of the flooding threat. Development in the floodplain makes it more difficult, if not impossible, to transport large quantities of water that will overbank and create low velocity habitats and contribute to the riparian successional processes that create habitat for this species. As populations increase, more water may be drawn from the Yampa Rived by reducing river flows and decreasing available habitat for the cuckoo.

Contamination of the water from sources such as sewage treatment plants and runoff from developments could adversely affect the cuckoo. A decrease in water quality and gradual changes in floodplain vegetation could adversely affect the cuckoo, its prey base, and its habitat.

Combustion of coal at the two regional generating stations will continue into the future. A portion of the coal that is combusted there may come from private coal reserves and therefore is not a federal action. While the amount of coal to be combusted is unknown, it would emit mercury which could result in cumulative impacts to the cuckoo.

7.0 Conclusion

7.1 Colorado River Fish

The four fish that collectively make up the Colorado River fish species all occur within the Yampa River north of the Colowyo Mine and adjacent to and west of the Craig Generating Station and the White River to the southwest of Colowyo Mine. Continued combustion of coal mined at the Colowyo Mine at the Craig Generating Station would release both mercury and selenium into the environment. Of the amounts emitted annually, it can be reasonably assumed that some would deposit either directly or indirectly into the Yampa River and White River. However, as stated above, the amount that would

actually enter the river or be available for bioaccumulation in the fish species is not known without detailed modeling.

In the future, mercury and selenium, which are globally transmitted pollutants, would continue to accumulate within the Yampa and White River Basins regardless of whether or not mining continues at the Colowyo Mine or the Craig Generating Station continues to operate. It is currently unknown however, how much of the mercury that is deposited into the basins comes from the Craig Generating Station. The uncertainty of source attribution would be addressed through the implementation of the additional conservation measures listed in **Section 6.1.5**. The mercury deposition modeling analysis would further the knowledge base for future assessments and would assist in make informed decisions for other future actions.

Given the potential for the release of mercury from the combustion of coal produced at the Colowyo Mine and the subsequent deposition in the Yampa River, the South Taylor/Lower Wilson project **May Affect, Likely to Adversely Affect** the Colorado River Fish. Additionally, while potentially not significant alone, the deposition of mercury into critical habitat from the proposed action along with other regional and global sources of mercury may be affecting the PCEs for that critical habitat. Therefore, the proposed action **May Affect, Likely to Adversely Affect** the critical habitat for the four Colorado River fish species.

7.2 Ute Ladies'-tresses

Given the lack of suitable habitat within or near the Project Area and the distance to the nearest known population of this species, OSMRE determines that the Proposed Action would have **No Effect** on Ute ladies'-tresses.

7.3 Yellow-billed Cuckoo

While proposed critical habitat exists within the analysis area, there have been no confirmed sightings of the yellow-billed cuckoo in the analysis area since 2008. Additionally, it is not known if the previous sightings represented nesting pairs or migrants. As this species is a migrant that may not return to previous nesting locations in subsequent years, the potential to suffer adverse impacts from mercury would be less than non-migrant species. Therefore, OSMRE determines that the proposed action **May Affect, not Likely to Adversely Affect** yellow-billed cuckoos. Additionally, while mercury deposition may affect aquatic insects, these are not the primary prey item for yellow-billed cuckoos. Therefore, OSMRE determines that the proposed action **not likely to destroy or adversely modify** the proposed critical habitat for cuckoos.

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Appendix A.

Previous Biological Opinions

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
764 Horizon Drive, Building B
Grand Junction, Colorado 81506-3946

IN REPLY REFER TO:
ES/GJ-6-CO-04-F-012-YP016
TAILS 65413-2006-F-0178

07-03-20-03

March 9, 2007

Memorandum

To: Natural Resources Specialist, Office of Surface Mining, Reclamation and Enforcement, Denver, Colorado

From: Western Colorado Supervisor, Fish and Wildlife Service, Ecological Services, Grand Junction, Colorado

Subject: Final Biological Opinion for Colowyo Coal Company, L.P., Colowyo Mine Permit C-81-019, Revision 02

In accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.), and the Interagency Cooperation Regulations (50 CFR 402), the U.S. Fish and Wildlife Service (Service) transmits this correspondence to serve as the final biological opinion for Revision 02, to Permit C-81-019, proposed by Colowyo Coal Company, L.P., for the Colowyo surface coal mine in Moffat and Rio Blanco counties, Colorado. The mine is approximately 28 miles south of the town of Craig, Colorado on State, private, and lands managed by the Bureau of Land Management. The Colowyo Coal Company, L.P. estimates the current operations at the project result in a depletion of 527.48 acre-feet per year to the Yampa River, and that Permit Revision 02 will result in an additional annual depletion of 27.0 acre-feet due to the construction of 4 new sediment ponds – for a total net annual water depletion of 554.48 acre-feet. The applicant made a payment of $1270 in 1988 for a depletion of 127.43 acre-feet/year, and a payment of $29.90 in 1992 due to an additional depletion of 2.6 acre-feet; therefore, the new depletion is 554.48 minus 130.03 = 424.45 acre-feet. The new one-time payment was calculated by multiplying the project's average annual new depletion of 424.45 acre-feet by the Fiscal Year 2007 charge of $17.24 per acre-foot, which equals a total contribution of $7,317.52 for this project's share of the Recovery Program costs. In a letter received by the Service on February 20, 2007, Rio Tinto Energy America notified the Service that Colowyo Coal Company, L.P. has submitted a payment of $7,317.52 to the National Fish and Wildlife Foundation.

A Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin was initiated on January 22, 1988. The Recovery Program was intended to be the reasonable and prudent alternative for individual projects to avoid the likelihood of jeopardy to the endangered fishes from impacts of depletions to the Upper Colorado River Basin. In order to further define and clarify the process in the Recovery Program, a section 7 agreement was implemented on October 15, 1993, by the Recovery Program participants. Incorporated into this

agreement is a Recovery Implementation Program Recovery Action Plan (RIPRAP) which identifies actions currently believed to be required to recover the endangered fishes in the most expeditious manner.

On January 10, 2005, the Service issued a final programmatic biological opinion on the *Management Plan for Endangered Fishes in the Yampa River Basin* (this document is available for viewing at the following internet address: http://www.r6.fws.gov/crrip/yampaPBO.htm). The Service has determined that projects that fit under the umbrella of the Yampa River PBO would avoid the likelihood of jeopardy and/or adverse modification of critical habitat for depletion impacts. The Yampa River PBO states that in order for actions to fall within the umbrella of the PBO and rely on the RIPRAP to offset its depletion, the following criteria must be met.

1. A Recovery Agreement must be offered and signed prior to conclusion of section 7 consultation.

2. A fee to fund recovery actions will be submitted as described in the proposed action for new depletion projects greater than 100 acre-feet/year. The 2007 fee is $17.24 per acre-foot and is adjusted each year for inflation.

3. Reinitiation stipulations will be included in all individual consultations under the umbrella of this programmatic.

4. The Service and project proponents will request that discretionary Federal control be retained for all consultations under this programmatic.

The Recovery Agreement was signed by the Service and the Water User. In the letter received by the Service on February 20, 2007, Rio Tinto Energy America notified the Service that Colowyo Coal Company, L.P. has submitted a one-time contribution based on its share of the costs of the Recovery Implementation Program, to fund recovery actions specified in the Colorado River PBO. The Office of Surface Mining, Reclamation and Enforcement has agreed to condition its approval documents to retain jurisdiction should section 7 consultation need to be reinitiated. Therefore, the Service concludes that the subject project meets the criteria to rely on the RIPRAP to offset depletion impacts and is not likely to jeopardize the continued existence of the species and is not likely to destroy or adversely modify designated critical habitat.

REINITIATION NOTICE

This concludes formal consultation on the subject action. The Recovery Action Plan is an adaptive management plan because additional information, changing priorities, and the development of the States' entitlement may require modification of the Recovery Action Plan. Therefore, the Recovery Action Plan is reviewed annually and updated and changed when necessary and the required time frames include changes in timing approved by means of the normal procedures of the Recovery Program, as explained in the description of the proposed action. Every 2 years, for the life of the Recovery Program, the Service and Recovery Program will review implementation of the Recovery Action Plan actions that are included in this biological opinion to determine timely compliance with applicable schedules. As provided in 50 CFR section 402.16, reinitiation of formal consultation is required for new projects where

discretionary Federal Agency involvement or control over the action has been retained (or is authorized by law) and under the following conditions:

1. The amount or extent of take specified in the incidental take statement for this opinion is exceeded. The implementation of the Recovery actions contained in this opinion will further decrease the likelihood of take caused by water depletion impacts.

