



Native Fish Management Plan – Great Sand Dunes National Park and Preserve

Natural Resource Report NPS/XXXX/NRR—201X/XXXX



ON THE COVER

Rio Grande cutthroat trout from Upper Sand Creek Lake.
Credit: Trout Unlimited.

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Executive Summary

The Great Sand Dunes National Park and Preserve Native Fish Management Plan (Plan) describes the goals, objectives, management strategies and major activities necessary for the long-term conservation of the native fish community, including the rare Rio Grande cutthroat trout (*Oncorhynchus clarkii virginalis*, RGCT), Rio Grande chub (*Gila pandora*, RGC), and Rio Grande sucker (*Catostomus plebeius*, RGS), within Great Sand Dunes National Park and Preserve (GRSA), Colorado, U.S.A.

The Plan identifies strategies to remove undesirable non-native trout and restore the native fish community to the extent possible. In overview, the two major drainages on, and flowing from, the Preserve portion of GRSA, Medano and Sand Creeks, will be managed for RGCT, other members of the native fish assemblage (RGC and RGS), and longnose dace (*Rhinichthys cataractae*, LND), and the provision of recreational fishing. The two major drainages originating within the Park portion of GRSA from the west side of the dune field, Big Spring Creek and Little Spring Creek, will be managed for the conservation of native fathead minnow (*Pimephales promelas*, FHM) and the possible introduction of native RGS if suitable habitat exists, with no fishing allowed.

Other proposed management strategies identified in the Plan, include fish community monitoring, genetic management, stream restoration and visitor education and outreach about the importance of native fish conservation. Many of these activities are currently being conducted, or can easily be implemented in the near future as part of the routine resource management of GRSA. Any required project-specific regulatory compliance will be conducted as needed.

The Plan is consistent with the conservation goals of GRSA, the Division of Colorado Parks and Wildlife (CPW), National Park Service (NPS) Management Policies (NPS MP 2006) and regulations, and the recently published Department of the Interior (DOI) Secretarial Order, SO 3356 (DOI SO 3356); Hunting, Fishing, Recreational Shooting, and Wildlife Conservation Opportunities and Coordination with States, Tribes, and Territories, that requires federal agencies to enhance conservation stewardship in collaboration with the States, improve the management of game species and their habitats, and increase opportunities for outdoor recreation. The Plan is also consistent with the RGCT Range-Wide Conservation Strategy and Agreement of which GRSA and CPW are both signatories.

The implementation of the Plan will help secure the long-term conservation of native fish within GRSA and provide a unique opportunity to experience wildlife viewing and fishing for large, rare RGCT, in a truly magnificent setting.

Purpose of Management Plan

The GRSA Native Fish Management Plan provides a programmatic foundation for the future long-term management of native fish populations and other water-dependent species within GRSA. The purpose of the Plan is to implement a management approach that will ensure the conservation, protection, and restoration of the fish community native to the upper Rio Grande and GRSA, and the possible introduction of other regionally extant native aquatic species as appropriate, while providing opportunities for visitor enjoyment and recreational fishing, consistent with the NPS Mission and NPS Management Policies (NPS MP 2006).

Need for Management Plan

The need for the Strategy is for GRSA to manage the extant fish community and fishing consistent with NPS missions, goals, and current NPS management policies to; protect native, and rare and at-risk species; restore such populations to preclude listing under the Endangered Species Act, and; provide opportunities for the public to enjoy the resources, such as recreational fishing and wildlife viewing.

Legislative and Management History

Great Sand Dunes National Monument in the State of Colorado was established by Presidential Proclamation No. 1994 of March 17, 1932 (47 Stat. 2506) under the authority of the Antiquities Act (June 8, 1906, 34 Stat. 225 (16 U.S.C. 431)) to preserve Federal land containing spectacular and unique sand dunes and additional features of scenic, scientific, and educational interest for the benefit and enjoyment of future generations. Through a series of further Presidential Proclamations (No. 2681, March 12, 1946; No. 3138, June 7, 1956) the boundaries of the Monument underwent minor adjustments. A large addition to the Monument was authorized on May 11, 2000, when the Colorado Congressional delegation introduced the Great Sand Dunes National Park and Preserve Act and on November 22, 2000, Public Law 106-530 was signed into law by President Bill Clinton. The Act authorized the Secretary of the Interior to designate a new national park upon determining sufficient land, having a sufficient diversity of resources, had been acquired.

Accordingly, The Act included; the creation of GRSA National Preserve, consisting of 42,000 acres of lands transferred from the Rio Grande National Forest, United States Department of Agriculture to the National Park Service; the purchase of the 97,000 acre Baca Ranch, of which 31,000 acres would be included in the new GRSA National Park, and; establishment of GRSA National Park at the time when the notice of the Secretary's designation was to be published in the Federal Register. After a complex acquisition process to acquire the Baca Ranch and the Medano Ranch, involving the assistance of The Nature Conservancy, on September 13, 2004 Secretary of Interior Gale Norton signed the designation which established The Great Sand Dunes National Park and Preserve (America's 58th national park). The Great Sand Dunes National Park and Preserve Act increased the size of the previous GRSA National Monument from 46,034 acres to almost 150,000 acres. The Park now encompasses 107,342 acres (167.7 sq mi) while the Preserve protects an additional 41,686 acres

(65.1 sq mi) for a total of 149,028 acres (232.9 sq mi), all of which are under NPS administrative control, but the land is divided into several zones that emphasize different management goals identified in the General Management Plan (Figure 1).

While the park and preserve are distinct within GRSA, they are both managed under the same set of laws and policies. While traditionally preserves have been managed to allow some activities that are not traditionally permitted in parks (e.g. hunting), many of the streams within GRSA traverse the park/preserve boundary. Consequently, the fish resources within GRSA are managed similarly with respect to NPS policy, with no distinction made between the park and preserve.

Great Sand Dunes Lands

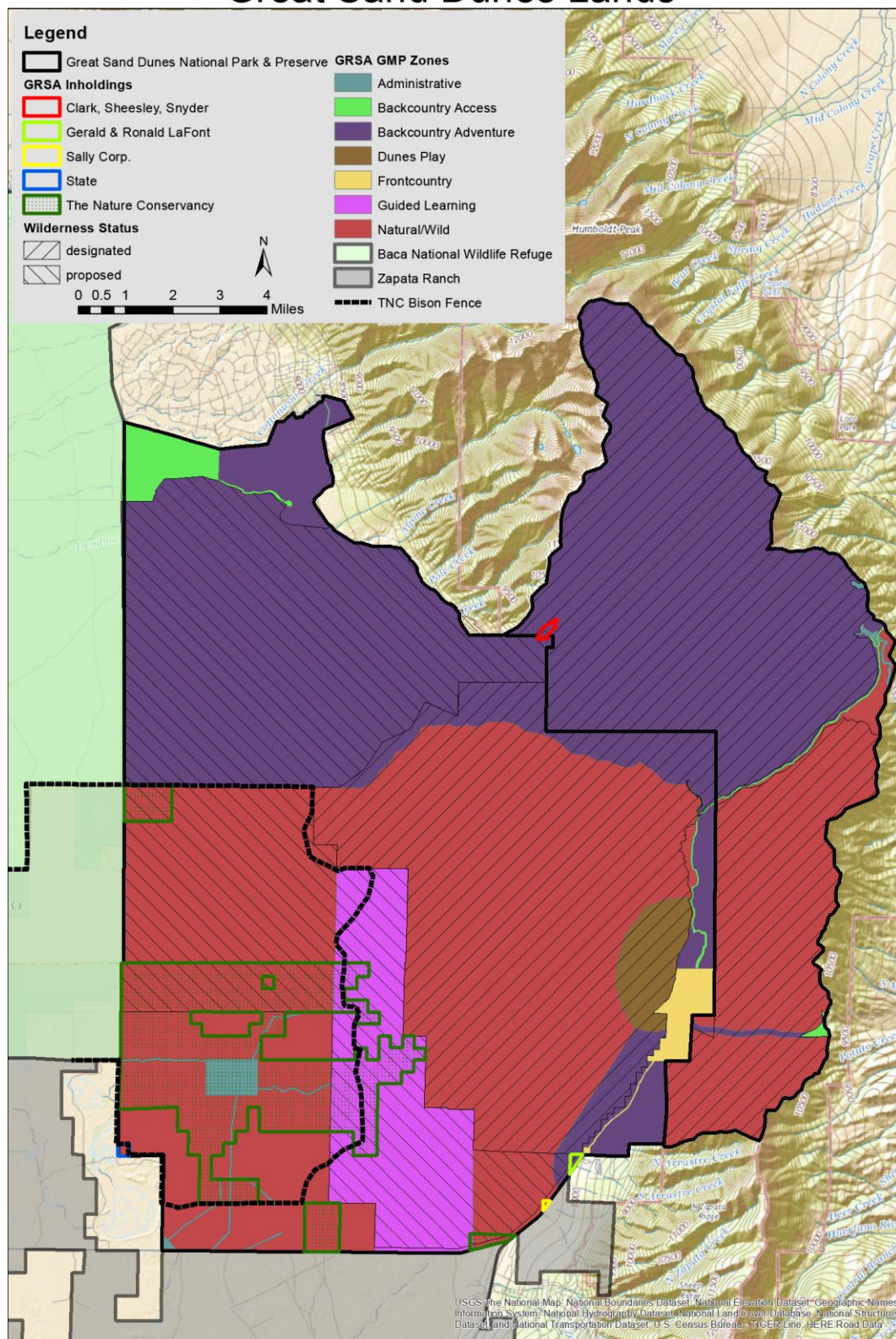


Figure 1. Land management status within the administrative boundaries of GRSA. (Source: Andrew Valdez, NPS).

Geographic and Physiographic Setting

Great Sand Dunes National Park and Preserve is situated in the northern portion of the San Luis Valley of south-central Colorado. The San Luis Valley is bordered by Poncha Pass on the north, the San Juan Mountains on the west, and the Sangre de Cristo Range on the east. To the south, the San Luis Valley extends into New Mexico along the Rio Grande. Blanca Peak, the fourth-highest mountain in Colorado, towers over the valley, just southeast of the park and is sacred to some native peoples. This high mountain valley is the northern part of the Rio Grande Rift, a valley created by tectonic forces rather than erosional processes.

GRSA is dominated by two features; the large dunefield that lies on the eastern edge of the valley at the base of the Sangre de Cristo Range that is mostly contained within the Park, and the high rugged Sangre De Cristo Range to the east of the dunefield that is almost entirely within the Preserve (Figure 2). The Park and Preserve are named for the sand dunefield that is the most visited part of the park. GRSA also protects alpine lakes, tundra, six peaks over 13,000 feet, ancient spruce and pine forests, large stands of aspen and cottonwood, grasslands, and wetlands.

Great Sand Dunes National Park and Preserve protects two designated wilderness areas within the boundaries of the national park and preserve: the 35,955-acre Great Sand Dunes Wilderness and the approximately 40,000-acre Sangre de Cristo Wilderness (Figure 1). In addition, more than 53,000 acres of proposed wilderness are managed by the park as “designated wilderness.”

Visitors can easily access both designated wilderness areas due to the proximity of roads to the area, but still find ample solitude and isolation to enjoy the unconfined recreational opportunities, along with relatively clean air and clear views. There are no developed campgrounds, few trails, and limited signage in designated wilderness, allowing wilderness areas to remain largely undeveloped.

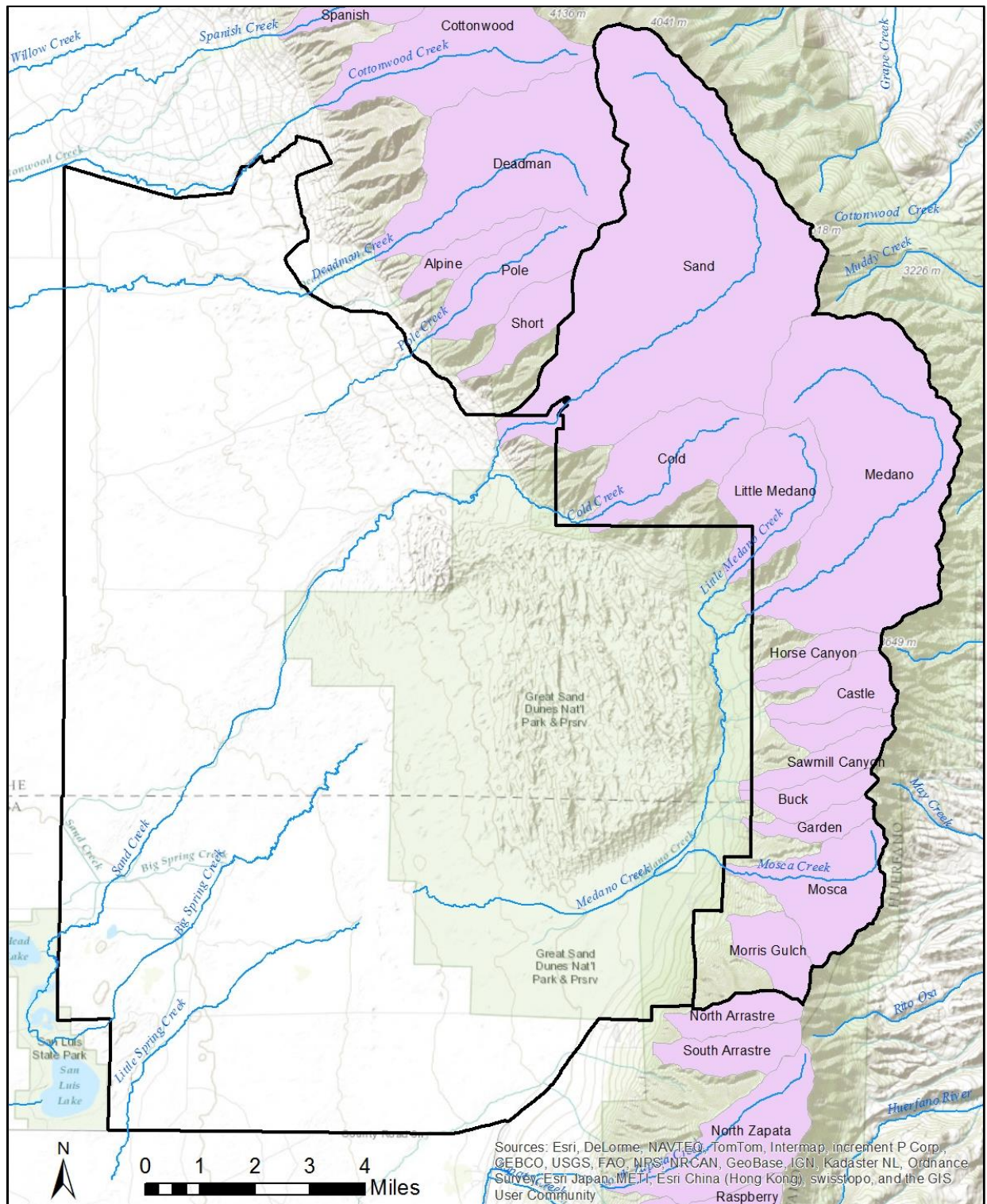


Figure 2. Location of major streams within GRSA. Black line indicates administrative boundary of GRSA, and identifies the boundaries of the Park (West), and Preserve (East). (Source: Andrew Valdez, NPS).

