FINAL GREEN AND COLORADO RIVERS MINERAL LEASING PLAN

Prepared for Utah Department of Natural Resources, Division of Forestry, Fire & State Lands

Prepared by SWCA Environmental Consultants

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Prepared for

Utah Department of Natural Resources
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CONTENTS

Figures

Tables

INTRODUCTION AND BACKGROUND

Introduction

The Utah Department of Natural Resources Division of Forestry, Fire & State Lands (FFSL) first developed a mineral leasing plan (MLP) for sovereign lands on the Green and Colorado Rivers in 1998. The 1998 MLP provided a brief history of mineral ownership and leasing, inventoried mineral resources, examined existing resource conflicts on the rivers, and outlined management direction (FFSL 1998). The 1998 MLP has been amended six times since the date of final approval. This 2020 Green and Colorado Rivers MLP has been developed to update, consolidate, and replace the 1998 plan and all associated amendments. This plan is not intended to assert State of Utah ownership or adjudicate or resolve any ownership or title issues. It is intended to be used as a management tool only for lands owned by the State of Utah. Issues related to ownership and title may be resolved formally or informally in separate proceedings.

Sovereign Land Boundaries

The Utah State Legislature defines sovereign land as "those lands lying below the ordinary high water mark [OHWM] of navigable bodies of water at the date of statehood and owned by the state by virtue of its sovereignty" (Utah Code 65A-1-1). FFSL rules define the OHWM as follows: "The high water elevation in a lake or stream at the time of statehood, uninfluenced by man-made dams or works, at which elevation the water impresses a line on the soil by covering it for sufficient periods to deprive the soil of its vegetation and destroy its value for agricultural purposes or other tests as may be applied by the courts. This 'ordinary high water mark' may not have been adjudicated by the courts" (Utah Administrative Code R652-1-200[17]). Navigable bodies of water in the State of Utah that are presently considered sovereign lands include the beds of Great Salt Lake, Utah Lake, and the Jordan River, along with portions of Bear Lake, Bear River, Colorado River, and Green River.

The OHWM along the navigable portions of the Green and Colorado Rivers is what defines FFSL's ownership. The boundary of sovereign land in a river corridor is intrinsically more difficult to define than that of a lake because rivers are more susceptible to substantial geographic movement and shifts in location over time. A thorough examination of the laws of water boundaries, particularly as they pertain to rivers, is complex and beyond the scope of this MLP. However, there are a few basic concepts that are important in understanding the management of rivers as sovereign lands.

Most rivers meander over time unless human-made or natural barriers exist to prevent such movement. As the course of the river changes, natural and artificial processes of erosion, reliction, avulsion, and accretion[1] may affect landownership. Generally, the gradual processes of accretion, reliction, and erosion change the property boundaries between private and public ownership. An adjacent, upland landowner may obtain title to any dry land added by accretion or reliction and/or

1 *Reliction* = gradual recession of water, leaving land permanently uncovered; *avulsion* = rapid abandonment of a river channel and the formation of a new river channel; *accretion* = the gradual deposition of sediment along the edge of a channel.

may lose title to dry land eroded and now covered by water. For the purposes of sovereign land management, state ownership of the riverbed generally follows the movement of the river over time as it naturally meanders because of erosion, reliction, and accretion processes. However, landownership remains fixed regardless of sudden avulsive events. Avulsive events can result from natural occurrences such as flash floods or from human-made causes such as channel straightening or artificial channel relocation.

The Utah State Legislature has designated FFSL as the executive authority for the management of sovereign lands in Utah, including the Green River and Colorado River. Since the precise location of the OHWM at the time of statehood has not been determined for the entire Green and Colorado Rivers, FFSL generally manages the rivers from the top of the bank to the top of the opposite bank. Because knowing where the OHWM was located at statehood is challenging and because the OHWM has not been mapped continuously along the Green and Colorado Rivers, a case-by-case demarcation of the OHWM may be undertaken as part of a permit authorization process. Sovereign lands of the Green and Colorado Rivers are shown on Figure 1.