2. New information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion. In preparing this opinion, the Service describes the positive and negative effects of the action it anticipates and considered in the section of the opinion entitled "EFFECTS OF THE ACTION." New information would include, but is not limited to, not achieving one or more response criteria that will be developed as part of the terms and conditions to minimize incidental take. The Service retains the authority to determine whether a significant decline in population has occurred, but will consult with the Recovery Program's Biology Committee prior to making its determination. In the event that one or more population criteria have not been achieved, the Service is to first rely on the Recovery Program to take timely actions to correct the deficiency.

3. The section 7 regulations (50 CFR 402.16 (c)) state that reinitiation of consultation is required if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion. It would be considered a change in the action subject to consultation if the Recovery Action Plan items listed as part of the proposed action (Green River Action Plan: Yampa and Little Snake rivers) in this opinion are not implemented within the required timeframes. Also, the analysis for this biological opinion assumed implementation of the Green River Mainstem Action Plan of the RIPRAP because the Colorado pikeminnow and razorback sucker that occur in the Yampa River use the Green River and are considered one population. The essential elements of the Green River Plan are as follows: 1) provide and protect instream flows; 2) restore floodplain habitat; 3) reduce impacts of nonnative fishes; 4) augment or restore populations; and 5) monitor populations and conduct research to support recovery actions. The analysis for the non-jeopardy determination of the Yampa Plan that includes about 53,000 AF/year of new water depletions from the Yampa River Basin relies on the Recovery Program to provide and protect flows on the Green River. Specifically, the analysis for this biological opinion assumed operation of Flaming Gorge Dam to meet the flow recommendations according to the upcoming Record of Decision on the Flaming Gorge Dam Operations environmental impact statement (EIS)[a].

   The Service recognizes that the RIPRAP is an adaptive management plan that is modified according to additional information and changing priorities. The plan is reviewed annually and updated when necessary. The required timeframes include changes in timing approved by means of normal procedures of the Recovery Program. In 2006, and every 2 years thereafter, for the life of the Recovery Program, the Service and the Recovery Program will review implementation of the RIPRAP actions to determine timely compliance with applicable schedules.

[a] That decision has not been made as of the date of this letter.

Also, the analysis for this biological opinion assumed impacts to peak flows based on anticipated future uses of water, if water is used in a substantially different timing regime that adversely affects endangered fishes in a way not considered in this opinion, then reinitiation of consultation is required. The Recovery Program will monitor all new water projects that deplete more than 100 AF/year to determine their impacts to peak flows on the Yampa River. In addition, the Recovery Program will monitor projects individually depleting 100 AF/year or less in cumulative increments of 3,000 AF/year to determine their impacts to peak flows.

4. The Service lists new species or designates new or additional critical habitat, where the level or pattern of depletions covered under this opinion may have an adverse impact on the newly listed species or habitat. If the species or habitat may be adversely affected by depletions, the Service will reinitiate consultation on the programmatic biological opinion as required by its section 7 regulations. The Service will first determine whether the Recovery Program can avoid such impact or can be amended to avoid the likelihood of jeopardy and/or adverse modification of critical habitat for such depletion impacts. If the Recovery Program can avoid the likelihood of jeopardy and/or adverse modification of critical habitat no additional recovery actions for individual projects would be required, if the avoidance actions are included in the Recovery Action Plan. If the Recovery Program is not likely to avoid the likelihood of jeopardy and/or adverse modification of critical habitat then the Service will reinitiate consultation and develop reasonable and prudent alternatives.

If the annual assessment indicates that either the recovery actions specified in this opinion have not been completed or that the status of all four fish species has not sufficiently improved, the Service intends to reinitiate consultation on the Yampa Plan to specify additional measures to be taken by the Recovery Program to avoid the likelihood of jeopardy and/or adverse modification of critical habitat for depletions. If other measures are determined by the Service or the Recovery Program to be needed for recovery prior to the review, they can be added to the Recovery Action Plan according to standard procedures, outlined in that plan. If the Recovery Program is unable to complete those actions which the Service has determined to be required, consultation on projects with a Federal nexus may be reinitiated in accordance with ESA regulations and this opinion's reinitiation requirements. The Service may also reinitiate consultation on the Recovery Program if fish populations do not improve according to the population response criteria to be developed within one year of the issuance of this biological opinion. Failure to maintain a positive response, whenever achieved, will be considered a negative response and subject to reinitiation.