Hydrology

GRSA is situated in the San Luis Closed Basin (SLCB); a 2,940 square mile endorheic sub-basin in the north portion of the larger Rio Grande valley, separated from the southern and western portion of the valley by a low lying plateau, the San Luis Hills (Figure 3). The SLCB receives water from San Luis Creek, Saguache Creek, and the majority of the water from the Sangre de Cristo Range on the east side of the valley. All the water originating in GRSA enters the SLCB. The rest of the valley is drained by the Rio Grande, which flows south into New Mexico.

Historically, water derived from spring snowmelt and summer rainstorms ran into the closed basin from the surrounding watershed and collected in the lowest point where it formed a large playa lake centered near the current San Luis Lake, from which the water slowly evaporated. In the 1970's, the Bureau of Reclamation constructed the SLCB Project and intercepted part of this water for diversion into the Rio Grande and delivery to New Mexico. Part of the salvaged water was subsequently used to develop San Luis Lake, a small recreational lake to the west of the park.

As a closed basin, there is no contemporary surface water connection between streams within the closed basin originating in the park and the Rio Grande. Consequently fish from the Rio Grande cannot now get into park streams. Additionally, the dunefield creates another significant barrier to movement and recolonization of the Preserves creeks, from other streams that flow into the closed basin (e.g. Saguache Creek, San Luis Creek).

All streams originating from the Sangre de Cristo Range within the Preserve portion of GRSA have been designated by the State of Colorado as "Outstanding Natural Resource Waters" (ONRW), under the federal Clean Water Act (see Ferguson 2003). As such, they are afforded special protection to ensure that the water quality is not degraded under the CWA anti-degradation policy.

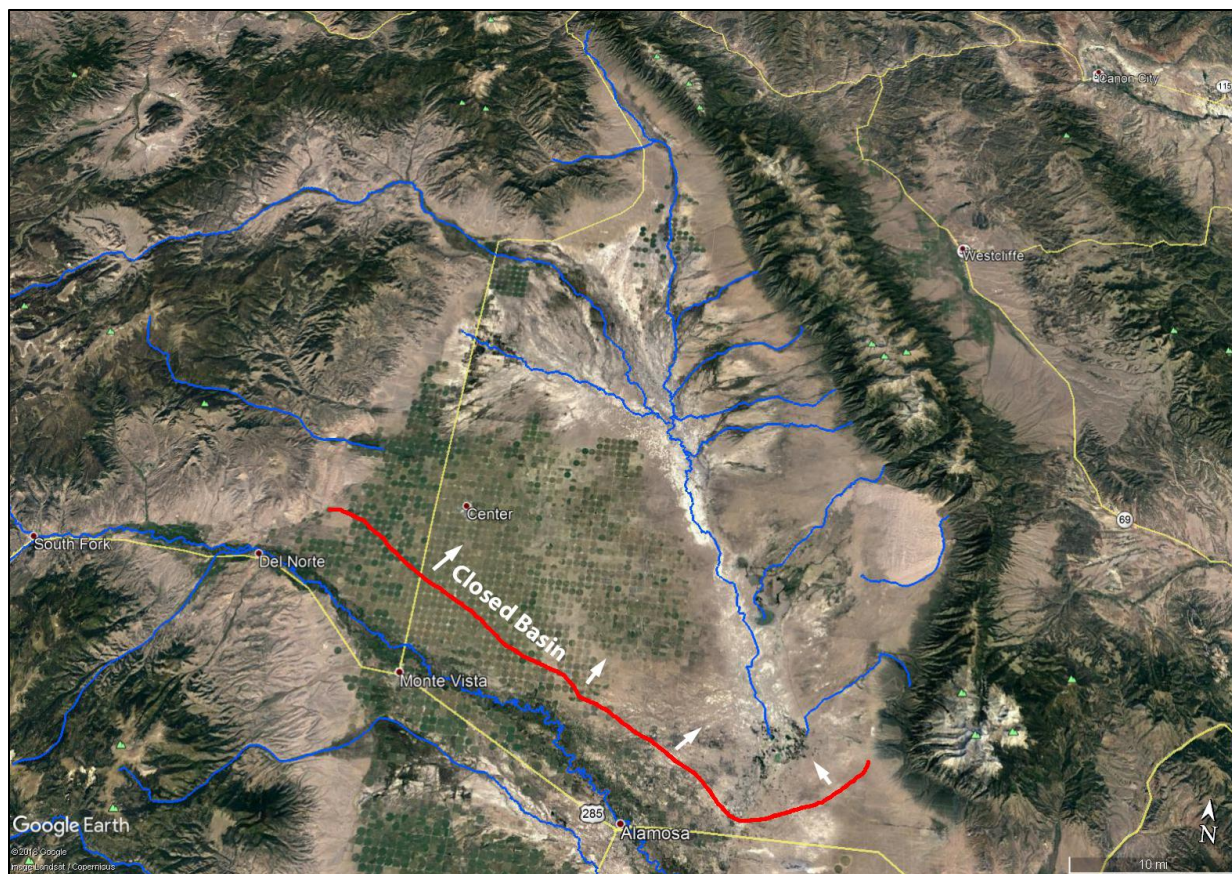


Figure 3. Approximate southern boundary of the San Luis Closed Basin. Everything north of the red line within the San Luis Valley is within the SLCB. (Source: Andrew Valdez, NPS).

Aquatic Biological Resources

Fish

Seven species of fishes, and several hybridized fish lineages have been documented within the GRSA boundary (Zuckerman and Bergersen 1986; Bramblett and Zale 2002; Table 1); Rio Grande cutthroat trout (*Oncorhynchus clarkii virginalis*, RGCT); Rio Grande sucker (*Catostomus plebeius*, RGS); fathead minnow (*Pimephales promelas*, FHM); cutthroat-cutthroat and cutthroat-rainbow hybrids of various and uncertain lineage (CRH); rainbow trout (*Oncorhynchus mykiss*, RT); brown trout (*Salmo trutta*, BT); brook trout (*Salvelinus fontinalis*, BRT); and brook stickleback (*Culaea inconstans*, BS).

The first three are regionally native to the Rio Grande Basin to the south, and believed to have been historically native to the SLCB and presumably, the permanent streams within GRSA. However, all fish currently extant to GRSA, other than the native FHM population in Big Spring Creek, are the result of intentional stocking (RGCT, CRH, RT, BT, BRT), accidental bait-bucket introductions (BS) associated with recreational fishing, or a result of recent intentional introduction for species conservation (RGS).

Two other species, Rio Grande chub (*Gila Pandora*, RGC) and longnose dace (*Rhinichthys cataractae*, LND) are often found sympatric with RGCT and RGS (Calamusso and Rinne 1996) and believed to have been native to the SLCB, and presumably, the permanent streams within GRSA. Neither of these fish has been documented in GRSA, but populations exist nearby, in other parts of the SLCB that were historically hydrologically connected to streams within GRSA (Zuckerman and Langlois 1990).

Table 1. Summary of current and proposed fish species presence in GRSA. RGCT: Rio Grande Cutthroat Trout; CCH: Cutthroat-Cutthroat Hybrids of various and uncertain lineage; CRH: Cutthroat-Rainbow Hybrids of various and uncertain lineage; RT: Rainbow Trout; BT: Brook Trout; BS: Brook Stickleback; FHM: Fathead Minnow; RGS: Rio Grande Sucker; RGC: Rio Grande Chub; LND: Long Nose Dace. XXX: Currently present; **XXX: proposed for introduction.** *XXX: proposed for possible introduction; see “Fish Introductions” narrative for further explanation*;?: presence possible.

Watershed	Waterbody	Current species presence	Proposed species presence
Medano Creek	Medano Creek	RGCT, RGS	RGCT, RGS, RGC, LND
	Medano Lake	RGCT	RGCT
Sand Creek	Upper Sand Creek Lake	CCH	RGCT (supplemental stocking as necessary)
	Lower Sand Creek Lake	CCH	RGCT
	Little Sand Creek Lake	RGCT	RGCT (supplemental stocking as necessary)
	Sand Creek above fish barrier	CCH	RGCT
	Sand Creek below fish barrier	CCH, CRH, RT, BT, RGCT?	RGCT, RGS, LND
	Little Sand Creek above barrier	–	RGCT
	Little Sand Creek below barrier	CCH, CRH, RT, BT, RGCT?	RGCT, RGS, LND
Big Spring Creek	Indian Springs Pond	FHM	FHM
	Big Spring Creek	FHM, BS	FHM, BS, <i>RGS</i>
Little Spring Creek	Little Spring Creek	No fish	<i>FHM, RGS, RGC?</i>

Extant Native Species

Rio Grande cutthroat trout (*Oncorhynchus clarkii virginalis*, RGCT)



Photo 1. Rio Grande cutthroat trout from Upper Sand Creek Lake. (Credit: Trout Unlimited).

- Native to GRSA and Upper Rio Grande Basin.
- Current Status: Rare. Colorado “Species of Greatest Conservation Need” with Regional Conservation Strategy and Agreement (Pritchard and Cowley 2006; RGCT Conservation Team 2013).
- Body Form: Streamlined, robust body, with terminal mouth. Grows to 500mm when conditions allow, but generally does not exceed 400mm in small habitats.
- Feeding Strategy: Visual predator. Midwater, drift feeder. Feeds on aquatic and terrestrial insects, small fish, and opportunistically on a wide variety of prey.
- Temperature Tolerance: Coldwater species. Temperature tolerance to 80F.
- Habitat/Substrate use: Variable, but generally cobble, gravel and pool/riffle/glide stream habitat in higher elevation rivers/streams, and cold lakes. Requires well-oxygenated water.
- Reproductive Strategy: Spring spawner, over large gravel. Deposits eggs in excavated nest in moving water, in highly-oxygenated environment.

Rio Grande sucker (*Catostomus plebeius*, RGS)



Photo 2. Rio Grande sucker. (Credit: Colorado Parks and Wildlife).

- Native to GRSA. Only two remaining native populations extant in Upper Rio Grande Basin, CO (Hot Creek, Crestone Creek), with other reintroduced populations (Middle Fork Carnero Creek, Lake Fork Conejos River, Medano Creek).
- Current Status: Rare. CO State endangered with Regional Conservation Agreement (Langlois et al. 1994; Rees and Miller 2005; RGC and RGS Conservation Team 2018). USFWS was recently sued by Wild Earth Guardians to list the species under federal Endangered Species Act (Wild Earth Guardians 2014).
- Body Form: Small sucker species, with terete, moderately dorsoventrally compressed body, ventral mouth, rarely exceeding 200mm.
- Feeding Strategy: Well-developed cartilaginous mouth ridge adapted for scraping rocks. Diet consists of periphyton, benthic insect larvae, and detritus and plant material.
- Temperature Tolerance: Uncertain, but likely a wide temperature tolerance, up to 90F.
- Habitat/Substrate Preference: Uncertain, but often found in mid-elevation, transitional, streams with moderate gradient, pool/glide habitat, over gravel substrate. Likely tolerant of low dissolved oxygen, high turbidity and high temperature.
- Reproductive Strategy: Uncertain, but likely early Summer (May to July), communal, spawner, over clean gravel, when water temperature 51 – 60F (Langlois et al. 1994).

Fathead minnow (*Pimephales promelas*, FHM)



Photo 3. Fathead minnow. (Credit: United States Geological Survey).

- Native to GRSA and Rio Grande Basin. Widely distributed in North America.
- Current Status: Common and widely introduced as bait for recreational fishing.
- Body Form: Robust, moderately deep-bodied minnow, rarely exceeding 75mm.
- Feeding Strategy: Generalist. Benthic and water column feeder. Omnivorous and opportunistic. Feeds on detritus, plankton, insect larvae, and plant material.
- Temperature Tolerance: Wide temperature tolerance, up to 95F.
- Habitat/Substrate Preference: Slow moving streams and lentic habitat, often over silt/sand. Tolerant of low dissolved oxygen, high turbidity and high temperature.
- Reproductive Strategy: Spring, Summer spawner. Eggs deposited on underside of hard objects when water temperature exceeds ~64F.

Extirpated Native Species

Rio Grande chub (*Gila pandora*, RGC)



Photo 4. Rio Grande chub. (Credit: Jennifer Macke, Pajarito Environmental Education Center).

- Native to GRSA and Upper Rio Grande Basin.
- Current Status: Rare. Colorado “Species of Greatest Conservation Need,” with Regional Conservation Agreement (Rees et al. 2005; RGC and RGS Conservation Team 2018). USFWS was recently sued by Wild Earth Guardians to list the species under federal Endangered Species Act (Wild Earth Guardians 2013).
- Body Form: Streamlined, robust body, up to 250mm, with terminal mouth.
- Feeding Strategy: Visual predator. Midwater, drift feeder. Feeds on aquatic and terrestrial insects, small fish, and opportunistically on a wide variety of prey (occupies similar ecological niche as trout species, but in more downstream habitats).
- Temperature Tolerance: Coolwater/warm water species. Temperature tolerance to 90F.
- Habitat/Substrate Preference: Variable, but generally cobble, gravel/sand and pool/riffle/glide stream habitat. Co-exists with trout species in upper range, but range extends further downstream, and species is tolerant of wide range of water and habitat conditions.
- Reproductive Strategy: Early summer, communal, spawner, over gravel in well-oxygenated environment.

Longnose Dace (*Rhinichthys cataractae*, LND)



Photo 5. Longnose dace. (Credit: Colorado Parks and Wildlife).

- Native to Upper Rio Grande Basin. Records exist for San Luis Creek and Saguache Creek in Closed Basin, but no records from GRSA. However, Medano Creek and Sand Creek are likely within the species' historic range.
- Current Status: Most widely distributed fish in North America.
- Body Form: Small minnow (< 100mm). Body adapted for benthic living in rocky, fast flowing streams. Fusiform body, long nose, large reverse-aerofoil fins keep fish on bottom of stream.
- Feeding Strategy: Omnivore, generalist. Opportunistic. Eats algae, and aquatic and terrestrial insects.
- Temperature Tolerance: Prefers cool water streams in mid-elevation stream reaches, but wide temperature tolerance.
- Habitat/Substrate Preference: Prefers shallow, fast moving riffles, with large rocky cobble/gravel substrate.
- Reproductive Strategy: Males create and defend territories to attract females. Typically spawn in rocky substrate, in early summer (May to August) when water temperatures reach 60F.

Extant Non-Native Species

Cutthroat-cutthroat trout and cutthroat-rainbow trout hybrids of various and uncertain lineage (CRH).

Derived from historical stocking and subsequent natural reproduction, including genes from Colorado River cutthroat trout, Yellowstone cutthroat trout, Rio Grande cutthroat trout and rainbow trout.