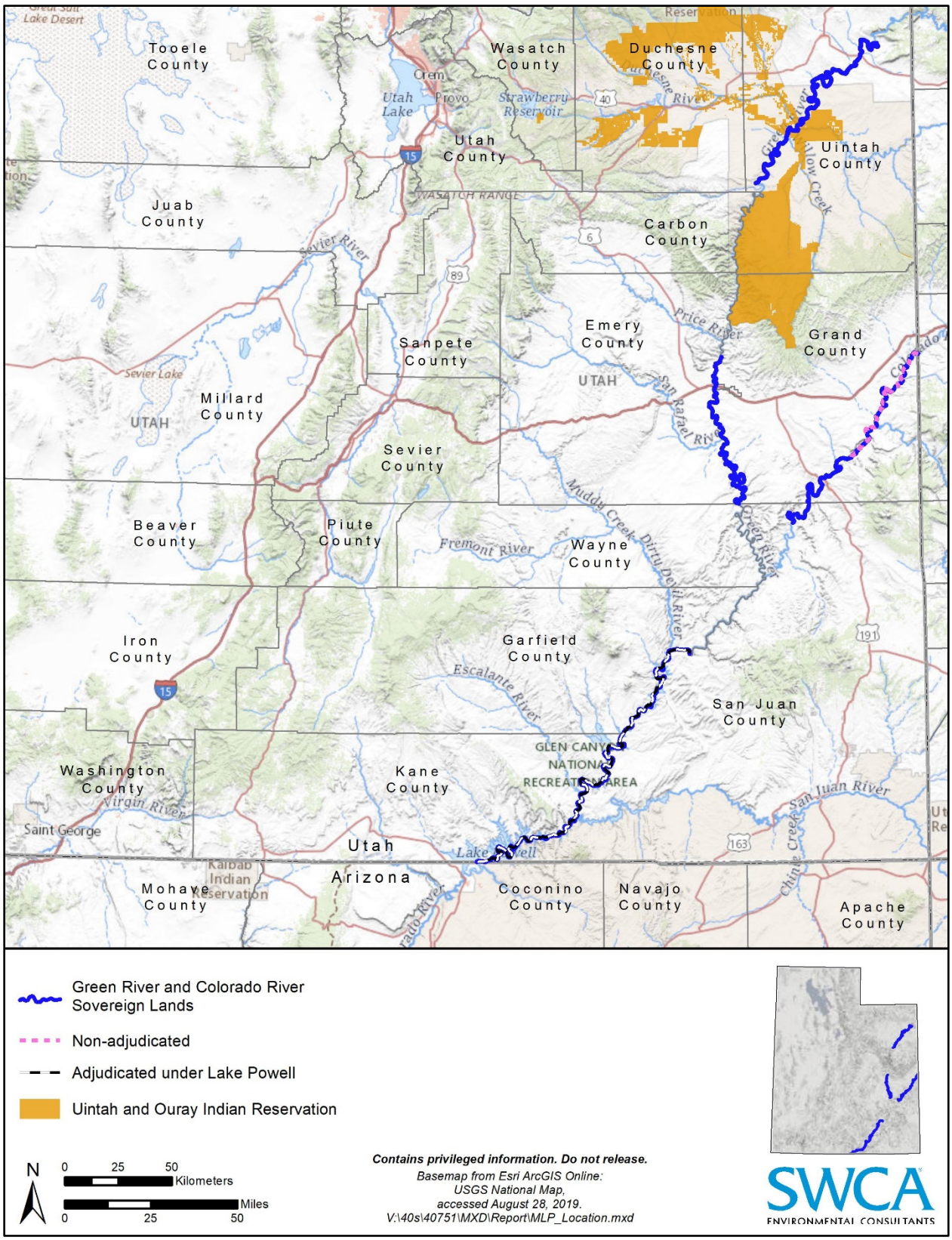

Figure 1. Sovereign Lands of the Green and Colorado Rivers.

The Public Trust and Multiple-Use, Sustained-Yield Principles

The Public Trust Doctrine is a legal principle derived from English common law. It provides that Public Trust lands, waters, and living resources in a state are held by the state in trust for the benefit of all people (Slade et al. 1997). The doctrine establishes the right of the public to use Public Trust resources, and it also establishes the responsibilities of the states when managing Public Trust assets (Slade et al. 1997). In general, Public Trust waters consist of the navigable waters in a state, whereas Public Trust lands are the lands beneath those waters up to the OHWM. The living resources (e.g., fish, aquatic plants, and aquatic wildlife) inhabiting these lands and water are also subject to the Public Trust Doctrine (Slade et al. 1997).

The State of Utah has recognized and declared that the bed and banks of navigable waters within the state are owned by the state and are among the basic resources of the state, and that there exists, and has existed since statehood, a Public Trust over and upon these waters (Utah Administrative Code R652-2-200). Segments of the Colorado and Green Rivers owned by the state are included in this category of navigable waters and are managed by FFSL for public benefit consistent with the Public Trust Doctrine.

Historically, the common law rights in Public Trust lands and waters were directly related to navigation, fishing, and commerce. As society has changed and evolved, the public's use of trust lands and waters has changed. The Public Trust Doctrine has evolved from preserving the public's right to use trust lands and waters for navigation, fishing, and commerce to include recreation, environmental protection, and the preservation of scenic beauty (Slade et al. 1997). Recognition of this evolution in the Public Trust Doctrine is found in the following management objective text from Utah Administrative Code R652-2: "It is also recognized that the public health, interest, safety, and welfare require that all uses on, beneath or above the beds of navigable lakes and streams of the state be regulated, so that the protection of navigation, fish and wildlife habitat, aquatic beauty, public recreation, and water quality will be given due consideration."

In addition to managing for the Public Trust, FFSL administers state lands by using multiple-use, sustained-yield principles as required by Utah Code 65A-2-1 and Utah Administrative Code R652-90-800. As a trustee, FFSL must also strive for an appropriate balance among compatible and competing uses on the Green and Colorado Rivers. Fulfilling this obligation is particularly challenging when balancing recreational and aesthetic uses with compatible mineral development. The general rule consistently applied throughout the western states is "ownership of mineral rights in land is dominant over the rights of the owner of the fee to the extent reasonably necessary to extract the minerals therefrom" (*Flying Diamond v. Rust*, 551 P.2d 509 [Utah 1976]). Under this established legal principle, the surface owner cannot prevent mineral extraction if the proposed mineral development is reasonable, practical, and implemented to minimize surface damages.

While FFSL can establish management objectives preventing the surface occupancy of any planned mineral extraction on sovereign lands, a challenge is posed when an authorized lease on adjacent upland property contemplates horizontal drilling and mineral development. Under this scenario, FFSL, under the fiduciary obligation imposed by the Public Trust Doctrine, is precluded from

divesting itself from the mineral estate located under Public Trust waters without compensation. See generally *Illinois Central R.Co. v. State of Illinois et. al.*, 146 U.S. 387 (1892). Instead, if mineral extraction from horizontal drilling includes sovereign lands within any legally approved drilling or spacing unit, FFSL is "obligated to receive full value for the public trust resources leased to persons for profit" (Utah Administrative Code R652-20-1000.2(d)(i)). However, in addition to requiring minimal surface damage in any mineral development activities on sovereign lands, FFSL requires the planned development to not cause pollution or salinity in any navigable lake or stream in excess of the acceptable limits established by applicable ordinance, law, or inter-governmental treaty (Utah Administrative Code R652-20-3000.2).

River Mile System and River Segments

One method of identifying features along rivers is by using river miles (RMs) as reference points. The RMs used in this MLP are based on the *Guide to the Colorado & Green Rivers in the Canyonlands of Utah & Colorado* (Martin and Whitis 2016). The starting point (RM 0) on the Colorado River is the gauging station at Lee's Ferry, located approximately 9 miles south of the Utah-Arizona border (outside of sovereign lands). RM numbers increase in the upstream direction on the Colorado River to the confluence of the Colorado and Green Rivers within Canyonlands National Park (hereafter referred to as The Confluence). At The Confluence, the RM numbering restarts at 0 and again increases in the upstream direction on both the Colorado River and the Green River. Commonly used river segment names, associated with RMs, are listed in Tables 1 and 2. RMs in this plan may be slightly edited from Martin and Whitis (2016) for continuity between river segments.

Table 1. Green River Mineral Leasing Plan River Segments and Associated River Miles

River Segment	River Miles	Segment Identification	Description (length)
Uinta Basin	317.7 to 215.8	G-1-UB	Border of Dinosaur National Monument to Sand Wash (101.9 miles)
Green River Valley	132.2 to 120.1	G-2-GRV	Swasey's rapid to Green River State Park (12.1 miles)
Labyrinth Canyon	120.1 to 46.7	G-3-LC	Green River State Park to the border of Canyonlands National Park (73.4 miles)

Note: River mile references are for management purposes only and may not represent precisely the ownership interests and/or fee title claimed by the State of Utah.

Table 2. Colorado River Mineral Leasing Plan River Segments and Associated River Miles

River Segment	River Miles	Segment Identification	Description (length)
Above Westwater	131.7 to 127.6	C-1-AW	Utah-Colorado border to the Westwater Ranger Station (4.1 miles)
Westwater Canyon Wilderness Study Area	127.6 to 113	C-2-WSA	River segment in the Westwater Canyon Wilderness Study Area (14.6 miles)
The Moab Daily	113 to 47.3	C-3-TMD	Bald Eagle Campground to the Potash boater access point (65.7 miles)

River Segment	River Miles	Segment Identification	Description (length)
Meander Canyon	47.3 to 31	C-4-MC	Potash boater access point to the border of Canyonlands National Park (16.3 miles)
Glen Canyon	176 to the Utah-Arizona border	C-5-GC	River segment beneath Lake Powell. This segment is below The Confluence; therefore, RM numbering for this segment is calculated from RM 0 at Lee's Ferry.