If the Service reinitiates consultation, it will first provide information on the status of the species and recommendations for improving population numbers to the Recovery Program. Only if the Recovery Program does not implement recovery actions to improve the status of the species, will the Service reinitiate consultation with individual projects. The Service intends to reinitiate consultations simultaneously on all depletions.

All individual consultations conducted under this programmatic opinion will contain language requesting the applicable Federal agency to retain sufficient authority to reinitiate consultation should reinitiation become necessary. The recovery agreements to be signed by non-Federal

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entities who rely on the Recovery Program to avoid the likelihood of jeopardy and/or adverse modification of critical habitat for depletion impacts related to their projects will provide that such non-Federal entities also must request the Federal agency to retain such authority. Non-Federal entities will agree by means of recovery agreements to participate during reinitiated consultations in finding solutions to the problem which triggered the reinitiation of consultation.

If you have any questions regarding this consultation or would like to discuss it in more detail, please contact Larry Thompson of our Grand Junction Ecological Services Field Office at (970) 243-2778, extension 39.

Sincerely,

Allan R. Pfister

Allan R. Pfister
Western Colorado Supervisor

Attachment: Recovery Agreement

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RECOVERY AGREEMENT

This RECOVERY AGREEMENT is entered into this 18th day of January, 2007, by and between the United States Fish and Wildlife Service (Service) and Colowyo Coal Company, L.P. (Water User).

WHEREAS, in 1988, the Secretary of Interior, the Governors of Wyoming, Colorado and Utah, and the Administrator of the Western Area Power Administration signed a Cooperative Agreement to implement the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (Recovery Program); and

WHEREAS, the Recovery Program is intended to recover the endangered fish while providing for water development in the Upper Basin to proceed in compliance with state law, interstate compacts and the Endangered Species Act; and

WHEREAS, the Colorado Water Congress has passed a resolution supporting the Recovery Program; and

WHEREAS, on January 10, 2005, the Service issued a programmatic biological opinion (2005 Opinion) on the *Management Plan for Endangered Fishes in the Yampa River Basin* concluding that implementation of specified elements of the Recovery Action Plan (Recovery Elements), along with existing and a specified amount of new depletions, are not likely to jeopardize the continued existence of the endangered fish or adversely modify their critical habitat in the Yampa River subbasin and Green River subbasin downstream of the Yampa River confluence; and

WHEREAS, Water User is the owner of Colowyo Mine, Permit C-81-019 – South Taylor/Lower Wilson Mining Area (Water Project), which causes or will cause depletions to the Yampa River subbasin; and

WHEREAS, Water User desires certainty that its depletions can occur consistent with section 7 and section 9 of the Endangered Species Act (ESA); and

WHEREAS, the Service desires a commitment from Water User to the Recovery Program so that the Program can actually be implemented to recover the endangered fish and to carry out the Recovery Elements.

6. This Recovery Agreement shall be in effect until one of the following occurs.

a. The Service removes the listed species in the Upper Colorado River Basin from the endangered or threatened species list and determines that the Recovery Elements are no longer needed to prevent the species from being relisted under the ESA; or

b. The Service determines that the Recovery Elements are no longer needed to recover or offset the likelihood of jeopardy to the listed species in the Upper Colorado River Basin; or

c. The Service declares that the endangered fish in the Upper Colorado River Basin are extinct; or

d. Federal legislation is passed or federal regulatory action is taken that negates the need for [or eliminates] the Recovery Program.

7. Water User may withdraw from this Recovery Agreement upon written notice to the Service. If Water User withdraws, the Service may request reinitiation of consultation on Water Project without reinitiating other consultations as would otherwise be required by the "Reinitiation Notice" section of the 2004 Opinion.