- Non-native to GRSA: Native to West coast of U.S., from California to Alaska.
- Status: Common, invasive, widely introduced for recreational fishing.
- Body Form: Streamlined, robust body, up to 400 mm, with terminal mouth.
- Feeding Strategy: Visual predator. Midwater, drift feeder. Feeds on aquatic and terrestrial insects, small fish, and opportunistically on a wide variety of prey.
- Temperature tolerance: Coldwater/coolwater species. Temperature tolerance to 80F.
- Habitat/Substrate Preference: Variable, but generally cobble, gravel and pool/riffle stream habitat, and lakes. Requires well-oxygenated habitat.
- Reproductive Strategy: Spring spawner, over large gravel. Deposits eggs in excavated nest in moving, highly oxygenated environment.

Rainbow trout (*Oncorhynchus mykiss*, RT)

- Non-native to GRSA. Native to West coast of U.S., from California to Alaska.
- Status: Common, invasive, widely introduced for recreational fishing.
- Body Form: Streamlined, robust body, with terminal mouth. Can grow very large (800mm+) when conditions allow, but generally do not exceed 400mm in small habitats.
- Feeding Strategy: Visual predator. Midwater, drift feeder. Feeds on aquatic and terrestrial insects, small fish, and opportunistically on a wide variety of prey.
- Temperature Tolerance: Coldwater/coolwater species. Temperature tolerance to 80F.
- Habitat/Substrate Preference: Variable, but generally cobble, gravel and pool/riffle stream habitat, and lakes. Requires cold, well-oxygenated habitat.
- Reproductive Strategy: Spring spawner, over large gravel. Deposits eggs in excavated nest in moving, highly oxygenated environment.

Brown trout (*Salmo trutta*, BT)

- Non-native to GRSA: Widely distributed and native to Europe.
- Status: Common invasive, widely introduced for recreational fishing.
- Body Form: Streamlined, robust body, with terminal mouth. Can grow very large when conditions allow (800mm+), but generally does not exceed 400mm in small habitats.
- Feeding Strategy: Visual predator. Midwater, drift feeder. Feeds on aquatic and terrestrial insects, small fish, and opportunistically on a wide variety of prey.
- Temperature Tolerance: Coldwater/coolwater species. Temperature tolerance to 85F.

- Habitat/Substrate Preference: Variable, but generally cobble, gravel and pool/riffle stream habitat, and lakes in high/mid elevation streams. Requires well-oxygenated habitat.
- Reproductive Strategy: Fall (September to November) spawner, over large gravel. Deposits eggs in excavated nest in moving, highly oxygenated environment. Eggs hatch in spring when water temperatures exceed 43F).

Brook trout (*Salvelinus fontinalis*, BRT)

- Non-native to GRSA. Native to East Coast United States.
- Status: Common, invasive, widely introduced for recreational fishing.
- Body Form: Streamlined, robust body, with terminal mouth. Can grow large when conditions allow, but stream populations often remain small where individuals rarely exceed 300mm).
- Feeding Strategy: Visual predator. Midwater, drift feeder. Feeds on aquatic and terrestrial insects, small fish, and opportunistically on a wide variety of prey.
- Temperature Tolerance: Coldwater species. Temperature tolerance to 80F.
- Habitat/Substrate Preference: Variable, but generally cobble, gravel and pool/riffle stream habitat, and lakes in higher elevation streams. Requires well-oxygenated habitat.
- Reproductive Strategy: Fall (September to November) spawner, over large gravel. Deposits eggs in excavated nest in moving, highly oxygenated environment. Eggs hatch in spring when water temperatures exceed 43F).

Brook stickleback (*Culaea inconstans*, BS)

- Non-native to GRSA*. Widely distributed in northern North America.
- Status: Common, widely introduced as bait for recreational fishing.
- Body Form: Small, (up to 90mm), moderately deep bodied fish, 5 spines in front of dorsal fin.
- Feeding Strategy: Generalist, omnivore. Eats aquatic insects, plankton, fish larvae.
- Temperature Tolerance: Prefers cool water temperature, but highly adaptable and wide temperature tolerance.
- Habitat/Substrate Preference: Lives in low gradient streams, rivers, ponds and lakes, over silt and sand, around dense vegetation.
- Reproductive Strategy: Summer breeder. Nest built using aquatic vegetation on available substrate above river bed. Male guards nest.

* It has been suggested that brook stickleback in the Rio Grande drainage, and by extension the San Luis Closed Basin and Big Spring Creek, may be a disjunct, native population (Woodling 1985). However, there is no direct support for this hypothesis and it appears unlikely (Bestgen 2018, personal communication). Zuckerman and Behnke (1986) make a compelling argument that it is likely non-native to the Rio Grande Basin, accidentally introduced along with northern pike brought in from Minnesota, or introduced with baitfish (fathead minnow) shipments from Minnesota and

Wisconsin. For the purposes of this Plan, it will be assumed that FHM are native, and that BS are non-native.

Amphibians and Reptiles

Six species of amphibians have been documented within GRSA (Muths and Street 2002; Lahti 2010). The first systematic survey of herpefauna (amphibians and reptiles) of GRSA were conducted in 2001 and 2002 (Muths and Street 2002). The study was restricted to survey sites closely associated with Medano Creek. The study captured four amphibian species; leopard frog (*Rana pipiens*); spadefoot toad (*Spea bombifrons*); Great Plains toad (*Bufo cognatus*) and; Woodhouse's toad (*Bufo woodhousii*). The only predicted amphibian that was not captured was the chorus frog (*Pseudacris triseriata*). However, chorus frogs were heard adjacent to the park, within the Medano-Zapata Ranch, in May of 2001 (Muths and Street 2002). The ranch has since been acquired by the NPS and is now within the administrative boundaries of GRSA. All amphibians caught were in the lower reaches of Medano Creek, associated with stream and wetland areas south and west of the dune field. No amphibians were detected on Medano Creek within the Preserve, where trout were observed at all sites surveyed. Boreal toads (*Anaxyrus boreas boreas*), a rare, at risk species of regional conservation concern were not found during the survey, and their presence has not been detected within the park, or within any habitats in the Sangre de Cristo Mountains adjacent to GRSA. The Sangre de Cristo Mountains are not considered within the historic range of the species.

Tiger salamander (*Ambystoma tigrinum*), were the only water-dependent amphibian found in the survey, but again were restricted to lower elevation sites.

Results suggest that herpefauna are largely restricted to lower elevation, permanent and ephemeral aquatic habitats west of the dunefield, though tiger salamanders have been observed up to elevations of about 9,000 ft. It is likely that the presence of predatory trout in higher elevation lakes and streams has impacted aquatic life stages of herpefauna within the park, but the historical distribution of herpefauna at high elevations, and the magnitude and intensity of such an impact is uncertain.

A single, non-native, painted turtle (*Chrysemys picta*) has been observed in Indian Spring (John Alves, CPW, pers. obs). The species is not native to the region, and the origin of this individual is unknown.

Aquatic Insects

The aquatic insects of Sand Creek were surveyed in 2004 and 2005 (Zuellig et al. 2005) to document aquatic insect diversity with GRSA, and to better understand the potential impacts of a potential piscicide treatment in anticipation of treating Sand Creek to remove undesirable, non-native fish before reintroduction of RGCT, and other members of the regional native fish community.

Sampling began in Spring of 2004, and continued on a monthly or bimonthly basis until October 2005 to ensure that seasonal patterns of insect emergence were captured. Nearly 4,200 specimens were examined from 71 site visits. Results indicated that the aquatic insect community of Sand Creek was composed of taxa typically found in high/mid elevation, cold water, high gradient mountain streams of the region. No species of any management concern were documented (Boris Kondratieff, 2018, pers. comm.). Of the specimens examined, 70 species were identified from 47 genera and 19 families. The caddisflies were the most diverse with 31 species, followed by the stoneflies with 24 species, and the mayflies with 14 species.

More recently (2015), the Colorado Department of Health conducted aquatic insect surveys in Sand Creek as part of their long-term state water quality program (<https://www.colorado.gov/pacific/cdphe/rivers-lakes-and-streams-data>).

While many streams within the park remain unsampled, there is no reason to believe that the results of this study are not reflective of the aquatic insect community in all the mountain streams that flow down the west slope of the Sangre de Cristo Mountains within GRSA.

Anostraca

Fairy shrimp (Order Anostraca) are one of the four orders of crustaceans in the class Branchipoda. They live in permanent and temporary aquatic habitats worldwide, including high altitude mountain lakes in the rocky mountain region. The Colorado fairy shrimp (*Branchinecta coloradensis*) has not been documented within GRSA, but historically they may have been present in lakes and wetland habitats within GRSA prior to the introduction of predatory trout.

Waterbody Descriptions and Fish Management

Medano Creek Watershed

Medano is a small, steep stream with baseflows of ~ 1.5cfs at the point the creek exits the mountains. Medano Creek originates from Medano Lake (11,535ft), a small oligotrophic lake above treeline, high in the Sangre de Cristo Range, and drops ~ 3,000ft down a very steep, boulder/cobble, pool riffle creek ~ 10 miles, flowing WSW until it meets the dunefield at an elevation of ~8,425ft. Medano Creek has one major tributary, Little Medano Creek, located just north of the main Medano Creek drainage, which flows ~ 4.5 miles until it joins Medano Creek adjacent to the dunefield. Medano Creek then flows south along the east edge of the dunefield through a largely sand bedded channel, until it sinks into the dunefield, southwest of the park visitor center. The length of the wetted channel is almost solely dependent on creek flows. At low summer flows, the creek does not flow far into the dunefield. During high, spring snowmelt flows Medano Creek can flow a considerable distance into the dunefield, where it creates “surge flows” as the water travels over the sand bed.

Few systematic native fish surveys were conducted before the 1980’s (Zuckerman and Bergersen 1986). A survey from 1976 documented only brown trout at two sites. Historically, it is likely that Medano Creek was native habitat for Rio Grande cutthroat trout, and possibly Rio Grande sucker, Rio Grande chub and Longnose dace, but the upper and lower extent of each species is unclear. The conclusion is based upon a presumption of their presence from the documented presence of relict populations of these species in other streams within the SLCB, and evidence of their historic use as a food source by prehistoric native human populations. The specific reasons for their extirpation in Medano Creek are unclear.

In the early 1980’s, the Medano Creek watershed was identified by Colorado Division of Parks and Wildlife (CPW); formerly Colorado Division of Wildlife (CDOW), as a priority site for the restoration of Rio Grande cutthroat trout, the trout subspecies, native to the region. In 1985 while still under the administrative authority of the Rio Grande National Forest, USFS, the entire watershed was treated with the piscicide Rotenone to remove unwanted, non-native trout species. CPW records show that the treatment was repeated in 1986, and that the stream was treated with Antimycin in 1987. The treatment was successful, and since 1988 the entire watershed has been managed to maintain a self-sustaining population of pure RGCT derived from fish originating from Placer Creek and West Indian Creek on the Trinchera Ranch in southern Colorado. The population was later supplemented by 100 fish from Osier Creek in southern Colorado. Medano Creek, including the Hudson Branch, now serves as an important refugia for this trout, because it is a closed system where exotic species cannot enter; the creek is bounded by an alpine basin at its source, and the Great Sand Dunes at its terminus.

In 1996, native Rio Grande sucker, a state listed endangered species were introduced to the lower reaches of Medano Creek, followed by additional transplants in 1997 and 1999. Since 2008, ~3,000 juvenile suckers, bred at the state funded J. W. Mumma Native Aquatic Species

Restoration Facility (NASRF) in Alamosa, CO, have been introduced to Medano Creek annually to augment the original population. Recent monitoring has shown that the introduced fish are able to persist and spawn, but there is little evidence of survival of young of year (YOY) fish, or evidence of recruitment of naturally spawned fish to the adult population. It is hypothesized that predation on YOY suckers by the abundant RGCT, the lack of YOY sucker habitat, or both, may be limiting sucker recruitment. The long-term success of this effort to create a self-sustaining RGS population is thus uncertain, and cannot be known until the stocking program is suspended and the sucker population monitored for evidence of natural propagation and recruitment in the absence of continued stocking.

Medano Lake: It is unknown if fish were historically native to Medano Lake, but while the creek is steep and rocky, no obvious barrier to fish movement exists that would prevent fish from reaching the lake over a long period of time. However, prior to the 1985-1987 native fish restoration project, the lake had been stocked in 1974 with non-native cutthroat trout. These non-native trout were removed as part of the restoration project and the lake now contains a good population of native RGCT that are maintained by natural reproduction in the outlet stream, and occasional aerial stocking by CPW.

Sand Creek Watershed

Sand Creek is the largest stream in the park, with baseflows of ~5 cfs at the point the creek exits the mountains (Figure 4.). Sand Creek originates from two lake basins high in the Sangre De Cristo Range. Both Upper Sand Creek Lake (11,770 feet, 26.2 acres, 58.1 feet max. depth, 18.4 feet av. depth), and Lower Sand Creek Lake (11,490 feet, 22.2 acres, 43.0 max depth, 14.8 feet av. depth) are small lakes just at treeline (CPWa 2015). The outflows of the lakes drop very steeply out of the lake basin and meet to form Sand Creek (11,100 feet), before dropping steeply for about 10 miles, until Sand Creek meets the dunefield (~8,350 feet). Sand Creek has two important tributaries. Little Sand Creek originates from Little Sand Creek Lake (~12,000 feet, 8.0 acres) and flows steeply from the lake basin ~2 miles before joining Sand Creek from the north (9,830 feet). Cold Creek is a lower elevation tributary, south of the primary Sand Creek valley, which joins Sand Creek just east of the dunefield. Both of these tributaries are currently unoccupied by fish except for the bottom quarter mile of Little Sand Creek below a natural migration barrier. After leaving the mountains, Sand Creek flows west ~5 miles, around the northern edge of the main dunefield. In most years, spring flows associated with seasonal snowmelt are sufficient for Sand Creek to connect with San Luis Lake. However, in below average spring runoff years, or during lower flow periods outside the runoff season, creek flows seep into the sand, the exact distance dependent upon the magnitude of streamflow.

Several other small lakes are present within the Sand Creek drainage, but none contain fish at this time.

Sand Creek, Little Sand Creek, and Cold Creek, Great Sand Dunes National Park and Preserve.