Note: River mile references are for management purposes only and may not represent precisely the ownership interests and/or fee title claimed by the State of Utah.

Management Authority of State and Federal Agencies Affecting Sovereign Lands

FFSL's management of sovereign lands is often affected by decisions made by adjacent or nearby landowners, especially other state and federal agencies. FFSL supports collaboration with adjacent landowners and agencies that have jurisdiction or management authority on the Green and Colorado Rivers to improve overall river management and decision making. A complete discussion of agencies with intersecting jurisdictions and regulatory authorities can be found in the *Final Green River Comprehensive Management Plan* (Green River CMP) (SWCA Environmental Consultants [SWCA] et al. 2020a) and in the *Colorado River Comprehensive Management Plan* (Colorado River CMP) (SWCA et al. 2020b). The following paragraphs briefly discuss several of the agencies and regulations that particularly affect FFSL's management of mineral leasing. In the event there is a change in any of the management practices specified below or implemented by any applicable agency, any mineral leasing or management practice described herein will be subject to review and revision.

U.S. Bureau of Land Management

Approximately 29% of the landownership within 50 feet of the Green River's banks and approximately 13% of the landownership within 50 feet of the Colorado River's banks is administered by the Bureau of Land Management (BLM). The BLM is responsible for the management of mineral resources on federal lands. The minerals on federal lands are divided into the following three categories, each subject to different laws and regulations (BLM 2019):

- Locatable minerals, subject to the Mining Law of 1872, as amended, which include gold, silver, copper, and other hard rock minerals
- Leasable minerals, subject to various Mineral Leasing Acts, which include coal and other commodities
- Saleable minerals, subject to the Materials Act of 1947, as amended, which include sand and gravel that are essential to construction and road building

The BLM also implements land management plans to guide resource decisions in the area. In the Uinta Basin, the BLM has completed the *Vernal Field Office Record of Decision and Approved Resource Management Plan* (Vernal FO RMP), published in 2008 (BLM 2008a). In the other areas of Green and Colorado River sovereign lands, the BLM has completed the *Price Field Office Record of Decision and*

Approved Resource Management Plan (BLM 2008b), the *Moab Field Office Record of Decision and Approved Resource Management Plan* (BLM 2008c), and the *Monticello Field Office Record of Decision and Approved Resource Management Plan* (BLM 2008d).

According to these management plans, all federal lands adjacent to the Green River from Canyonlands National Park north to the Uintah and Ouray Indian Reservation are withdrawn from mineral entry. Federal lands adjacent to the Green River in Dinosaur National Monument are also withdrawn from mineral entry. The federal lands adjacent to the Green River between the Uintah and Ouray Indian Reservation and Horseshoe Bend are managed as open to mineral entry but subject to either no surface occupancy or timing and controlled surface use stipulations. All other federal lands adjacent to the Green River in the Uinta Basin are managed as open subject to standard stipulations.

Nearly all of the federal lands adjacent to the Colorado River from Moab north to the Utah-Colorado border are withdrawn from mineral entry. Additionally, nearly all federal lands adjacent to the Colorado River from Moab and south to the Utah-Arizona border are also withdrawn from mineral entry, primarily because they fall within either Canyonlands National Park or the Glen Canyon National Recreation Area.

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) manages the Ouray National Wildlife Refuge, which includes a portion of Green River sovereign lands. In addition, the USFWS is responsible for protecting flora and fauna, including fish and migratory birds; complying with the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act of 1918; and protecting threatened, endangered, and candidate species found in and near the Colorado River as required by the Endangered Species Act of 1973 (ESA).

The USFWS is responsible for overseeing implementation of the ESA for four endangered fish: Colorado pikeminnow (*Ptychocheilus lucius*), bonytail (*Gila elegans*), razorback sucker (*Xyrauchen texanus*), and humpback chub (*Gila cypha*). In 1994, portions of the Green and Colorado Rivers in Utah were designated as critical habitat for Colorado pikeminnow, bonytail, razorback sucker, and humpback chub (USFWS 1994). Areas of critical habitat on sovereign lands are described in detail in the Green River CMP (SWCA et al. 2020a) and in the Colorado River CMP (SWCA et al. 2020b). Recovery plans have been approved for all four species.

The Upper Colorado River Endangered Fish Recovery Program is a partnership of local, state (including Utah), and federal agencies; water and power interests; and environmental groups working to recover the four species of endangered fish while allowing for water use and development. The recovery program involves restoring and managing stream flows and habitat; boosting wild, endangered fish populations with hatchery-raised fish; and reducing negative interactions with some species of nonnative fish. The recovery program sets goals to provide objective, measurable criteria for downlisting (change in status from endangered to threatened) and delisting (removal from ESA protection) the endangered fish.

U.S. Army Corps of Engineers

Under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (USACE) is responsible for regulating placement of fill material in the nation's waters, including the Green and Colorado Rivers. USACE's management responsibilities under the Clean Water Act are to protect the nation's aquatic resources from unnecessary adverse impacts.

Other Federal Agencies

Other federal agencies with some regulatory or management responsibility for resources in or adjacent to sovereign lands include the U.S. Bureau of Reclamation (USBR), the National Park Service (NPS), and the Bureau of Indian Affairs (BIA). The USBR manages, develops, and protects water and water-related resources. It operates 338 reservoirs and is the nation's largest wholesale water supplier (USBR 2018). The USBR operates Glen Canyon Dam on the Colorado River.

The NPS has management authority for minerals on lands adjacent to sovereign lands along the Green and Colorado Rivers, such as Dinosaur National Monument, Arches National Park, Canyonlands National Park, and Glen Canyon National Recreation Area.

The BIA has management authority for minerals on behalf of the Ute Indian Tribe, which occupies the Uintah and Ouray Indian Reservation. The Uintah and Ouray Indian Reservation boundaries include approximately 13 miles of sovereign lands on the Green River.

State Agencies

Several state agencies, most of them in the Department of Natural Resources, have management authority for resources associated with the Green and Colorado Rivers. These state agencies include the Utah Division of Wildlife Resources, Utah Division of Water Rights, Utah Division of Water Resources, Utah Division of Oil, Gas and Mining (DOGM), and Utah Division of State Parks and Recreation (DSPR). In addition, the State of Utah School and Institutional Trust Lands Administration (SITLA) manages tracts adjacent to sovereign lands in eastern Utah. The responsibilities of these state agencies are described in more detail in the Green River CMP (SWCA et al. 2020a) and in the Colorado River CMP (SWCA et al. 2020b).