Water User Representative — Date: 1/18/2007

Western Colorado Supervisor
U.S. Fish and Wildlife Service — Date: 3/7/07

(ES/GJ-6-CO-04-F-012-YP016)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
764 Horizon Drive, Building B
Grand Junction, Colorado 81506-3946

IN REPLY REFER TO:
ES/GJ-6-CO-04-F-012-YP016
TAILS 65413-2006-F-0178

November 6, 2006 06-11-13-07

Memorandum

To: Natural Resources Specialist, Office of Surface Mining, Reclamation and Enforcement, Denver, Colorado

From: Western Colorado Supervisor, Fish and Wildlife Service, Ecological Services, Grand Junction, Colorado Allan R. Pfister

Subject: Biological Opinion for Colowyo Coal Company, L.P., Colowyo Mine Permit C-81-019, Revision 02

This is in response to your letter dated August 28, 2006, concerning Revision 02, to Permit C-81-019, proposed by Colowyo Coal Company, L.P., for the Colowyo surface coal mine in Moffat and Rio Blanco counties, Colorado. The mine is approximately 28 miles south of the town of Craig, Colorado on State, private, and lands managed by the Bureau of Land Management. This U.S. Fish and Wildlife Service (Service) response is in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.), and the Interagency Cooperation Regulations (50 CFR 402).

Your letter includes effects determinations for the bald eagle, black-footed ferret, Mexican spotted owl, Canada lynx, Dudley Bluffs bladderpod, Dudley Bluffs twinpod, yellow-billed cuckoo, Graham beardtongue, White River beardtongue, and the 4 endangered Colorado River fishes: Colorado pikeminnow, humpback chub, razorback sucker, and bonytail.

Your analysis arrives at "no effect" determinations for the black-footed ferret, Mexican spotted owl, Dudley Bluffs bladderpod, Dudley Bluffs twinpod, yellow-billed cuckoo, Graham beardtongue, and White River beardtongue. Your "no effect" determinations were based on effects analyses indicating no suitable habitat for these species within the project area. Because the Office of Surface Mining, Reclamation and Enforcement (OSM) determined that the proposed action would not affect the black-footed ferret, Mexican spotted owl, Dudley Bluffs bladderpod, Dudley Bluffs twinpod, yellow-billed cuckoo, Graham's beardtongue, and White River beardtongue, consultation and concurrence are not necessary on these species.

Your analysis arrives at a "may affect, but not likely to adversely affect" determination for the bald eagle and yellow-billed cuckoo. Bald eagles are known to nest in the Yampa River and White River Valleys, and to winter in the Yampa River Valley north of the project area. However, your analysis indicates that on-site surveys revealed no suitable roosting habitat or nest

sites. You determined that bald eagles may forage in the project area, and could potentially be adversely affected by vehicular collisions or contact with power lines and poles at or near the site. Based on the information provided in your analysis, the Service concurs with your "may affect, but not likely to adversely affect" determination for the bald eagle.

Regarding the Canada lynx, your analysis indicates that no lynx occupancy in the project area is known and no suitable habitat for this species exists in the area. You found that lynx could travel through the project area, and determined that the project is "not likely to adversely affect" the species. Based on the information provided in your analysis, the Service concurs with your "may affect, but not likely to adversely affect" determination for the Canada lynx.

Regarding the endangered Colorado pikeminnow, razorback sucker, humpback chub, and bonytail, the Colowyo Coal Company, L.P. estimates the current operations at the project result in a depletion of 527.48 acre-feet per year to the Yampa River, and that Permit Revision 02 will result in an additional annual depletion of 27.0 acre-feet due to the construction of 4 new sediment ponds – for a total net annual water depletion of 554.48 acre-feet. This depletion to the Yampa River may affect the 4 endangered Colorado River fishes and their designated critical habitat. Therefore, you were correct to request formal consultation under section 7 of the Endangered Species Act of 1973, regarding the potential effects of the project.

A Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin was initiated on January 22, 1988. The Recovery Program was intended to be the reasonable and prudent alternative to avoid jeopardy to the endangered fishes from impacts of water depletions to the Upper Colorado River Basin. In order to further define and clarify the process in the Recovery Program, a section 7 agreement was implemented on October 15, 1993, by the Recovery Program participants. Incorporated into this agreement is a Recovery Implementation Program Recovery Action Plan (RIPRAP) which identifies actions currently believed to be required to recover the endangered fishes in the most expeditious manner.

On January 10, 2005, the Service issued the final programmatic biological opinion on the *Management Plan for Endangered Fishes in the Yampa River Basin* (this document is available for viewing at the following internet address: http://www.r6.fws.gov/crrip/yampaPBO.htm). The Service has determined that projects that fit under the umbrella of the Yampa River Programmatic Biological Opinion (PBO) would avoid the likelihood of jeopardy and/or adverse modification of critical habitat for depletion impacts to the Yampa River basin. The Service has determined that if the subject project meets the following criteria, then it fits under the umbrella of the Yampa River PBO.