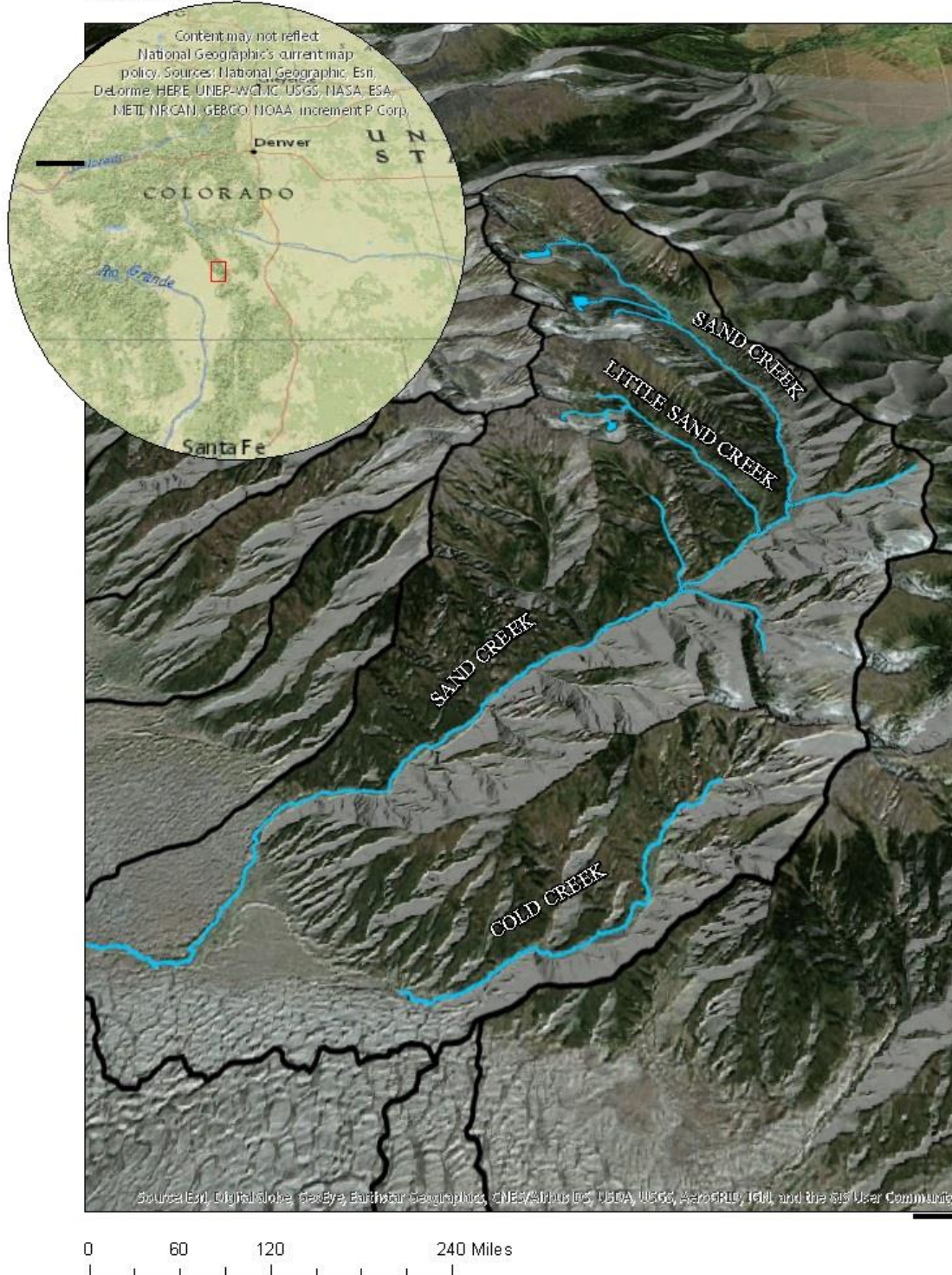


Figure 4. Map of Sand Creek Watershed, GRSA (Source: NPS)

Since Sand Creek was seasonally hydrologically connected to the lake that historically formed at the lowest point in the closed basin, it is likely that Sand Creek was also native habitat for Rio Grande cutthroat trout, and possibly Rio Grande sucker, Rio Grande chub and longnose dace. The lower extent of each species is unclear, but fish presence likely changed seasonally dependent upon the magnitude of Sand Creek flows and their seasonal penetration into the dunefield. However, it is certain that all high elevation lakes within the drainage were fishless due to the presence of barriers to upstream fish movement.

Two barriers exist, both with important management implications. The most upstream barrier exists just below the confluence of the outlet streams from Upper and Lower Sand Creek Lakes. Above this barrier only lake derived, cutthroat trout are present (see below). CPW refers to these fish as “Pikes Peak Native,” though they are actually a cross between non-native Yellowstone and Colorado River cutthroat trout.

Below this barrier, Sand Creek is now dominated by a variety of non-native trout species that have been historically stocked in the reach or are derived from fish stocked above the barrier. The creek now contains brook trout, rainbow trout, a few pure RGCT, a variety of hybrids derived from the upstream lakes and other stocking operations, and possibly a few brown trout in the lower reaches that were stocked as early as the 1890’s.

A second barrier exists on Little Sand Creek about a quarter of a mile above the confluence with Sand Creek. Below this barrier all the fish species in lower Sand Creek are represented. eDNA and electroshocking surveys have confirmed that there are no fish present in the creek above this barrier, though fish are extant in Little Sand Creek Lake (Andrew Todd, USGS, pers. comm. to GRSA).

Recent fish surveys have failed to document fish in Cold Creek, though fish have been observed here in the past (Fred Bunch, NPS, pers. obs.), and it is possible that fish historically occupied this reach. Recent eDNA studies have confirmed that there are no trout species extant in Cold Creek (Andrew Todd, USGS, pers. comm. to GRSA). It is likely that the dunefield at the lower reaches of Cold Creek now acts as a reliable barrier to fish movement from Sand Creek. Due to its low baseflows, the available habitat in Cold Creek is limited. While it may have historically contained some native fish, at this time the park will not introduce fish, and Cold Creek will continue to be managed to maintain its fishless condition, unless fish were to naturally colonize from Sand Creek.

eDNA and electrofishing studies have also confirmed that fish are not present in Smith Creek and McKenney Creek; small tributaries of Sand Creek. However, brook trout were captured in the lower 30 meters of Jones Creek, upstream of the confluence with Sand Creek, to the trail crossing. Similarly, cutthroat trout were captured in the lower 15 meters of “Bunch Creek” (a small tributary entering Sand Creek downstream of the outlet creek from Lower Sand Creek

Lake), upstream of its confluence with Sand Creek (Andrew Todd, USGS, pers. comm. to GRSA).

Currently, all three major lakes within the Sand Creek basin contain varying mixtures of pure RGCT, cutthroat-cutthroat hybrids and cutthroat- rainbow hybrids, the result of natural reproduction of many past stocking efforts conducted by the CPW to provide recreational fishing, at a time when the Preserve was administered by the U.S. Forest Service, prior to it being incorporated into GRSA.

Upper Sand Creek Lake has a healthy population of trout whose population is sustained by a small amount of natural reproduction in the inlet and outlet streams, and some supplemental stocking as necessary. Amplified fragment length polymorphism (AFLP) analysis of 30 trout from Upper Sand Creek Lake revealed that trout are genetically dominated by Rio Grande cutthroat alleles. These trout include some pure Rio Grande cutthroat trout, but also many cutthroat-cutthroat and cutthroat-rainbow hybrids of various combinations, with contributions from Yellowstone cutthroat trout, greenback cutthroat trout, Colorado River cutthroat trout, and rainbow trout.

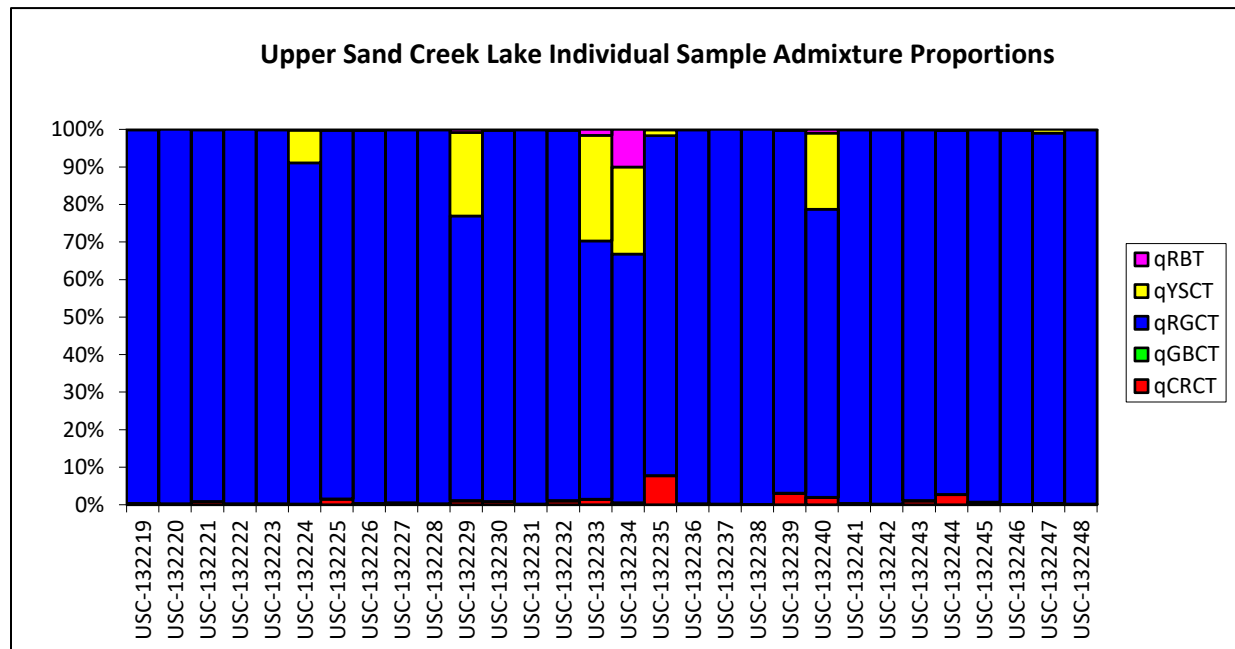


Figure 5. Results of AFLP analysis of thirty trout from Upper Sand Creek Lake (Wood and Epp 2015).

Lower Sand Creek Lake is considerably more productive than the upper lake due to its lower elevation, shallower depth and location at the tree line that provides a greater source of nutrients and potential food items. The lake contains a very abundant trout population sustained by a larger inlet and outlet stream reach with adequate spawning habitat. Trout from Lower Sand Creek Lake are genetically dominated by Yellowstone cutthroat, with contributions from other

Colorado River cutthroat subspecies (except greenback cutthroat trout). The low occurrence of rainbow trout markers is thought to be due to natural cutthroat trout genetic diversity, and not introgression with rainbow trout (John Alves, CPW, pers. comm. with GRCA.). There are no records of stocking rainbow trout in Upper or Lower Sand Creed lakes since 1973. There is a 1958 record of rainbow stocking in Sand Creek but the location (Upper vs Lower Sand Creek) is not known.

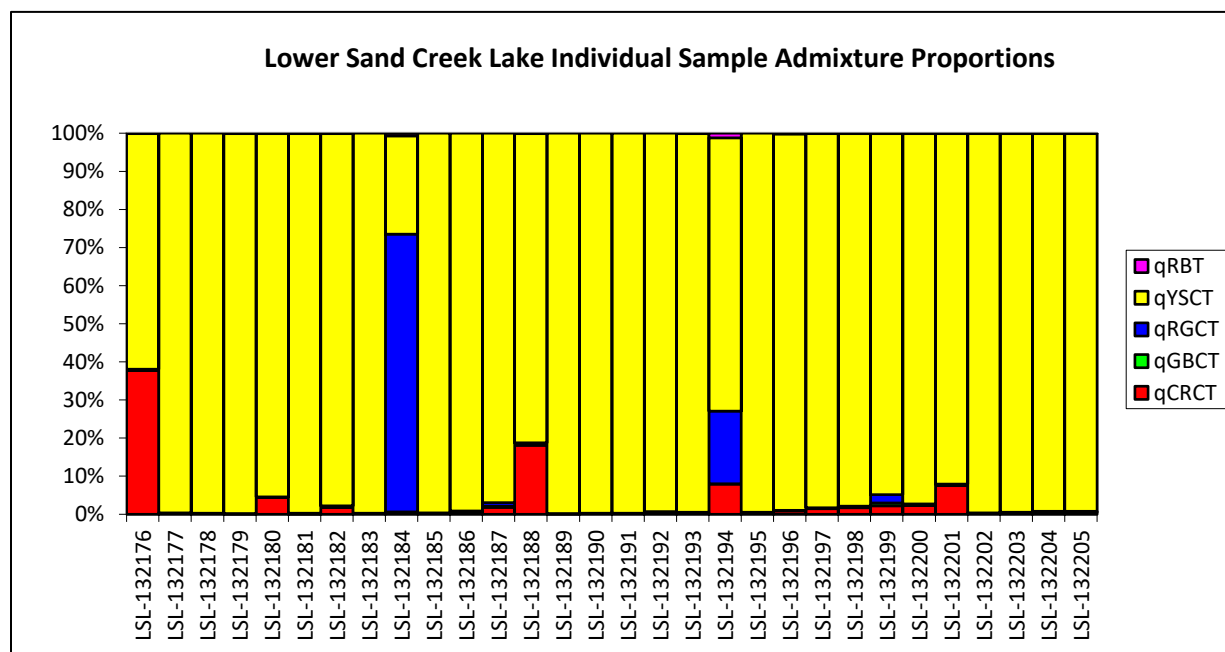


Figure 6. Results of AFLP analysis of thirty fish from Lower Sand Creek Lake (Wood and Epp 2015)

Little Sand Creek Lake contains a small population of pure RGCT. The lake is very high and unproductive, with little, or perhaps no natural recruitment due to the lack of suitable spawning habitat. The fish remaining in the lake are all large, old fish derived from previous stocking efforts. Without further stocking, it is believed that this population will soon be extirpated.

Other than the pure RGCT in Little Sand Creek Lake, none of the trout in the Sand Creek watershed have any conservation value.

Mosca Creek

Mosca is a small tributary creek that flows due west, ~ 4 miles from a low point on the Continental Divide (~9,750 feet) until it joins Medano Creek (8,070 feet), just east of the main dunefield, north of the park Visitor Center. While natural baseflows are low (0.25 cfs), ~ 3.5 miles of the creek is perennial, and it is believed that historically, native fish may have been present in Mosca Creek (Zuckerman and Bergerson 1986), at least during wetter periods when baseflows were maintained and fish could recolonize from the greater Medano Creek watershed.

CPW records indicate that the stream was stocked with “Pikes Peak Natives” in 1974. Due to its low baseflows, the available habitat in Mosca Creek is limited and at this time the Park believes the stream is fishless. The park does not intend to introduce fish to Mosca Creek and it will continue to be managed to maintain its presumed fishless condition.

Spring Creeks

Big and Little Spring Creek are sand-bedded spring creeks that originate from headsprings on the western edge of the dunefield. The source water is cold with a constant temperature of 56 °F (reflective of the average annual temperature of the area), but streams can warm up to 80 °F as they flow downstream. Both springs gain water along their course and flow southwest before terminating in the low point of the historic San Luis Closed Basin.