Wild and Scenic Rivers Act

The Wild and Scenic Rivers Act (WSRA) was passed by Congress in 1968. The WSRA's purpose was to set aside "certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations" (16 United States Code 1271 et seq.). Rivers must be both eligible ("free-flowing" with one or more "outstandingly remarkable values") and suitable (whether designation is the best way to manage or

protect the eligible river corridor). Depending on the type and degree of human development associated with the river and adjacent lands (e.g., impoundments, shoreline development), eligible rivers are preliminarily classified as wild, scenic, or recreational.

After the eligibility and suitability determinations are complete, federal agencies can formally recommend designation to the Wild and Scenic River System. Congress must approve any rivers recommended by federal agencies for designation. A river authorized for study by Congress receives statutory protection under Public Law 90-542 Section 7(b), water resources projects; Section 8(b), land disposition; and Section 9(b), mining and mineral leasing. A river identified for study through a federal agency is not protected under the WSRA. Rather, protection of its outstanding remarkable values and other characteristics occurs through other agency decisions.

In March 2019, the President signed Senate Bill 47, the John D. Dingell, Jr. Conservation, Management, and Recreation Act into law. The Emery County Public Land Management Act of 2018 (the Emery County Act) was incorporated into this law. The Emery County Act amends the WSRA to include the following portions of the Green River: the 5.3-mile segment from the boundary of the Uintah and Ouray Indian Reservation south to the Nefertiti boater access point, as a wild river; the 8.5-mile segment from the Nerfertiti boater access point south to the Swasey's Landing boater access point, as a recreational river; and the 49.2-mile segment from Bull Bottom south to the county line between Emery and Wayne Counties, as a scenic river. Of these three segments, a small portion (less than 0.5 RM) of the Green River north of the Swasey's Landing boater access point (the Green River Valley segment near RM 132) and the segment from Bull Bottom south to the county line (the Labyrinth Canyon segment from approximately RM 47 to RM 93) are sovereign lands that have been adjudicated and were determined by the United States Supreme Court to be owned by the State of Utah.

The 2019 federal National Wild and Scenic River designations create implications for FFSL management of the sovereign lands lying below the Green River, especially in the Labyrinth Canyon segment. However, FFSL intends to work with the BLM, Grand County, and Emery County to define management roles, the sovereign land boundary along the river, and any other boundaries associated with the scenic designation. It is FFSL's position that the State retains complete ownership and managerial control over the bed of the Green River in the scenic Labyrinth Canyon segment.

None of the Colorado River is designated under the WSRA.

In addition, the BLM has identified portions of the Green and Colorado Rivers as suitable for recommendation into the National Wild and Scenic Rivers system and as eligible for designation (the initial step in the river assessment process prior to the determination of suitability). These suitable and eligible segments are described in the Green River CMP (SWCA et al. 2020a) and in the Colorado River CMP (SWCA et al. 2020b).

The Wilderness Act

The Wilderness Act was passed by Congress in 1964 and established the National Wilderness Preservation System. The Wilderness Act's purpose was to

> assure than an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition (16 United States Code 1131 et seq.).

Wilderness is defined by the Wilderness Act as "an area where the earth and its community of life are untrammeled by man" and as "an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation" (16 United States Code 1131 et seq.). Under the Wilderness Act, wilderness characteristics include having outstanding opportunities for solitude or a primitive and unconfined type of recreation; having at least 5,000 acres of land or sufficient size to make practicable its preservation and use in an unimpaired condition; and having ecological, geological, or other features of scientific, educational, scenic or historical value.

The Wilderness Act initially immediately placed 54 areas into the National Wilderness Preservation System. The process for adding new lands to the National Wilderness Preservation System involves the Secretary of the Interior's classification of new lands and review of suitability before these findings are reported to the President. The President must then advise Congress of his/her recommendations with respect to the designation of new wilderness. Each recommendation of the President for designation as wilderness becomes effective by an act of Congress.

The Emery County Act, discussed in the previous section, designated 54,643 acres of land adjacent to the Labyrinth Canyon segment as wilderness and added it to the National Wilderness Preservation System. The new Labyrinth Canyon Wilderness will be managed by the BLM. The Desolation Canyon Wilderness was also added to the National Wilderness Preservation System under the Emery County Act. This designation includes 142,996 acres adjacent to the Green River, also to be managed by the BLM. Both wilderness areas are now withdrawn from all forms of appropriation under mining laws and are now closed to future mineral development.

Three Rivers Withdrawal

In September 2004, then–Secretary of the Interior, Gale Norton, signed the Three Rivers Withdrawal, which became effective on October 6, 2004 (Wait 2004). The Three Rivers Withdrawal withdrew nearly 200 miles of public lands river corridor along portions of the Colorado, Dolores, and Green Rivers, including the Colorado River Special Recreation Management Area, from the locating of any new hard rock mining claims.

Brief History of Exploration and Mineral Development on the Green and Colorado Rivers

The Green and Colorado Rivers have played a prominent role in Utah's history beginning with early explorers. The earliest Spanish explorers named the Green River "Rio de San Buenaventura" and mapped it as flowing west to the Pacific from northern Utah, a mistake that was corrected by John C. Fremont's explorations from 1843 to 1844. The Green River was used by early American fur trappers who referred to it as the Spanish River, Colorado River of the West, and Seeds-Kee-Dee Agie. William Ashley established the name as the Green River, using the name given it (Rio Verde) by a party of New Mexican fur trappers he met in 1825 (Webb 1994).

The Green River was navigated by William Ashley from southern Wyoming to the Uinta Basin in 1825, followed by numerous trips by other fur trappers before the famous exploration of the Green and Colorado Rivers by John Wesley Powell in 1869 and 1871 (Webb 1994). Powell explored the Green and Colorado Rivers from Green River, Wyoming, to the mouth of the Virgin River in 1869 and 1871 (Webb 1994). During the second expedition in 1871, Powell and his crew provided the scientific and descriptive observations that outlined the importance of the rivers for the western region—remoteness and inaccessibility in many reaches of the rivers; the geology, natural history, archaeological sites; and water resources for irrigation and settlement.

Robert Brewster Stanton led the next exploration expedition along the Colorado River in 1889. In contrast to Powell's explorations, Stanton was interested in the economic potential of the rivers. Stanton's party embarked from Green River, Utah, with the intent of surveying the Colorado River for a railroad route through the canyons of the Colorado. Stanton was also interested in the mineral potential along the Colorado River and staked several mining claims during his two expeditions (Webb 1994).

In his account of the 1869 Powell expedition, Jack Sumner had noted the presence of "flour" gold in the gravel bars of the Colorado River from the mouth of the Dirty Devil River to Lee's Ferry (Stanton 1982). Several others prospected for this gold, with the largest operation set up by Hoskaninni Mining Company from 1901 to 1902. Stanton was the engineer for this project, which was a considerable financial failure (Webb 1994). From these earliest mining developments came the "giant sluice" theory—that the rivers drained large areas rich in mineral resources, washing down in particular flour gold.