1. The project depletes water from the Yampa River basin.

2. The Colowyo Coal Company, L.P. (applicant) signs the attached Recovery Agreement and returns it to the Service.

3. The subject project will deplete 554.48 acre-feet of water. In order to rely on the Recovery Program to offset the subject depletions, the project sponsors are to make a one-time monetary contribution for water depletions greater than 100 acre-feet to help fund their share of the costs of recovery actions. It is the understanding of the Service that the applicant made a payment of $1270 in 1988 for a depletion of 127.43 acre-feet/year, and a payment of $29.90 in 1992 due to

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an additional depletion of 2.6 acre-feet; therefore, the new depletion is 554.48 – 130.03 = 424.45 acre-feet. The new one-time payment is calculated by multiplying the project's average annual new depletion (424.45 acre-feet) by the water users share of Recovery Program costs (the charge) in effect at the time payment is made. For Fiscal Year 2007 (October 1, 2006, to September 30, 2007), the charge is $17.24 per acre-foot for the average annual depletion which equals a total contribution of $7,317.52 for this project's share of the Recovery Program costs. This amount will be adjusted annually for inflation on October 1 of each year based on the Consumer Price Index. Ten percent of the total contribution ($7,317.52), or total payment, will be provided to the Service's designated agent, the National Fish and Wildlife Foundation, at the time of issuance of the Federal approvals from the OSM. The balance will be due at the time the construction commences. The payment will be included by the OSM as a permit stipulation. The funds will be used for acquisition of water rights (or directly-related activities) to meet the instream flow needs of the endangered fishes; or to support other recovery activities for the endangered fishes described in the RIPRAP. All payments should be made to the Foundation.

National Fish and Wildlife Foundation
28 Second Street, 6th Floor
San Francisco, California 94105

Each payment should be accompanied by a cover letter that identifies the project and biological opinion number (ES/GJ-6-CO-04-F-012-YP016), the amount of the payment enclosed, and the check number. A copy of the cover letter and a copy of the payment check should be sent to the Service office issuing this biological opinion. The cover letter should identify the name and address of the payor, the name and address of the Federal agency responsible for authorizing the project (OSM), and the address of the Service office conducting the section 7 consultation. This information will be used by the Foundation to notify the payor, the lead Federal agency, and the Service that payment has been received. The Foundation is to send notices of receipt to these entities within 5 working days of its receipt of payment.

4. The Service requests that the OSM retain discretionary Federal authority for the subject project in case re-initiation of section 7 consultation is required. The OSM should return the Recovery Agreement signed by the applicant, and provide a letter from the applicant stating that they agree to make the subject payment within the time frames outlined above. The OSM should also provide a statement that they intend to retain discretionary Federal authority for the subject project in case re-initiation of section 7 consultation is required. These documents should be sent to the following address.

Attn: Larry Thompson
U. S. Fish and Wildlife Service Ecological Services
764 Horizon Drive, Building B
Grand Junction, Colorado 81506

When the Service receives the signed Recovery Agreement and any other required documentation, the Service will provide the OSM with documentation that the project may rely on the RIPRAP to offset its impacts as described in the Yampa River PBO.

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If you have any questions regarding this consultation or would like to discuss it in more detail, please contact Larry Thompson of our Grand Junction Ecological Services Field Office at (970) 243-2778, extension 39.

Attachment: Recovery Agreement

LThompson:OSMColoWyoMinePR-02YPBO1.doc:103006

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Appendix B.

IPAC Resource Report

U.S. Fish & Wildlife Service

Colowyo Coal Mine

IPaC Trust Resource Report

Generated June 05, 2015 01:38 PM MDT

US Fish & Wildlife Service

IPaC Trust Resource Report

Project Description

NAME

Colowyo Coal Mine

PROJECT CODE

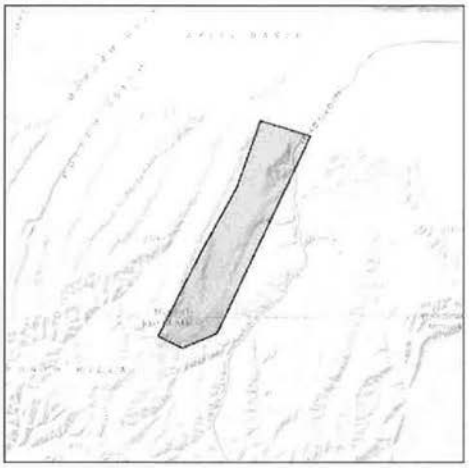
34PKB-EXNIJ-ADFFK-2VWAF-CXRJ6Q

LOCATION

Moffat and Rio Blanco counties, Colorado

DESCRIPTION

PR 02



U.S. Fish & Wildlife Contact Information

Species in this report are managed by:

Western Colorado Ecological Services Field Office
445 West Gunnison Avenue, Suite 240
Grand Junction, CO 81501-5720
(970) 243-2778

Endangered Species

Proposed, candidate, threatened, and endangered species that are managed by the Endangered Species Program and should be considered as part of an effect analysis for this project.

Birds

Greater Sage-grouse Centrocercus urophasianus Candidate

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B06W

Mexican Spotted Owl Strix occidentalis lucida Threatened

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B074

Yellow-billed Cuckoo Coccyzus americanus Proposed

CRITICAL HABITAT
There is **proposed** critical habitat designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B06R

Fishes

Bonytail Chub Gila elegans Endangered

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=E020

Colorado Pikeminnow (=squawfish) Ptychocheilus lucius Endangered

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=E006

Humpback Chub Gila cypha Endangered

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=E000

Razorback Sucker Xyrauchen texanus Endangered

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=E054

Flowering Plants

Ute Ladies'-tresses Spiranthes diluvialis

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=Q2WA

Mammals

Black-footed Ferret Mustela nigripes — Endangered

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A004

Black-footed Ferret Mustela nigripes — **Experimental Population, Non-Essential**

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A004

Critical Habitats

Potential effects to critical habitat(s) within the project area must be analyzed along with the endangered species themselves.

There is no critical habitat within this project area

Migratory Birds

Birds are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Any activity which results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service (1). There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

You are responsible for complying with the appropriate regulations for the protection of birds as part of this project. This involves analyzing potential impacts and implementing appropriate conservation measures for all project activities.

American Bittern Botaurus lentiginosus — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0F3

Bald Eagle Haliaeetus leucocephalus — Bird of conservation concern
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B008

Black Swift Cypseloides niger — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0FW

Brewer's Sparrow Spizella breweri — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0HA

Brown-capped Rosy-finch Leucosticte australis — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0J5

Burrowing Owl Athene cunicularia — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0NC

Cassin's Finch Carpodacus cassinii — Bird of conservation concern
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0J6

Ferruginous Hawk Buteo regalis — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B06X

Fox Sparrow Passerella iliaca — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0NE

Golden Eagle Aquila chrysaetos — Bird of conservation concern
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0DV

Greater Sage-grouse Centrocercus urophasianus — Bird of conservation concern
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B06W

Juniper Titmouse Baeolophus ridgwayi — Bird of conservation concern
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0JC

Lewis's Woodpecker Melanerpes lewis — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0HQ

Loggerhead Shrike Lanius ludovicianus — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0FY

Olive-sided Flycatcher Contopus cooperi — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0AN

Peregrine Falcon Falco peregrinus — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0FU

Pinyon Jay Gymnorhinus cyanocephalus — Bird of conservation concern
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0I0

Prairie Falcon Falco mexicanus — Bird of conservation concern
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0ER

Sage Thrasher Oreoscoptes montanus — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0ID

Short-eared Owl Asio flammeus — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0HD

Swainson's Hawk Buteo swainsoni — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B070

Veery Catharus fuscescens — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0JF

Williamson's Sapsucker Sphyrapicus thyroideus — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0FX

Willow Flycatcher Empidonax traillii — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0F6

Refuges

Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. If your project overlaps or otherwise impacts a Refuge, please contact that Refuge to discuss the authorization process.

There are no refuges within this project area

Wetlands

Impacts to NWI wetlands and other aquatic habitats from your project may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes.

Project proponents should discuss the relationship of these requirements to their project with the Regulatory Program of the appropriate U.S. Army Corps of Engineers District.

DATA LIMITATIONS

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

DATA EXCLUSIONS

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

DATA PRECAUTIONS

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Freshwater Emergent Wetland

PEMC	13.7 acres
PEMA	0.968 acre

Freshwater Pond

PABFh	4.28 acres
PUBFx	3.24 acres
PUSCh	2.06 acres

Riverine

R4SBCx	26.5 acres