The groundwater flows from a shallow aquifer below the dunefield derived from surface water soaking into the dunefield sands from rain and snowmelt on the dunes themselves, or derived from mountain creeks. In certain areas the groundwater is known to be tritium free, suggesting that the residence time in the dunefield is more than 75 years; at least as long as the time between now, and the first atomic explosion that occurred in 1944. Stable isotope analysis has determined that the water in the confined aquifer below the dunes is at least 30,000 years old (Rupert and Plumber 2004).

Little Spring Creek

Little Spring Creek flows ~7 miles from its source to its termination south of Ln 6 N Road in a group of small playa lakes. From its source it gains flow, and reaches a very constant flow of about 1.5 cfs, at the point of maximum discharge. The creek travels ~4 miles before flows are captured in a cattle tank (aka Suzy Lake), from which they evaporate. Below the stock tank, the creek gains water and continues to flow southwest to its terminus. LSC is separated from San Luis Lake by a low divide and does not naturally connect with the lake basin.

Historically, Little Spring Creek was seasonally connected to the large playa lake that formed during spring runoff in the low point of the closed basin, in the general area of the present San Luis Lake. Consequently, it is possible, that at least seasonally, it contained all fish species represented within tributary streams of the closed basin (RGCT, RGC, RGS, LND, and fathead minnow). However, as a sand-bedded stream, available fish habitat was limited, but it was perhaps sufficient to have been able to sustain populations of fish species that could reproduce in the absence of hard gravel substrates (fathead minnow). This may have been more likely when the creek was in better condition before the direct and cumulative impacts of water development and cattle/bison grazing that have greatly impacted the LSC watershed.

No fish have been recently documented within Little Spring Creek, and it is currently believed to be fishless.

Big Spring Creek

Big Spring Creek is a larger version of Little Spring Creek, originating ~ 3 miles north of the Little Spring Creek springhead on the western edge of the dunefield. It flows ~ 9 miles before entering an

extensive wetland complex prior to emptying into San Luis Lake. The current headspring of BSC is a short distance (~100 yards) downstream of Indian Spring Lake, a stock pond that was excavated into the ground water table just upstream of the present (but maybe not historic?) location of the headspring. The source spring flows at ~0.5 cfs but rapidly gains water until it reaches a very constant flow of about ~7 cfs at the point of maximum discharge.

BSC and Indian Spring is home to a large, presumptive native population of fathead minnows “which may have scientific and historic significance” (Hubbs and Miller 1984; Zuckerman and Bergersen 1986). This population is thought to be a relict population that existed in the SLCB streams and wetland complex that were seasonally connected through the historical playa lake. Individuals from this population were possibly captured within Indian Springs pond upon initial modification of the original headspring, and were native in BSC above the playa.

According to Hubbs and Miller (1984), “these fish may have great zoogeographical significance in that they are intermediate in meristic and morphological characters between the Rio Grande and Arkansas River subspecies of fathead minnow. Indian Springs and the other hydrologic features of the Great Sand Dunes National Monument area are too geographically recent for unique fishes to have evolved in isolation from the Rio Grande drainage. This does not mean that the processes of genetic divergence are not operating, but rather that they have not reached the state of taxonomic recognition.”

The native FHM population coexists with an introduced population of non-native brook sticklebacks. It is almost certain that this population was established in San Luis Lake as a bait bucket introduction during recreational fishing from which individuals have moved upstream.

Other Waterbodies

Many other small streams, wetlands, and playa lakes exist within GRSA. However, at this time, only Medano Creek, Sand Creek and Big Spring Creek have fish. There are not believed to be any fish in any other GRSA waterbodies. With the possible exception of Little Spring Creek, that historically likely contained some native fish species, it is the intent of GRSA to keep these streams fishless for the benefit of other native aquatic species.

NPS Mission and Management Policies

NPS Mission

The National Park Service preserves unimpaired the natural and cultural resources and values of the national park system for the enjoyment, education, and inspiration of this and future generations. The Park Service cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world.

Preserving park natural resources is one of the core responsibilities of NPS managers (Natural Resource Management Mission, Chapter 4, NPS Management Policies 2006). The NPS has distilled this responsibility into a separate natural resources mission statement: The National Park Service will preserve and protect the natural resources, processes, systems, and values of units of the national park system in an unimpaired condition to perpetuate their inherent integrity and to provide present and future generations with the opportunity to enjoy them.

NPS Natural Resource Management Policies

To achieve the NPS Mission, the NPS creates laws to regulate the management and use of park resources, including fish and fishing. However, it is the NPS management policies that provide guidance on the appropriate standards and thresholds for protection. Such policies form the basis of park regulations that protect resources consistent with the NPS mission, and ensure that all parks are managed and regulated in a consistent and proper manner in pursuit of NPS goals. Adherence to policy is mandatory for all NPS employees, unless specifically waived or modified by the Secretary, the Assistant Secretary [of Department of Interior], or the Director [of the NPS].

NPS policies that pertain to the management of native aquatic resources, and the management and regulation of fishing are located throughout the current version of NPS Management Policies. Superintendents have the primary responsibility to ensure that fishing in parks is managed consistent with management policies and to direct their staffs to enforce federal fishing regulations, including adopted state regulations, and to review and amend regulations as necessary to fulfill the NPS mission and comply with the Organic Act.

The following is an abridged summary of the important management policies relevant to the management and regulation of aquatic species, fish and fishing in parks, including GRSA. Apart from a few words used to preserve the context, the text is quoted directly from the NPS Management Policies. The most recent, complete service-wide policies may be found at: <http://www.nps.gov/policy/mp/policies.html>.

Chapter 1: The Foundation

The National Park Service must manage park resources and values in such manner and such means as will leave them unimpaired for the enjoyment of future generations.

The Laws Generally Governing Park Management

(M.P. 1.4.1) The most important statutory directive for the National Park Service is provided by interrelated provisions of the [NPS Organic Act of 1916](#) and the [NPS General Authorities Act of 1970](#), including amendments to the latter law enacted in 1978.

The key management-related provision of the Organic Act is as follows:

[The National Park Service] shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations hereinafter specified ... by such means and measures as conform to the fundamental purpose of the said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.

The NPS Obligation to Conserve and Provide for Enjoyment of Park Resources and Values

(M.P. 1.4.3). The fundamental purpose of all parks also includes providing for the enjoyment of park resources and values by the people of the United States. Congress, recognizing that the enjoyment by future generations of the national parks can be ensured only if the superb quality of park resources and values is left unimpaired, has provided that when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant.

What Constitutes Impairment of Park Resources and Values

(M.P. 1.4.5). The impairment that is prohibited by the Organic Act and the General Authorities Act is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values.

Unacceptable Impacts

(M.P. 1.4.7.1). The impact threshold at which impairment occurs is not always readily apparent. Therefore, the Service will apply a standard that offers greater assurance that impairment will not occur. The Service will do this by avoiding impacts that it determines to be unacceptable. These are impacts that fall short of impairment, but are still not acceptable within a particular park's environment.

Chapter 4: Natural Resource Management

Management of Native Animals (Fish)

(NPS MP 4.4.1). The NPS will maintain as parts of the natural ecosystems of parks, all fishes and other aquatic species native to park ecosystems by (1) preserving and restoring the natural abundances, diversities, dynamics, distributions, habitats and behaviors of native fish populations and the communities and ecosystems where they occur; and (2) minimizing human impacts on native fish populations, communities and ecosystems, and the processes that sustain them.

Management of Threatened or Endangered Plants and Animals

(M.P. 4.4.2.3): The Service will undertake active management programs to inventory, monitor, restore, and maintain listed species' habitats; control detrimental nonnative species; manage detrimental visitor access; and reestablish extirpated populations as necessary to maintain the species and the habitats upon which they depend.

The National Park Service will inventory, monitor, and manage state and locally listed species in a manner similar to its treatment of federally listed species to the greatest extent possible. In addition, the Service will inventory other native species that are of special management concern to parks (such as rare, declining, sensitive, or unique species and their habitats) and will manage them to maintain their natural distribution and abundance.

Harvest of Plants and Animals by the Public

(M.P. 4.4.3). Habitat manipulation for harvested species will not include the artificial manipulation of habitat to increase the numbers of a harvested species above its natural range in population levels.

Management of Non-Native (Exotic) Species

(M.P. 4.4.4). Exotic [fish] species will not be allowed to displace native [fish] or other aquatic native species, if displacement can be prevented. All exotic fish species that are not maintained to meet an identified park purpose will be managed – up to and including eradication- if control is prudent and feasible (M.P. 4.4.4.2).

The NPS will manage exotic (nonnative or invasive) species by eradicating their populations if 1) control is prudent and feasible, and 2) the exotic species interferes with natural processes and the perpetuation of natural features, native species, or natural habitats (M.P. 4.4.4.2).

The NPS will manage fishing activities (see MP 8.2.2.5) and may encourage the intensive harvesting of exotic fish species in certain situations when needed to meet park management objectives (NPS MP 4.4.3).

Watershed and Stream Processes

(M.P. 4.6.6) The NPS will also manage watersheds as complete hydrologic systems and minimize human-caused disturbances. The NPS will protect watersheds and stream features primarily by avoiding impacts on watershed and riparian vegetation and by allowing natural fluvial processes to proceed unimpeded (NPS 2006).

Chapter 8: Use of the Parks

The Service will focus special attention on visitor enjoyment of the parks while recognizing that the NPS mission is to conserve unimpaired each park's natural and cultural resources and values for the enjoyment, education, and inspiration of present and future generations.

Fishing

(M.P. 8.2.2.5) Recreational fishing will be allowed in parks when it is authorized or not specifically prohibited by federal law provided that it has been determined to be an appropriate use per section 8.1 of these policies. When fishing is allowed, it will be conducted in accordance with applicable

federal laws and treaty rights, and non-conflicting state laws and regulations. The Service will manage fishing activities to achieve management objectives. Before the Service issues regulations or other restrictions, representatives of appropriate tribes and state and federal agencies will be consulted to ensure that all available scientific data are considered in the decision-making process. Any such regulations or other restrictions will be developed with public involvement and in consultation with fish and wildlife management agencies as appropriate, consistent with departmental policy at 43 CFR Part 24, and as described in section 4.4.3.

NPS Management of Fishing

The fundamental purpose of the national park system begins with a mandate to conserve park resources and values for the benefit and inspiration of all people of the United States, and to regulate their use accordingly.

Native fish have biological, recreational and cultural heritage values and play critical roles in maintaining the ecological health of NPS area ecosystems. Fish are unique in the NPS; they are the only animal that may be caught and harvested in parks by general regulation (36CFR2.3). Fishing, and the management of fish resources (including non-native fish) to provide fishing opportunities, is an activity that has the potential to alter the abundance, size and age structure, and behavior of native fish populations with consequences for ecosystem function. The National Park Service allows fishing as a means of providing for public enjoyment and customary and traditional use, but must ensure that it is managed, and regulated in a manner that avoids unacceptable impacts and impairment of park resources.

Where fishing is allowed it is recognized that there will be impacts to park resources. However, park Superintendents are responsible for ensuring that the impacts associated with fishing are not in conflict with the fundamental purpose of conserving native species and functioning ecosystems. As NPS Management Policies make clear, parks must determine when and where fishing is an appropriate use, determine the nature of that use, and develop monitoring and assessment tools, standards, indicators to determine if fishing is causing impacts that may lead to impairment. It is the responsibility of parks to establish the level at which the impacts resulting from fishing become unacceptable, and if evidence indicates that such impacts are occurring, to take all measures within NPS authority to ensure that the threshold is not reached.

Any apparent conflict is resolved by adherence to the underlying principles that guide the development of all NPS management policies. In cases of uncertainty as to the impacts of activities on park natural resources, park managers must ensure that conservation will be predominant when there is a potential conflict between the protection of resources and their use. In doing so, a park must “employ a tone that leaves no room for misunderstanding the National Park Service’s commitment to the public’s appropriate use and enjoyment, including education and interpretation, of park resources, while preventing unacceptable impacts.”

Important Note: Fishing management in this context is concerned not only with the direct impacts of fishing on native fish populations, but also the impacts of past management activities on native species (e.g., stocking of non-native sports fish and the subsequent impacts to native fish).

NPS Regulation of Fishing

Fishing is allowed in all parks as a traditional activity unless specifically prohibited. Unless otherwise provided in law, fishing in national parks is managed and regulated by the National Park Service under the authority provided in the NPS Organic Act. Regulations within NPS units strive to permit reasonable use and enjoyment of fish resources without compromising the health and biological diversity of native species and aquatic ecosystems. Areas inside park boundaries may be closed to fishing to protect spawning and nursery areas, threatened and endangered fish species or other resources that are at risk due to habitat loss or over-fishing.

By regulation (36CFR1), fish are defined as “any member of the subclasses Agnatha, Chondrichthyes, or Osteichthyes, or any mollusk or crustacean in salt water”. Therefore, fishing regulations cover all fin-fish in both fresh and salt water. Other taxa (e.g. horseshoe crabs), and freshwater mollusks and crustaceans (freshwater crayfish) are considered “wildlife,” and cannot be fished for, or harvested unless specifically allowed by regulations addressing wildlife.

Fishing in national parks is conducted in accordance with the **NPS Service-wide general fishing regulations**, published in the Code of Federal Regulations at 36 CFR §2.3 (Appendix I). The NPS has determined that these regulations are widely applicable and provide for the proper use of fisheries resources in all NPS units. Unless otherwise provided for in statute (e.g. law that created the park), or subsequently modified by the park, the general fishing regulations apply in all park waters, at all times, unless modified by special park regulations.

State regulations are adopted as federal regulations under 36 CFR § 2.3(a) to the extent that they do not conflict with the NPS general regulations. Where there is a conflict between an adopted state regulation and the general federal regulations, the federal regulation applies. In order to reduce the opportunity for conflicts between federal and state regulations, NPS policy encourages NPS units to adopt fishing regulations that are at least, or more restrictive than state regulations.

For many parks, the federally adopted state regulations are the only ones that an angler needs to be aware of. However, 36 C.F.R. §§ 1.2, and 1.5 provides the authority for parks to further modify the general fishing regulations to meet park specific management goals or when the NPS general fishing regulations and state regulations, by themselves, are inadequate to protect park fish resources consistent with the NPS conservation mission. Permanent “**Special Park Regulations**” can be found in the Code of Federal Regulations at 36 CFR §7 and 36 CFR §13 (Alaska).

Sometimes, in order to protect important resources, it is necessary for a park to adopt temporary or emergency fishing regulations. These are published in the **Superintendents Compendium**; the annual compilation of designations, closures, permit requirements, and other restrictions made by the Superintendent, in addition to what is contained in the NPS General Fishing Regulations (36CFR§2.3) and Park Special Regulations (36 CFR §7 and §13). Regulations that may be changed from year to year to better protect fish resources, may also be published here.

Anglers should be aware that when parks state that “state regulations apply,” it is important to remember that the state regulations are adopted as federal regulations, and only apply to the extent

that they do not conflict with the NPS Service-wide General Fishing Regulations, or are amended by Park Special Regulations or the Superintendents Compendium.