The first oil well in Utah was drilled close to the town of Green River and adjacent to the Green River in 1891 (Gurgel et al. 1983). This initial well proved unproductive and was soon plugged and abandoned. Oil seeps were noted along the San Juan River in 1883 by E. L. Goodridge, and he drilled a "gusher" well in 1908. This was the discovery well for the Mexican Hat field, adjacent to and within the meander area of the San Juan River (Utah Geological Association 1993). Intense prospecting for oil along the Colorado River below Moab and the San Juan River began in the 1920s (Webb 1994).

MINERAL RESOURCES ON GREEN AND COLORADO RIVER SOVEREIGN LANDS

Mineral Resources Definitions

According to Utah Administrative Code R652-20-200, mineral substances are classified as follows:

- Clay minerals: kaolin, bentonite, ball clay, fire clay, fuller earth, common clay, and shale.
- Metalliferous minerals: aluminum, antimony, arsenic, beryllium, bismuth, chromium, cadmium, cerium, columbium, cobalt, copper, fluorspar, gallium, gold, germanium, hafnium, iron, indium, lead, mercury, manganese, molybdenum, nickel, platinum, group metals, radium, silver, selenium, scandium, rare earth metals, rhenium, tantalum, tin, thorium, tungsten, thallium, tellurium, vanadium, uranium, ytterbium, and zinc.
- Coal: black or brownish-black solid fossil fuel that has been subjected to the natural processes of coalification and which falls in the classification of coal by rank: I anthracite, II bituminous, III sub-bituminous, IV lignitic.
- Oil, gas, and hydrocarbon: oil, natural gas, elaterite, ozocerite, and other hydrocarbons (whether found in solid, semi-solid, liquid, vaporous, or any other form) including tar, bitumen, asphaltum, maltha, and other gases. Does not include coal, oil shale, or gilsonite.
- Oil shale: any sedimentary rock containing kerogen.
- Potash: chlorides, sulfates, carbonates, borates, silicates, and nitrates of potassium.
- Phosphate: any phosphate rock containing one or more phosphate minerals such as calcium phosphate, including all phosphatized limestones, sandstones, shales, and igneous rocks.
- Gypsum: alabaster, anhydrite, gypsite, satin spar, and selenite.
- Gilsonite.
- Building stone and limestone: flagstone, granite, quartzite, sandstone, slate, marble, travertine, dolostone, and limestone whether dimensioned crushed, or calcined.
- Industrial sands: abrasive sands, filler sands, foundry sands, frac sands, glass sands, lime sands, magnetic sands, silica sands, and other uncommon sands used in industrial applications.
- Gemstone and fossil: agate, amber, beryl, calcite, chert, coral, corundum, diamond, feldspar, garnet, geodes, jade, jasper, olivine, opal, pearl, quartz, septarian nodules, spinel, spodumene, topaz, tourmaline, turquoise, and zircon; and coquina, petrified wood, trilobites, and other fossilized flora and fauna.
- Volcanic material: lava rock; volcanic pyroclastic material including ash, blocks, bombs, and tuff; volcanic glass material including perlite, pitchstone, pumice, scoria, and vitrophyre.

Oil and Gas Resources

Currently, all producing oil and gas fields that overlap or are adjacent to sovereign lands on the Green River are in the Uinta Basin and include the following geologic formations: Uinta Formation, Green River Formation, Wasatch Formation, Mesaverde Group, Dakota Sandstone, and Frontier Formation (Wood and Chidsey 2015). Oil and gas fields adjacent to or overlapping sovereign lands on the Green River in the Uinta Basin include Horseshoe Bend, Brennan Bottom, Three Rivers, Natural Buttes, West Willow Creek, Pariette Bench, and Uteland Butte. There is also an area adjacent to the Green River near the border of Carbon and Grand counties that is likely underlain in part by scattered, lean oil-impregnated rock (Gurgel et al. 1983).

The Colorado River overlays part of the Paradox Basin, which contains areas of high occurrence potential for oil and gas. However, there are two locations with oil and gas fields (Kane Creek and Moab) adjacent to sovereign lands on the Colorado River (Wood and Chidsey 2015). Both areas are between Arches National Park and Canyonlands National Park, and both overlay the Pennsylvanian Paradox Formation. These fields occur along The Moab Daily and Meander Canyon river segments. The Moab field is not currently being developed but is actively used as a gas storage structure where gas is either injected or extracted depending on economic conditions. There are nine Kane Creek oil fields (five currently producing, one shut-in, and three abandoned) and one abandoned Leadville field within 10 miles of the Colorado River. There are also several dry wells along the Colorado River southeast of Dead Horse Point State Park that were plugged and abandoned in 1967 after minimal production (DOGM 2018).

Other Mineral Resources

Other mineral resources that underlay or are adjacent to sovereign lands on the Green River include the following:

- Uranium occurrences south of the town of Green River (along the Labyrinth Canyon river segment), as well as a uranium operation and occurrences near Ouray (along the Uinta Basin river segment) (Gloyn et al. 2005; Utah Geological Survey 2018a)
- Deeply buried Cretaceous strata, possibly coal-bearing, stretching northeast from the Book Cliffs across the Uinta Basin (along the Uinta Basin river segment) (Gurgel et al. 1983)
- Cretaceous outcrops with thin coal seams that overlap a section of the Labyrinth Canyon river segment south of the town of Green River (Gurgel et al. 1983)
- A gold mining operation southeast of the town of Green River (along the Labyrinth Canyon river segment), as well as two small, inactive placer gold operations along the Uinta Basin river segment (Bon and Heuscher 2008)
- Several small, inactive sand and gravel operations along the Uinta Basin river segment (Bon and Heuscher 2008; Utah Geological Survey 2018b)

- Four small tar sands mining operations along the Uinta Basin river segment near the town of Vernal (Bon and Heuscher 2008)
- A landscape rock mining operation along the Uinta Basin river segment near the town of Vernal (Bon and Heuscher 2008)
- Precious and base metal occurrences in the northern portion of the Uinta Basin along the Uinta Basin river segment, northeast of Castle Peak (Doelling and Tooker 1983)
- Phosphate north and east of Vernal, Utah (Uinta Basin river segment)
- Bitumen deposits within Uintah and Ouray Indian Reservation and near Pariette Draw (Uinta Basin river segment)
- Gilsonite veins that trend north to southeast across the Uinta Basin (Uinta Basin river segment)

There is a moderate potential for the occurrence of economically valuable coal deposits within the Uinta Basin, but it is unlikely that coal exploration or development will occur in the foreseeable future because of the lack of demand and the generally low-grade quality of the coal (BLM 2008a).