Cooperation with States and Others

Sport-fishing regulations in NPS units are generally established in consultation with (but not deference to) the state(s) within which a park occurs. Although park managers are ultimately responsible for managing fish and aquatic ecosystems, and regulating their use within their boundaries, Department of the Interior regulations (43 CFR § 24) encourage the development of cooperative agreements with states and requires the preparation of fish and wildlife management plans in cooperation with state fish and wildlife agencies and other Federal agencies when appropriate. (43 CFR § 24.4). Memoranda of Understanding (MOU) and joint fishery management plans are encouraged for parks with fishery resources that are in common or continuous with those managed by states or other entities. These documents should be used to articulate goals and objectives and define management and regulatory responsibilities.

Park staff are encouraged to work with local communities and other user groups in the management of fisheries through cooperative conservation principles found in NPS Management Policies (2006). Such coordination is identified as a best practice in Director's Order #75A: Civic Engagement and Public Involvement (See Management Policies § 1.6-1.8) and may be required as part of the public participation process involved in compliance with NEPA.

While 43 CFR § 24.6 encourages cooperation and communication with state agencies, "It is not intended to bind the National Park Service to the recommendations of the State or lessen the authority or responsibility of the Superintendents to ensure that management actions are consistent with public safety and enjoyment, sound resource management principles, and are compatible with the primary objectives for which the park area is established" (48 F.R. 30252).

Accordingly, unless otherwise provided for in statute, the NPS always has the responsibility to ensure that park fisheries and fishing resources are managed in a manner that is consistent with the NPS mission. However, it is always desirable to work cooperatively with the State, to reach mutually agreeable solutions, consistent with NPS statutory authority, regulation and policy. Both the NPS and the State has identified the restoration of the native fish community within GRSA as a conservation priority species of considerable conservation need.

Fishing Management and Regulation in GRSA

Fishing in GRSA is managed and regulated by the NPS under the authority of the National Park Service Organic Act (16 U.S.C. §1). While the ultimate management authority resides with the NPS, GRSA manages fish and fishing resources in close cooperation with the State of Colorado to meet mutually agreeable goals consistent with numerous federal and state management plans to which both the park and state are signatories (see GRSA Natural Resource Planning Priorities below).

To date, the state has promulgated fishing regulations for park streams which are then adopted as federal regulations consistent with 36CFR§ 2.3(a) of the NPS general fishing regulations, to the extent that they did not conflict with other NPS general fishing regulations.

A Colorado state fishing license is required to fish in GRSA.

Fishing in GRSA occurs in only the Medano and Sand Creek watersheds. Medano Lake and Medano Creek possesses a population of rare, genetically pure Rio Grande Cutthroat trout of high conservation value that were introduced in 1987. Fishing regulations that apply to Medano Creek may be found in the Colorado fishing regulation brochure. Catch and release fishing with single barbless hooks and artificial flies and lures only is allowed in the lake, creek, and all tributaries, and harvest of fish is strictly prohibited.

2017 Colorado Fishing Regulations

Season: April 1, 2017 – March 31, 2018

MEDANO CREEK - SAGUACHE, ALAMOSA

1. Artificial flies and lures only.
2. Cutthroat must be returned to water immediately.

MEDANO CREEK, HUDSON BRANCH - SAGUACHE

1. Artificial flies and lures only.
2. Cutthroat must be returned to water immediately.

MEDANO CREEK, LITTLE - SAGUACHE

1. Artificial flies and lures only.
2. Cutthroat must be returned to water immediately

At this time, Sand Creek possesses a variety of non-native trout species of little conservation value. At this time, no waterbody specific fishing regulations have been promulgated by either the state or GRSA. Accordingly, the NPS general fishing regulations apply including:

“36CFR2.3(d) The following are prohibited: (7) Failing to return carefully and immediately to the water from which it was taken a fish that does not meet size or species restrictions or that the person chooses not to keep. Fish so released shall not be included in the catch or possession limit: Provided, that at the time of catching the person did not possess the legal limit of fish.”

Accordingly, since the state has not set a waterbody specific harvest limit, all fish caught in Sand Creek are harvested under the NPS general fishing regulations and the states’ non-conflicting, general fishing regulations which allow a daily bag limit of four trout of any species, and a daily bag limit of an additional ten brook trout of 8 inches or less (see Colorado Fishing Brochure, Page 3).

It is anticipated that fishing regulations for GRSA will continue to be developed in close cooperation between NPS and the State to achieve mutually agreeable management goals

consistent with NPS regulation and policy, and promulgated by the State and adopted by the NPS consistent with 36CFR2.3(a).

Enforcement of Fishing Regulations

GRSA is a concurrent jurisdiction park. Concurrent jurisdiction exists when both the state and federal governments have authority over a particular area. Usually this occurs when a state has ceded land to the United States but has reserved to itself the right to exercise its state authority, so that both federal and non-conflicting state laws apply. In parks with concurrent jurisdiction, both the state and federal governments may prosecute those who violate their respective laws. This arrangement for GRSA was codified in Colorado Senate Bill No. 01-231, June, 2001.

At GRSA, the NPS generally enforces the fishing regulations, but the state may enforce violations of state regulations to the extent that they do not conflict with federal regulations.

Standards and Thresholds to Prevent Unacceptable Impacts

NPS Management Policies make clear that the primary statutory responsibility of the NPS is to leave park resources unimpaired. The impact threshold at which impairment occurs is not always apparent. Therefore the NPS ensures that impairment does not occur by managing to avoid “unacceptable impacts” that may lead to impairment, and identifies management standards and thresholds as benchmarks that must be attained.

Recreational Fishing and Visitor Carrying Capacity (M.P. 8.2.1)

NPS policy requires that recreational fishing should not cause unacceptable impacts to natural resources, including the GRSA native fish community. By identifying and staying within carrying capacities, Superintendents can manage park uses that may unacceptably impact the resources and values for which the parks were established (NPS MP 2006 8.2.1). Narrative qualitative standards have been identified in NPS and include:

- Preservation of the natural abundances, diversities, dynamics, distributions, habitats and behaviors of native fish populations and minimize human impacts on native fish populations, (see NPS MP 4.4.1).
- Management of visitor carrying capacity; the type and level of visitor use that can be accommodated, while sustaining the desired resource and visitor experience conditions in the park.

Management Plan

Purpose of Management Plan

The GRSA Native Fish Management Strategy provides a programmatic foundation for the future long-term management of native fish populations and other water-dependent species within all lands under its administrative control within GRSA. The purpose of the Strategy is to implement a management approach that will ensure the conservation, protection, and restoration of native aquatic species, including the regional native fish community, consistent with the NPS Mission and Management Policies (2006).

Need for Management Plan

The need for the Strategy is for GRSA to manage the extant fish community and fishing consistent with NPS missions, goals, and current NPS management policies to; protect native, and rare and at-risk species; restore such populations to preclude listing under the Endangered Species Act, and; provide opportunities for the public to enjoy the resources, such as recreational fishing and wildlife viewing.

GRSA Natural Resource Planning Priorities

The GRSA Foundation Document (NPS 2017) provides a foundation for future planning and management decisions, and is the park's most important planning document. The core components include a description of the park's purpose, significance, fundamental resources and values, other important resources and values, and interpretive themes. The foundation document also includes special mandates and administrative commitments, an assessment of planning and data needs identifies planning issues, planning products to be developed, and the associated studies and data required for park planning.

GRSA has identified water resources, the natural biological diversity, and visitor opportunities to fish within the Preserve, as "fundamental" resources and values within the park and preserve.

Fundamental resources and values (FRVs) are those features that are truly significant about a park and have been determined to warrant primary consideration during planning and management. They are considered a resource of such importance that if they are allowed to deteriorate, the park purpose and/or significance could be jeopardized. Through this process, the following management and planning opportunities and needs have been identified, all of which are consistent with and will be addressed through implementation of the actions proposed in the plan.

Specifically, the GRSA Foundation Plan has identified the extant populations of Rio Grande cutthroat trout and Rio Grande sucker in Medano Creek as fundamental resources; "There are two native fish species that inhabit the park. The Rio Grande cutthroat trout is a species of special concern that has been petitioned for listing under the federal Endangered Species Act, although listing was determined not warranted in 2014. The Rio Grande sucker is a state endangered species."

Furthermore, the park has identified the ongoing process to implement the proposed native fish conservation project in the Sand Creek (introduction of RGCT), of which this native fish management plan is a major component, as a high priority planning need. The park has also

identified the need for a climate change vulnerability assessment for Rio Grande cutthroat trout as a high priority planning need to support this effort.

State of Colorado Planning Priorities

The Colorado State Wildlife Action Plan (SWAP, CPWb 2015) was written in fulfillment of the requirements of the State Wildlife Grants program (Title IX, Public Law 106-553 and Title 1, Public Law 107-63). The purpose of this federal law is to provide federal financial assistance to states to assist them in their efforts to improve and secure the status of Species of Greatest Conservation Need (SGCN) so that they do not require protection via federal or state listing regulations.

The SWAP is the states roadmap for collaboration between a diverse suite of federal, state, and other stakeholders towards this end, and serves as a blueprint for improving the knowledge about native wildlife and plants (most of which are not commonly hunted or fished), the threats they face, and strategies to conserve them.

The SWAP identifies the Rio Grande cutthroat trout, the Rio Grande sucker, and the Rio Grande Chub, all as Tier 1 Species; those species “which are truly of highest conservation priority in the state.” These species are typically listed or proposed as threatened or endangered at the federal or state level, face urgent threats, have high ecological and conservation value, where there are few regulatory issues that limit the success of proposed conservation actions. The RGS has been listed as state endangered due to its highly restricted distribution. The RGCT and RGC are both listed as Species of Greatest Conservation Need (SGNC).

The Colorado Natural Heritage Program had identified RGS and RGC as an S1 species; a species that is “critically imperiled” and “at very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.” All species are listed as “sensitive” by the USFS and BLM. The USFWS considers the RGCT to be of conservation need, but determined that listing of the fish under the federal ESA was “not warranted” due to the development and implementation of a regional, multi-stakeholder conservation agreement in lieu of listing (USFWS 2014). The Center for Biological Diversity subsequently sued the USFWS protesting this decision (Southwest Center for Biological Diversity 2016).

Accordingly, Colorado Parks and Wildlife Department considers conservation of the three regionally native fish species to be a conservation priority and is extremely interested in partnering with NPS to expand the range of all three species within GRSA. The removal of undesirable fish, and the introduction of RGCT, RGS, RGC and LND into available habitats within GRSA is consider an urgent state and park conservation priority.

Opportunities for Aquatic Species Restoration

Fish are believed to be native to streams in GRSA, but did not naturally occur in lakes above fish barriers on Sand Creek. While fish are not native to these waterbodies within the Preserve, their current presence; their established recreational importance; the high recreational and conservation value of past RGCT and RGS introductions to perennial GRSA waterbodies; the opportunity for further introduction of the native Rio Grande fish community; and considerable interest from state

fish managers, other federal agencies and interested stakeholders (public, Trout Unlimited, the Nature Conservancy), provide a compelling case to manage additional aquatic habitats within GRSA for “native” fish restoration that provide additional desired recreational and conservation benefits, and important cultural and natural resource values.

Additionally, the presence of predatory fish in previously fishless lakes and streams certainly had enormous impacts to the native aquatic fauna that was historically present. Such species might have included leopard frogs, tiger salamanders, and Rocky Mountain fairy shrimp, all of which have aquatic life stages or are wholly aquatic. While it is difficult to know if these species were present, fishless lakes present a rare opportunity to introduce/restore other rare aquatic species that are in need of conservation and recovery.

While the argument could be made that GRSA, as a unit of the NPS, might pursue returning previously fishless lakes in the Preserve to its pre-European condition by removing fish and not replacing them, the reality is that the resources, public support, and inter-agency cooperation required to conduct such a removal would not be available if the potential recreational and conservation gains were not realized.

Accordingly, GRSA is proposing to; pursue opportunities to remove unwanted fish species presently in the Park and Preserve, as possible; introduce the regional Rio Grande fish community to the four major drainages (Medano, Sand, Big Spring, Little Spring), as appropriate (Table 1), and; manage the remainder of the parks streams and lakes fishless for the benefit, and possible introduction of other native water-dependent species (amphibians, Anastraca).

Unacceptable Impact Thresholds

NPS policies require that GRCA seek a balance between the dual mandate to protect park natural resources while providing for visitor enjoyment and recreational fishing without creating unacceptable impacts (for example, the establishment of fishing trails, or an increased mortality of native game fish (RGCT)), and set visitor carrying capacity accordingly.

It is proposed that visitor carrying capacity regarding recreational fishing be assessed using the following direct and surrogate indicators and thresholds:

Fish Abundance

Annual fishing mortality exceeds 20% of annual population estimate.

Fish Size

Number of fish greater than 80th percentile length for the habitat is less than 10% of population.

Hooking Injury

More than 25% of the fish have hooking injuries and deformations related to recreational fishing.

Riparian Vegetation

Permanent bare ground at lake shorelines and along the river margin of a magnitude and intensity at that does not recover between fishing seasons.

It is not anticipated that the identified unacceptable impact thresholds will always be monitored as part of a regular monitoring plan, but will be used as a threshold to implement corrective management actions should natural resource managers believe unacceptable impacts may be occurring. These thresholds may be adjusted in the future through an adaptive management process if monitoring results indicate the need.

Goals of GRSA Native Fish Management Plan

- Conserve, protect, and restore the native aquatic ecosystem, including the regional native fish community, consistent with the NPS mission and NPS Biological Management Policies.
- Partner with federal agencies (BLM, FWS, USFS), state, surrounding private landowners (TNC) and other stakeholders (TU) to protect and conserve at risk and rare native fish species to preclude listing under the federal Endangered Species Act.
- Provide recreational fishing opportunities to fish for native species, and regulate fishing, to prevent unacceptable impacts to the native aquatic ecosystem.

Management Strategies

In overview, the two major drainages on, and flowing from the Preserve portion of GRSA will be managed for RGCT, other members of the native fish assemblage (RGC, RGS, and LND), and the provision of recreational fishing (Table 1.).

The two major drainages within the Park portion of GRSA, originating from the west side of the dune field, will primarily be managed for the conservation of native FHM and the introduction of non-predatory native RGS, with no fishing allowed (Table 1.).

Remove, and/or control non-native fish in GRSA, to the extent prudent and feasible

Currently, non-native fish reside in two streams within GRSA; Sand Creek, and Big Spring Creek. With the exception of Little Sand Creek Lake which is isolated by a fish barrier from Sand Creek and contains only native RGCT, the remainder of the Sand Creek drainage contains only non-native fish. Consequently, non-native fish may be removed from all lakes and streams within the watershed (other than Little Sand Creek Lake) by the application of the piscicide Rotenone without impacting any native fish.

No efforts will be made to remove the fish that presently occupy Little Sand Creek Lake. While fish may continue to survive, they are pure RGCT. Consequently if after treatment of Sand Creek, individuals were to move from the lake downstream to Sand Creek, or other pure RGCT were to be stocked over them, reproduction will not result in any genetic impacts; all fish in the watershed would still be pure RGCT.