Other mineral resources that underlay or are adjacent to sovereign lands on the Colorado River include the following:

- Uranium mining operations and occurrences between Arches National Park and Canyonlands National Park, as well as northeast of Lake Powell near the Glen Canyon segment (Gloyn et al. 2005; Utah Geological Survey 2018a)
- A large potash mining operation southwest of Moab in a known potash leasing area (Bon and Wakefield 2008)
- Several small, active and inactive sand and gravel operations (Utah Geological Survey 2018b)
- Precious and base metal occurrences northeast and southwest of Moab, as well as occurrences under most of Lake Powell that include three small, inactive placer gold operations (Doelling and Tooker 1983; Utah Geological Survey 2018b)

Recreational Mining

Recreational mining includes gold panning, dredging, and sluicing activities. Gold placers have been found on the Green River from Flaming Gorge down to Horseshoe Bend (Utah Geological Survey 2018b). Gold placers have also been found from the mouth of the Dolores River south to the Amasa Back bend of the Colorado River west of Moab. Most placers on the Colorado River were located from the Dirty Devil River south to the Utah-Arizona border and are now under Lake Powell (Utah Geological Survey 2018b).

Recreational panning is defined as using non-mechanized equipment such as a pan, sluice box, or pick and shovel that does not disturb the earth above the water line or outside a dry streambed. *Recreational dredging* is defined as using a vacuum or suction dredge with an intake diameter of up to 4 inches and having a rating of up to 12 horsepower, or using hand-operated sluice equipment and related tools. The Green River and Colorado River are withdrawn from all recreational mining including recreational dredging, sluicing activities, and recreational panning because portions of both rivers have been declared critical habitat for federally listed endangered fish species.

MINERALS LEASING ON GREEN AND COLORADO RIVER SOVEREIGN LANDS

Terms and Definitions

FFSL uses the following terms and definitions in the mineral leasing process:

- Occupancy: Any temporary or permanent fluid, mineral, or hydrocarbon resource activity planned or conducted on both surface and/or surface estate of designated state and sovereign lands.
- No surface occupancy (NSO): Any use or occupancy of either the surface area or surface estate (whether temporary or permanent) is prohibited within specifically described lands for fluid, mineral, or hydrocarbon exploration and/or development. An NSO designation can also mean natural resource commercial exploration and/or development is prohibited to protect separately identified natural resource values.
- Stipulation: A provision that modifies standard mineral exploratory and development lease rights and is attached and incorporated into any mineral lease issued that involves, encumbers, and is appurtenant to state and sovereign lands. For example, if lands are designated as NSO, a mineral lease for those lands must contain an NSO stipulation.
- NSO stipulation: NSO stipulations prohibit surface occupation for development and exploration of mineral resources but allow the subsurface resources to be legally available so that they can be accessed by means other than occupying the surface. Leasing an area with an NSO designation, rather than declaring it "unavailable" or "not administratively available" for leasing, may allow development through directional drilling, if adjacent lands are suitable for surface occupancy. While directional drilling and any resulting production are cost prohibitive and often limited to shale plays, leasing with an NSO stipulation offers some exploration and development opportunities on lands where surface occupancy is prohibited. Leasing with an NSO stipulation can meet Utah's mineral policy directive by encouraging development of mineral resources while also protecting recreational resource values.

General Leasing Rules

Utah Administrative Code R652-20 provides rules for the leasing of mineral resources on sovereign lands. Some of the key rules are summarized below:

- Mineral leases on Green and Colorado River sovereign lands are limited to no more than 2,560 acres or four sections. In general, no mineral lease will be issued for a tract less than a quarter-quarter section or surveyed lot.
- FFSL may require lessees to provide a cultural, paleontological, or biological survey on lands under mineral lease and to be responsible for reasonable mitigative actions as specified by FFSL.
- The lessee or operator shall keep a log of accumulated geologic data for the land area described in the lease. This log should show the formations encountered and any other geologic information reasonably required by lessor and shall be available to FFSL upon request. A copy of the log, as well as any data related to exploration drill holes, shall be deposited with FFSL upon termination of the lease.
- The primary term for a lease is generally 10 years.
- The term of all mineral leases included in any cooperative or unit plan of oil and gas development or operation in which FFSL has joined shall be extended automatically for the term of the unit or cooperative agreement.
- If drilling operations are being diligently pursued on the leased premises at the end of the term, including any valid extension of any oil and gas lease, the lessee can request continuation of the lease based on due diligence. Upon written application by lessee and satisfactory showing of due diligence in execution of drilling operations, an extension rider will be issued by FFSL. Application for the extension rider shall be filed by the lessee within 30 days prior to expiration of the fixed term of any valid extension of the lease.
- Prior to commencement of any operations on a state mineral lease, the lessee or designated operator shall comply with all DOGM requirements.

Sovereign Land Leasing Classification

All sovereign lands on the Green and Colorado Rivers are classified as NSO (Figures 2, 3, and 4). All mineral leases issued on sovereign land will contain an NSO stipulation.

As a result of the NSO stipulation, development of oil and gas resources can only take place if adjacent lands are leased and the resources are legally developed through directional drilling. This development is contingent on applicable land management agency decisions (e.g., DOGM, BLM, SITLA) or the initiative of private landowners.

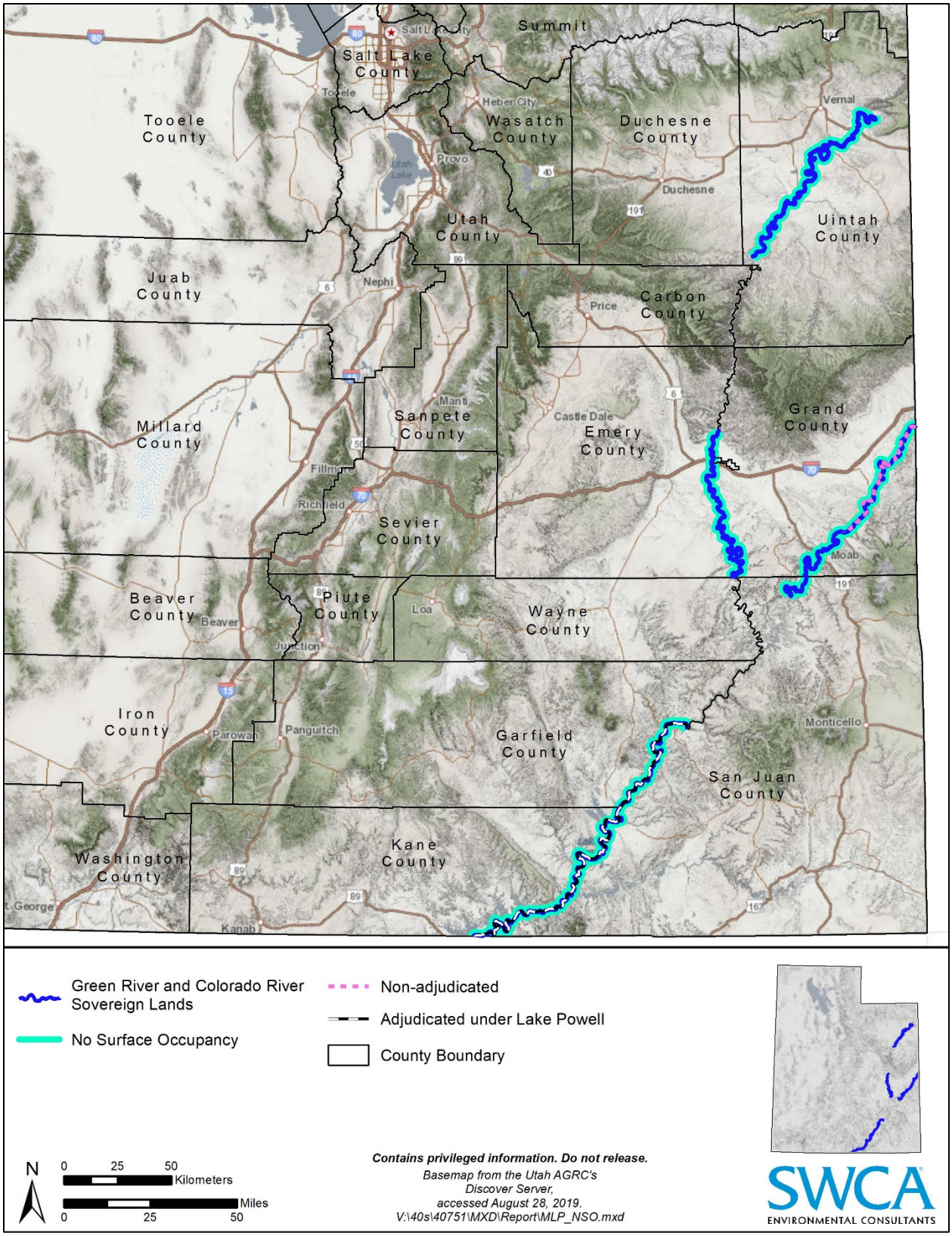

Figure 2. Sovereign lands mineral leasing classification.

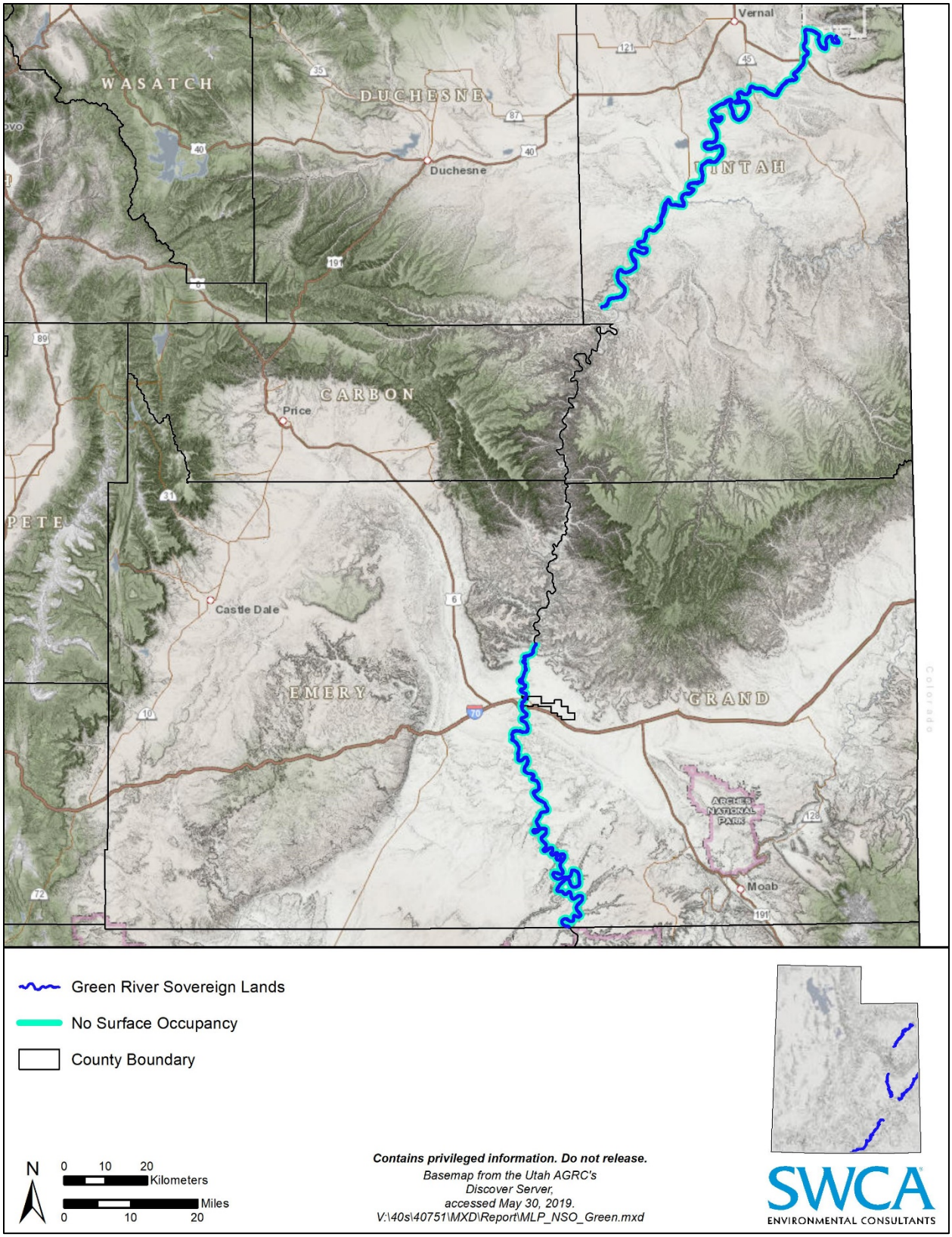

Figure 3. Green River sovereign lands mineral leasing classification.