- **In cooperation with CPW, treat Sand Creek watershed with piscicide (Rotenone) to remove non-native trout from Sand Creek watershed**

The primary project proposed in this Native Fish Management Plan is the removal of non-native trout from Sand Creek by piscicide application, and the restoration/introduction of native RGCT, and other members of the native fish community, to the entire Sand Creek watershed. Chemical piscicide is the preferred and most cost-effective method for removing fish from Sand Creek because alternative mechanical methods (e.g., electrofishing or trapping) are not effective in streams and lakes of this size.

It is proposed that CPW will be the lead agency conducting the treatment. They are an essential cooperator with the NPS, have conducted many of these projects in the past, and have the technical, policy and compliance expertise necessary to accomplish the project. CPW staff will conduct the necessary state/federal environmental compliance process for application of a piscicide to Colorado waters, and will provide staff that are certified in the use of piscicides, consistent with the State of Colorado Standard Operating Procedure (SOP) for Chemical Reclamation Projects (CPW 2009), and the Water Quality Control Division of the Colorado Department of Health, Colorado Discharge Permit System (CDPS) General Permit For Discharges From Applications of Pesticides (COG860000) under the authority of the Colorado Water Quality Control Act (25-8-101 et seq., CRS, 1973 as amended).

The CPW SOP is similar to the American Fisheries Society Standard Operating Procedure for the use of rotenone, and the NPS Field Manual for the use of Antimycin A for restoration of native fish populations (Finlayson et al. 2000; Moore et al, 2008). GRSA will undertake the remaining environmental compliance, including National Environmental Policy Act review and Environmental Assessment, Wilderness Act "Minimum Requirements Analysis," and development of an Integrated Pest Management (IPM) Plan and issuance of a pesticide use permit in compliance with the NPS Pesticide Use Proposal System (PUPS).

While the project details are not finalized, the project will require the considerable resources, and several years to fully implement. Final details will be included in the CPW detailed implementation plan required for permitting by the State and NPS. At this time, CPW proposes to treat the Sand Creek Watershed in two phases; Phase 1: the treatment of Upper and Lower Sand Creek Lakes and their outlet streams, downstream to the upper fish barrier, and; Phase 2: the treatment of the lower reach of Sand Creek and Little Sand Creek, downstream of the upper fish barrier on Sand Creek to the dunefield. Both phases will occur in late Summer or Fall when flows are low, requiring the least amount of piscicide. All required equipment (Legumine, pumps, generators, camping equipment, sprayers, drip stations, etc) will need to be flown by helicopter to the lake sites, and removed similarly.

Phase 1 will begin with the treatment of the upper lake and outlet stream, followed by the treatment of the lower lake and outlet stream, over a period of several days. Rotenone, formulated and sold as "CFT Legumine," will be applied to a concentration of 1ppm. This will likely require two boats, each with a crew of three people. Legumine will be mixed in the lakes with generator powered pumps. Stream reaches will be treated for 4 hours using drip stations, site specific spraying, and other application methods as necessary. It is anticipated that rotenone passing the upper fish barrier will be allowed to flow downstream, and kill fish in the lower reach before it loses some its toxicity, before entering, and seeping into the dune field without neutralization. It is anticipated that this treatment will be incomplete, but remove many fish. Phase 2 (Year 2) will re-treat the lower reach of Sand Creek and its tributaries to remove the remaining fish not removed in the prior treatment. However, if the treatment of the lakes is found to be incomplete, both the upper and lower reaches will be treated again.

At this time, Cold Creek, the major tributary of Sand Creek has been determined to be trout free. It will be important to keep monitoring the status of Cold Creek, prior to treatment, to ensure that non-native trout do not colonize from Sand Creek. If this were to occur, all perennial reaches of Cold Creek will need to be treated in Year 2.

Stocking of RGCT will occur when it is confirmed that all fish have been removed, and the aquatic insect/zooplankton community has recovered sufficiently to support introduced RGCT. Stocking of other members of the native fish assemblage will occur subsequent to RGCT restoration, at a time determined by CPW.

- **Ensure that non-native brook stickleback, or other non-native species that may become established, do not negatively impact fathead minnow in BSC**

Big Spring Creek contains native FHM and a small population (Dwayne Mosher, NPS, pers. comm. 2018) of putative, non-native BS, through its entire length. It is not possible for BS to be removed by rotenone application without also eliminating native FHM from that reach. GRSA has concluded that at this time, piscicide treatment of BSC is not warranted, and other indirect methods, in cooperation with CPW and other stakeholders will be considered to reduce the distribution and abundance of BS, and to reduce the likelihood of invasion of other introduced baitfish species originating from San Luis Lake.

- **Investigate possible methods to remove/reduce/mitigate brook stickleback from BSC without the use of a piscicide**
- **Work with CPW to educate the public about, and enforce, the current regulation prohibiting the use of live bait in San Luis Lake to reduce the possibility that other non-native fish will establish and invade BSC**

Restore regional native RGCT to habitats historically occupied by native trout, and to habitats presently occupied by non-native trout

After removal of non-native trout, the primary action proposed in the GRSA NFMP is the restoration of RGCT to habitats historically occupied by native RGCT trout and to habitats currently occupied by non-native trout within the Sand Creek watershed. Restoration of RGCT in the Sand Creek watershed has been identified as a CPW management priority since 2007, but was delayed when it was discovered that the proposed RGCT brood stock was hybridized with Colorado River cutthroat trout. CPW is in the process of developing a new brood stock from a suite of pure RGCT populations, including fish taken from Trinchera Ranch. Trout for Sand Creek will likely be sourced from Medano Creek as adults; from fry derived from eggs collected from Medano Creek fish, and; possibly from the newly developed RGCT brood stock. It will likely take several years to produce enough fish to adequately stock all habitats within the Sand Creek watershed. With the completion of this project, no non-native trout will remain in GRSA, and all habitats that are capable of maintaining a self-sustaining trout population will be populated by pure RGCT.

- **Introduce RGCT to three Sand Creek Lakes above barriers to fish movement**

RGCT will be stocked in all three Sand Creek Lakes. Lower Sand Creek Lake will be stocked with the intent of creating a self-sustaining population with limited future management needs. However, natural reproduction is limited in Upper and Little Sand Creek Lakes. While they can grow a few large trout, low productivity and limited recruitment may limit the future use of these lakes to provide brood stock for other native trout conservation projects or to provide quality recreational fishing opportunities. Future management of these lakes for native trout may require supplemental stocking.

- **Restore RGCT to Sand Creek below barriers to fish movement**

RGCT were historically native below the fish barriers on Sand Creek and Little Sand Creek, and RGCT, from an appropriate source determined by CPW, will be introduced to create a self-sustaining population, in a similar manner to the previous Medano Creek RGCT restoration project.

- **Implement adaptive stocking program in Upper Sand Creek Lake, and Little Sand Creek Lake including the outlet stream to the fish barrier on Little Sand Creek (~ 3.5 miles of potential habitat) to provide brood stock RGCT for future restoration efforts)**

Natural reproduction is limited in Upper Sand Creek Lake and Little Sand Creek Lake and the outlet stream. To maintain a recreational fishery, and to provide fish for future restoration efforts, the RGCT population will be sustained by stocking, as necessary.

- **Implement genetic exchange program through limited stocking of carefully selected fish to maintain genetic diversity of established, self-sustaining, RGCT populations in Upper and Lower Sand Creek Lakes**

Populations of RGCT in Upper and Lower Sand Creek Lakes will be isolated from the population of RGCT in Sand Creek below the fish barriers. To prevent genetic drift of these isolated populations, a small number of fish from the original RGCT stock, or from Sand Creek below the barriers and Medano Creek, will be introduced into the lakes, as necessary, to maintain the desired genetics of these populations. The need for supplementation will be determined by CPW in consultation with GRSA.

- **Restore regional native fish assemblage (RGS, RGC, LND, FHM) to historically occupied habitat.**

While past RGCT restoration efforts in Medano Creek have demonstrated the likely success of the proposed restoration approach for RGCT in Sand Creek, the possible restoration of other members of the presumed historical fish assemblage to waterbodies within GRSA is far less certain. However, these species, while rare in many of their native habitats, are readily available from NASRF, or from other local sources. While habitat characterization studies can classify the stream type and conditions, and can provide information about the availability of species specific habitat, in reality we can only confirm if the habitat is appropriate and sufficient by releasing fish and monitor how they respond. For example, RGS from NASRF have been introduced to Medano Creek since 1996.

Monitoring indicates that fish can survive and spawn, but little natural recruitment suggests that other factors may be limiting (eg juvenile habitat). Habitat for RGC is limited in both Medano and Sand Creek. Accordingly, GRSA, in cooperation with CPW and NASRF proposes to release RGS and LND) after restoration of the RGCT in both Medano Creek and Sand Creek and monitor the response of the fish community to inform future management decisions regarding the native fish assemblage.

- **Restore rest of native fish assemblage (RGS, and LND) to lower Sand Creek watershed, downstream of fish barriers**
- **Restore native LND to Medano Creek watershed**
- **Consider restoring RGS to BSC if it is determined that they will not have a negative impact to native FHM**

Currently, only FHM and BS reside in BSC. The FHM has considerable conservation significance, and predatory fish (RGCT, RGC), even if native, should not be introduced to this reach. Of the remaining species (RGS, LND), it is unlikely that the sand bed of BSC can provide sufficient spawning habitat for these species. At this time, GRSA is proposing to consider the introduction of only RGS on an experimental basis, as long as it is determined that they are unlikely to have a negative impact on FHM.

- **Consider restoring FHM and RGS to LSC**

Currently there are no fish in LSC. This provides a potential opportunity to establish an additional population of FHM that may have historically occupied the stream, and perhaps another population of RGS. GRSA is proposing the introduction of FHM to create a replicate conservation population, and will consider the introduction of RGS on an experimental basis, as long as it is determined that they are unlikely to have a negative impact on FHM.

Restore/Introduce other native aquatic organisms to potential historically occupied habitat

The historical distribution and abundance of other native aquatic organisms (amphibians, Anastraca) is undocumented, but it is likely that upon the introduction of trout to historically unoccupied high lakes within the Medano and Sand Creek watersheds, severe predation may have extirpated such species. Opportunities for native species introductions in other high country lakes will be identified and their feasibility studied in an effort to mitigate the past, and future possible impacts of trout presence in these lakes.

Protect and restore native fish habitat

To fully conserve native species, it is important to protect the habitat on which they depend, and the natural functions and processes that create and maintain it. Therefore, GRSA will undertake aquatic habitat protection and restoration within the park. There are no identified restoration needs within Medano and Sand Creek watersheds and their basins are almost pristine. However, there is considerable need for riparian and instream habitat protection and restoration on BSC and LSC due to the historic impacts of intense grazing and stream channelization associated with water development in the basin.

- **Conduct habitat protection/restoration on Big and Little Spring Creek**
 - **Remove stock tank on LSC**
- **Manage stock densities and distributions to reduce impacts to riparian areas**
 - **Reduce stock numbers**
 - **Create additional stock exclosures to protect stream habitats and better understand the impacts of current stock grazing**
 - **Develop alternative water sources adjacent to riparian habitat to reduce occupation pressure in stream reaches of greatest conservation priority**

Currently, portions of the Big and Little Spring Creek watersheds are within the Medano Ranch owned and managed by The Nature Conservancy. This land is currently being bought by the NPS, and should be under full administrative authority of the NPS at the closing date (2018). At this time, the NPS will implement a new Use and Occupancy Agreement between GRSA and TNC that identifies how bison will be managed on the ranch for the next 5 – 7 years. One of GRSA’s long-term goals is the protection and restoration of the highly damaged riparian area of BSC and LSC, which currently provides the only source of forage and water for the ~2,000 head of bison on the ranch. Upon the acquisition of the ranch, consistent with the terms of the Agreement, the NPS intends to remove the current bison herd, and replace it with pure bison derived from other Department of Interior lands. It also proposed to reduce the herd from 2,000 to ~100, not to exceed 400 animals. At this time, there will be an opportunity for the park to implement management practices to better protect stream habitat in BSC and LSC.

Manage and regulate fishing to protect native fish resources while providing appropriate opportunities for visitor enjoyment of the fish and fishing resource

While fishing is allowed in parks, it must be conducted and regulated in such a manner as to prevent unacceptable impacts to the resource, in this case, native fish and their habitat. Currently the State of Colorado, in consultation with GRSA, promulgates regulations for GRSA waters, which are adopted by the park consistent with the NPS general fishing regulations (36CFR2.3a) and NPS Management Policies. It is anticipated that this arrangement will continue and that regulations for Sand Creek will be developed upon restoration of the native fish assemblage.

- **Work cooperatively with CPW for the state to promulgate state regulations that protect native fish resources consistent with NPS Natural Resource Management Policies**

NPS Management Policies mandate that GRSA should manage park fish resources to preserve the natural abundances, diversities, dynamics, distributions, habitats and behaviors of native fish populations and minimize human impacts on native fish populations, (see NPS MP 4.4.1).

While it is acknowledged that impacts associated with recreational fishing will occur, GRSA must regulate to meet the intent of the management policies, and ensure that any impacts do not become “unacceptable”. Accordingly, GRSA intends to regulate fishing in such a manner that recreational fishing, and harvest does not unacceptably impact native fish communities. Attributes of the RGCT fishery that should be considered for protection include;

- **The protection of large, mature fish that provide a unique fishing opportunity, have a disproportionate positive impact to potential juvenile natural recruitment, and can be used to provide brood stock to other regional conservation efforts.**
- **Strict regulations to limit injury and mortality associated with fishing, including limits on the numbers and sizes of fish that may be harvested, and gear restrictions to limit hooking injury and mortality.**

Accordingly, GRSA will consider regulations that may include:

- **Use of artificial flies and lures, and barbless hooks only**
- **Catch and release fishing on Medano Creek and Lake (ie no change)**
- **Limited harvest in Sand Creek watershed lakes (Catch and release, slot limits)**
- **No fishing in Big Spring or Little Spring Creek**

Monitor park fish communities and conduct research within GRSA to further native fish conservation goals at GRSA

Monitoring the success of the rotenone treatment; its impact to, and recovery of the aquatic insect community; the successful establishment of the native fish community, and; the potential impact of recreational fishing, is essential to the success of the project, and is required by NPS Management Policies (NPS MP 8.2.2.1). Monitoring is expected to occur within the framework of the current cooperative management program between the GRSA, CPW, other federal agencies (USFS, BLM), adjacent landowners (TNC) and other interested stakeholders (TU). The following monitoring efforts have been identified:

Medano Creek

- **Monitor status of RGC**
- **Monitor success of ongoing RGS introduction and assess amount of natural recruitment**
- **Monitor success of RGC and LND restoration**
- **Document the presence and amount of natural reproduction in Medano Lake and need for supplemental stocking**
- **Research limiting factors for persistence of native fish populations**
- **Monitor the impact of fishing on native fish community**

Sand Creek

- **Monitor to confirm absence of fish prior to treatment**
- **Monitor effectiveness of rotenone treatment**
- **Monitor impact of rotenone treatment on aquatic insects and document their recovery**
- **Monitor status of native fish restorations**
- **Monitor recovery of aquatic insect community after piscicide treatment**

- Document the presence and amount of natural reproduction in Sand Creek Lakes and need for supplemental stocking
- Research limiting factors for persistence of native fish populations
- Monitor the impact of fishing on native fish community

BSC

- Monitor status of FHM population in BSC
- Determine if Indian Spring is historic habitat
- Investigate threats of brook stickleback
- Determine if BSC is an appropriate habitat for restoration of RGS
- Monitor recovery of stream geomorphology and riparian vegetation recovery before and after habitat restoration activities

LSC

- Conduct fish survey of LSC to confirm creek is fishless
- Monitor recovery of stream geomorphology and riparian vegetation recovery before and after habitat restoration activities
- Determine if LSC is an appropriate habitat for restoration of FHM, RGS and RGC

Other Habitats

- Conduct fish surveys of assumed fishless streams identified for native fish restoration to confirm fish absence prior to treatment
- Conduct biological surveys of high lakes (e.g. kettle ponds in upper Sand Creek, and upper Little Sand Creek above lakes, Smith Lake) to understand presence and absence of native aquatic species throughout park as a method to understand historic impacts to formerly fishless lakes and methods to mitigate the impact.

Create opportunities and materials for education and outreach concerning the protection and conservation of GRSA fish and aquatic resources

Such outreach efforts may include

- The development of informational brochures
- Publication of fishing regulations that include why special regulations are needed to protect native fish resources within GRSA
- Publication of web-based articles

Cooperate with state and federal natural resource agency and other stakeholders to further cooperative goals of GRSA and Colorado native fish conservation

The park, by itself, does not have the personnel and resources to conduct the proposed projects and the monitoring and research to support them. Consequently it will always need to rely on cooperative efforts between the GRSA, CPW, other federal agencies (USFS, BLM, FWS), adjacent landowners

(TNC) and other interested stakeholders (TU) if it is to be successful in its native fish management goals. GRSA will continue to seek areas of mutual interest and to foster an excellent working relationship between parties with common interests and goals.

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Appendix I: NPS General Service-wide Fishing Regulations

36CFR § 2.3 Fishing.

- (a) Except in designated areas or as provided in this section, fishing shall be in accordance with the laws and regulations of the State within whose exterior boundaries a park area or portion thereof is located. Non conflicting State laws are adopted as a part of these regulations.
- (b) State fishing licenses are not required in Big Bend, Crater Lake, Denali, Glacier, Isle Royale (inland waters only), Mammoth Cave, Mount Rainer, Olympic and Yellowstone National Parks.
- (c) Except in emergencies or in areas under the exclusive jurisdiction of the United States, the superintendent shall consult with appropriate State agencies before invoking the authority of § 1.5 for the purpose of restricting or closing park areas to the taking of fish.
- (d) The following are prohibited: (1) Fishing in fresh waters in any manner other than by hook and line, with the rod or line being closely attended. (2) Possessing or using as bait for fishing in freshwaters, live or dead minnows or other bait fish, amphibians, non preserved fish eggs or fish roe, except in designated waters. Waters which may be so designated shall be limited to those where non-native species are already established, scientific data indicate that the introduction of additional numbers or types of non-native species would not impact populations of native species adversely, and park management plans do not call for elimination of non-native species.
- (3) Chumming or placing preserved or fresh fish eggs, fish roe, food, fish parts, chemicals, or other foreign substances in fresh waters for the purpose of feeding or attracting fish in order that they may be taken.
- (4) Commercial fishing, except where specifically authorized by Federal statutory law.
- (5) Fishing by the use of drugs, poisons, explosives, or electricity.
- (6) Digging for bait, except in privately owned lands.
- (7) Failing to return carefully and immediately to the water from which it was taken a fish that does not meet size or species restrictions or that the person chooses not to keep. Fish so released shall not be included in the catch or possession limit: *Provided*, That at the time of catching the person did not possess the legal limit of fish.
- (8) Fishing from motor road bridges, from or within 200 feet of a public raft or float designated for water sports, or within the limits of locations designated as swimming beaches, surfing areas, or public boat docks, except in designated areas.
- (e) Except as otherwise designated, fishing with a net, spear, or weapon in the salt waters of park areas shall be in accordance with State law.

(f) Authorized persons may check fishing licenses and permits; inspect creels, tackle and fishing gear for compliance with equipment restrictions; and inspect fish that have been taken for compliance with species, size and other taking restrictions.

(g) The regulations contained in this section apply, regardless of land ownership, on all lands and waters within a park area that are under the legislative jurisdiction of the United States.

Appendix II: Compliance to Adopt and Implement the Native Fish Management Plan

In order to implement the activities identified in this Plan, the NPS is required to conduct a suite of environmental reviews. The following is a brief discussion of the major legal and regulatory requirements that must be met for the implementation of activities identified in the Plan.

State Compliance

Colorado Discharge Permit System

CPW will be lead agency for conducting the piscicide treatment of Sand Creek. The State of Colorado has developed a Standard Operating Procedure (SOP) for Chemical Reclamation Projects (CPW 2009), and a streamlined permitting process to reduce the regulatory burden of implementing such projects for non-native fish control prior to restoration of native fish populations. To facilitate the permitting process, the Water Quality Control Division of the Colorado Department of Health has issued a Colorado Discharge Permit System (CDPS) General Permit For Discharges From Applications of Pesticides (COG860000) under the authority of the Colorado Water Quality Control Act (25-8-101 et seq., CRS, 1973 as amended), which sets out the conditions by which biological pesticides (including the piscicide Rotenone), may be used by certified Operators within Colorado.

Approval for chemical reclamation projects is secured through submittal to, and review by, the appropriate CPW Aquatic Section Manager of the Fish Control Application; a detailed implementation plan that describes the treatment procedures and safety precautions that will be used during the project. For approval to be granted by the Regional Manager, all phases of the operation must be explained in detail. The application requirements and the permitting process are described in the SOP. The CPW Senior Aquatic Biologist is also responsible for maintaining all files and records concerning chemical reclamation projects that take place in his or her region of jurisdiction.

All CPW personnel conducting a chemical reclamation project will be certified as, or supervised by personnel, who are Colorado Certified Applicators and/or who have obtained similar certification through comprehensive training in the planning and conducting of chemical reclamation projects.

All stream waters within GRSA are designated by the State as “Outstanding Natural Resource Waters” under the authority of the federal CWA. Criteria for ONRW Designation:

- (1) The water is a significant attribute of special trout waters, national or state park, national or state monument, national or state wildlife refuge or designated wilderness area, or is part of a designated wild river under the federal Wild and Scenic Rivers Act; or
- (2) The water has exceptional recreational or ecological significance; or
- (3) The existing water quality is equal to or better than the numeric criteria for protection of aquatic life uses, recreational uses, and human health uses, and the water has not been significantly

modified by human activities in a manner that substantially detracts from its value as a natural resource.

The EPA advises that no degradation of the existing water quality be allowed in ONRW's. However, temporary lowering of water quality is permitted for short-term activities such as facility repairs and construction projects. Similarly, the State of Colorado SOP for Chemical Reclamation Projects allows for the temporary reduction of water quality in ONRW's for the restoration of native fish;

"1.1.2.2 Discharges to Waters Designated as Outstanding Waters for Anti-degradation Purposes

Except for discharges from pesticide applications made to restore or maintain water quality or to protect public health or the environment that either do not degrade water quality or only degrade water quality on a short-term or temporary basis, Operators are not eligible for coverage under this permit for discharges to surface waters of the State if the water is designated by the Water Quality Control Commission as Outstanding Waters for anti-degradation purposes under Title 40 of the Code of Federal Regulations (CFR) 131.12(a)(3). A list of Outstanding waters in geographic areas covered under this permit is available at

<http://www.cdphe.state.co.us/regulations/wqccregs/index.html>.

Federal Compliance

National Environmental Policy Act (NEPA)

The National Environmental Policy Act (NEPA) was signed into law on January 1, 1970. NEPA requires federal agencies to assess the environmental effects of their proposed actions prior to making decisions. This policy requires the federal government to use all practicable means to create and maintain conditions under which man and nature can exist in productive harmony.

Section 102 in Title I of the Act requires federal agencies to incorporate environmental considerations in their planning and decision-making through a systematic interdisciplinary approach. Specifically, all federal agencies are to prepare statements assessing the environmental impact of federal actions that may affect the environment. If the agency determines that the action will not have significant environmental impacts, the agency will publish a Categorical Exclusion (CE), or an Environmental Assessment (EA) and issue a Finding of No Significant Impact (FONSI).

A CE is a class of actions that a Federal agency has previously determined do not individually or cumulatively have a significant effect on the human environment and for which, therefore, neither an environmental assessment nor an environmental impact statement is normally required. The use of categorical exclusions can reduce paperwork and save time and resources. Many planning and restoration actions typically implemented by the NPS may, at the park Superintendents discretion be covered by existing NPS CE's

(https://www.nps.gov/subjects/nepa/upload/NPS_NEPAHandbook_Final_508.pdf).

An EA is an analysis to determine whether or not a federal action is a "major federal action significantly affecting the quality of the human environment." The EA leads either to the decision to do an Environmental Impact Statement (EIS) or to a Finding of No Significant Impact (FONSI). A

FONSI is a document that presents the reasons why the agency has concluded that there are no significant environmental impacts projected to occur upon implementation of the action. If the EA determines that the environmental impacts of a proposed Federal action will be significant, then an Environmental Impact Statement is prepared. Significant impacts must be considered in the context of the environment in which the proposed action occurs, and the intensity of the action, but generally involve impacts that are large in scale, permanent, or include an irretrievable commitment of resources which can't be mitigated.

The NPS is subject to the provisions of NEPA, and is required to evaluate the impacts of implementing the GRSA Native Fish Management Plan. The Plan is a high level, programmatic document that identifies a wide range of activities that will be implemented as funds and opportunities become available. Accordingly, adoption of the Plan is considered a broad administrative document which in itself is considered to have no significant environmental impacts, and which may be covered under existing NPS NEPA Categorical Exclusions. However, the impacts associated with implementation of specific actions identified in the Plan will be analyzed, as appropriate, in a CE or EA. If it is found that no significant impacts will occur, the CE or EA is approved and signed by the park Superintendent or Intermountain Regional Director, as appropriate.

Use of Categorical Exclusions

Many activities identified in the Plan are anticipated to be covered under existing NPS NEPA Categorical Exclusions CE. Any action not covered by existing CE's will undergo further project specific environmental compliance and review before implementation, as appropriate.

Elimination of Exotic Species and Reintroduction of Non-Controversial Species

It is anticipated that the elimination of non-native trout, and the reintroduction of non-controversial native species can be conducted under NPS NEPA Categorical Exclusion (CE) 3.4 (E) 2: Actions Related to Resource Management and Protection: Restoration of noncontroversial native species into suitable habitats within their historic range and elimination of exotic species.

This CE should only be used when the action under the CE would result in no, or minor impacts. The Environmental Screening Form should be used to determine the level of potential impacts. This CE is from 43 CFR § 46.210 and 516 DM 12. NPS Directors Order 12, Section 3.4. This CE has previously been used by parks to conduct piscicide treatments (e.g. Grand Teton NP), and for the reintroduction of RGCT (e.g. Bandelier National Monument).

Fish community monitoring activities may be covered under at least two CE's: CE 3.3 Y, and 3.4 (E) 5.

CE 3.3. CEs for Which No Formal Documentation is Necessary

Y. Day-to-day resource management and research activities.

Guidance: This CE applies to cultural and natural resource management and research activities that have no impact on the human environment and that are not otherwise listed in section 3.4.

3.4 (E). Actions Related to Resource Management and Protection for Which a Record is Required

5. Nondestructive data collection, inventory (including field, aerial, and satellite surveying and mapping), study, research, and monitoring activities.

Other activities not covered by the EA for implementation of the Plan or CE's will undergo additional environmental review as appropriate.

NPS Integrated Pest Management (IPM) and Pesticide Use Proposal System (PUPS)

IPM is a science-based decision-making process that guides park managers when investigating a pest situation, and its treatment. Treatments are based on an understanding of the biology of the pest and use the least-toxic treatment that is effective. The NPS Integrated Pest Management (IPM) program oversees the park's management of plant and animal pests. A 'pest', as defined by NPS policy, is "any organism that interferes with the purpose of a park or that threatens human health or safety". Non-native, predatory fish that would otherwise not be present, are considered "pests" in the context of this Plan.

An NPS permit to use a pesticide (or piscicide) within a national park service unit will be required and will be obtained as part of the IPM, through the NPS Pesticide Use Proposal System (PUPS) review process. An IPM plan will be developed in coordination with the NPS Intermountain Regional Office IPM Program. It is anticipated that the detailed implementation plan submitted to the Colorado Department of Health by CPW will provide the basis for much of the IPM Plan.

ESA: Informal consultation with USFWS for ESA

No endangered species are known within the project area. However, it is anticipated that GRSA will coordinate with the USFWS through an "informal interagency consultation, and seek a letter of concurrence that removal of non-native fish will not have any adverse effects on listed species."

Wilderness Act: Minimum Requirements Analysis

Much of GRSA within the project area is Designated Wilderness under the authority of the Wilderness Act of 1964. Section 4(c) states;

"...except as necessary to meet the minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons within the area) there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area".

Removal of non-native fish by chemical treatment will require considerable equipment being flown in to the Sand Creek Lakes by helicopter and the prolonged use of generators and pumps to mix rotenone in the lakes. Accordingly, GRSA must complete a Minimum Requirements Analysis (MRA) the purpose of which is to determine if action is necessary in wilderness, and if it is, to then determine the minimum activity required to accomplish the action.

A summary of NPS policies related to Wilderness Preservation and Management can be found at: https://www.wilderness.net/MRDG/documents/MRDG_NPS_wilderness_policy.pdf. Specifically NPS Management Policy 6.3 provides general guidance on wilderness resource management. More specific guidance can be found in NPS Directors Order #12: Conservation Planning, Environmental Impact Analysis, and Decision Making, and; Directors Order #41: Wilderness Stewardship; and the National Wilderness Steering Committee Guidance Paper #3: “What Constitutes the Minimum Requirements in Wilderness?”

National Historic Preservation Act (NHPA)

Section 106 of the National Historic Preservation Act of 1966 (NHPA) requires Federal agencies to take into account the effects of their undertakings on historic properties, and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment. The dam on Little Spring Creek may have potential historic and cultural significance and will need to undergo Section 106 review if proposed for removal or the outlet modified to provide stream flow.

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS XXXXXX, Month Year (The Fort Collins Support Office will fill out this line for you)

National Park Service
U.S. Department of the Interior



[Natural Resource Stewardship and Science](#)

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