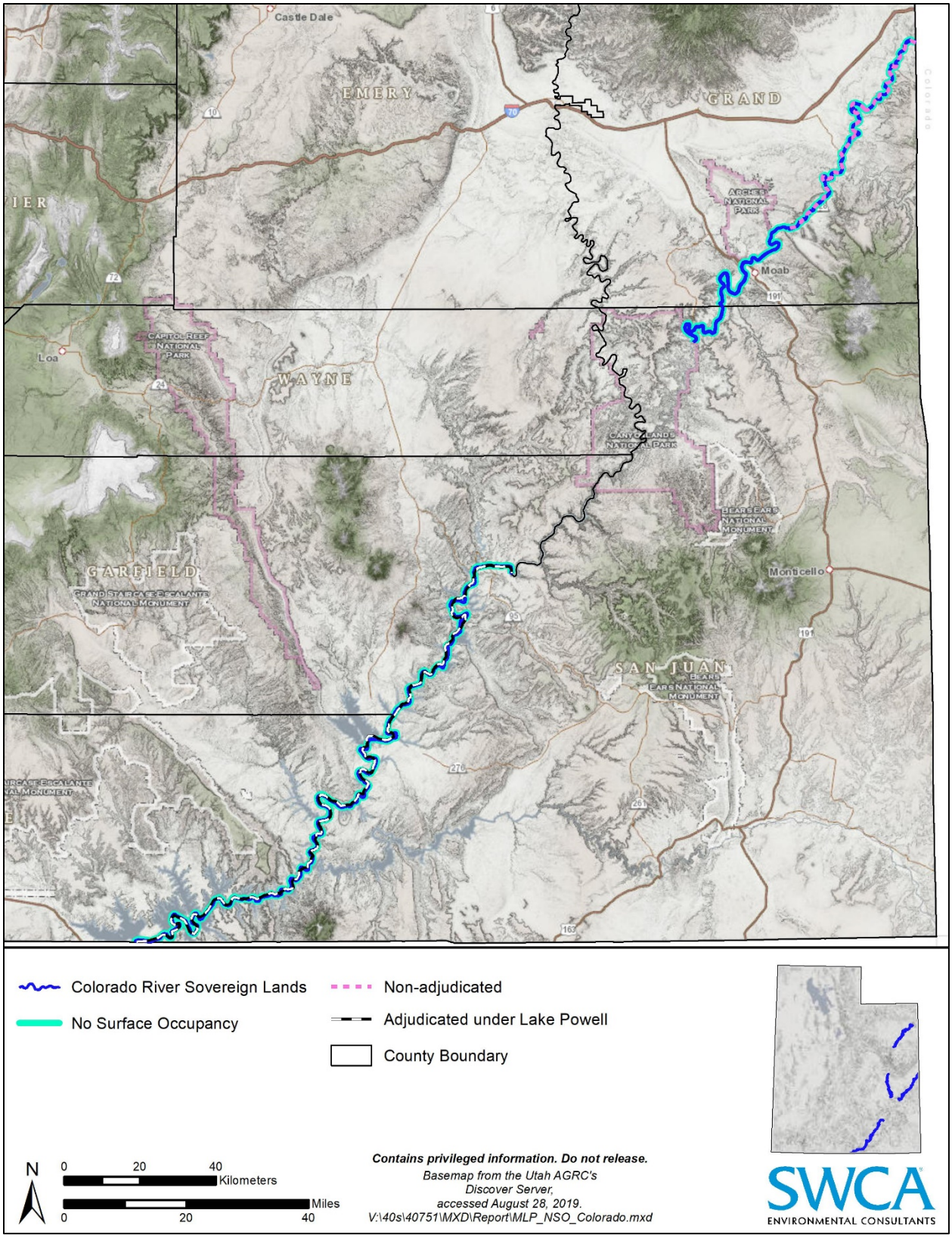

Figure 4. Colorado River sovereign lands mineral leasing classification.

Ownership Issues

Ownership issues that arise with adjacent, private, and public landowners can be settled and/or adjudicated on a case-by-case basis as boundary issues arise or as management decisions dictate or warrant.

Green River

The longitudinal scope and extent of Utah's ownership of the bed of the Green River were formally adjudicated in decisions issued by the United States Supreme Court in 1931[2] and in 1965.[3] The 1931 decision decreed the Labyrinth Canyon segment of the Green River to be navigable

> where the river crosses the township line between townships 23 and 24 south, range 17 east, Salt Lake Base and Meridian, to the confluence of the Grand (Colorado) River, is now and at all times on and after January 4, 1896, has been, a navigable river, and the title to the bed thereof vested in the State of Utah upon its admission to the Union. (283 U.S. 801 [1931]).

The complicated history surrounding the expanding and retracting boundaries of the Uintah and Ouray Indian Reservation along the Green River prompted more litigation, and the 1965 decision provided certainty regarding tribal and state ownership of the upper Green River. The 1965 decision adjudicated the remaining longitudinal length of the Green River on a segment-by-segment basis. The District Court determined the segments of the Green River located in Dinosaur National Monument and in Desolation and Gray Canyons to be non-navigable. However, the Green River was determined to be navigable as it flowed out of Dinosaur National Monument (RM 312 above The Confluence) and across the Uinta Basin to Sand Wash (RM 212.7 above The Confluence), and as it emerged from Gray Canyon (RM 129 above The Confluence) across the San Rafael Desert to RM 95.

For purposes of mineral leasing, the relevant river segment is the Green River section flowing across the Uinta Basin (from RM 312 to the mouth of Sand Wash) because the shale formations in the basin are experiencing increased oil and gas development prompted by advances in directional drilling and hydraulic fracturing techniques. Along this segment of the Green River, the State of Utah, through FFSL, has been properly issuing mineral leases for the state lands and corresponding mineral estate under the riverbed of the Green River.[4] FFSL intends on continuing to issue no surface occupancy leases along the navigable Uinta Basin segment of the Green River while consulting and cooperating with the Ute Indian Tribe on any subsequent mineral leases involving state lands.

[2] *United States v. State of Utah,* 283 U.S. 801 (1931).

[3] Civil No. C-201-62 (D. Ut. 1965) (unpublished decision).

[4] In addition to the 1965 decision adjudicating title to the State of Utah on the navigable stretches of the Green River, Utah's ownership of those sections flowing over the Uintah and Ouray Indian Reservation is further supported by the United States Supreme Court decision in *Montana v. United States*. 450 U.S. 544 (1981), which held that creation of the Crow Indian Reservation pre-statehood did not trump the strong presumption against title to the Big Horn River vesting with the state upon admission to the Union.

Colorado River

Portions of the Colorado River have been adjudicated in terms of ownership of the submerged lands constituting the bed of the river, but a significant stretch of the Colorado River remains unadjudicated in terms of title. Specifically, the section of the Colorado River from the Colorado border south to Castle Creek (referred to in this section as the Upper Colorado) has not been adjudicated in terms of ownership, whereas "the Colorado river from the mouth of Castle creek (about 14 miles above the town of Moab) to the boundary line between Utah and Arizona, 296 miles (including the portion of the Colorado river above the mouth of the Green river which had formerly been known as the Grand river)" was adjudicated and held navigable for title purposes by the United States Supreme Court in 1931 in *United States v. Utah* (283 U.S. 64). In other words, the Court determined the State of Utah has title to the bed of the Colorado River in this section. The southern portion of this adjudicated section of the Colorado River is now submerged under Lake Powell. Because the State of Utah retains title to the bed of the river submerged under Lake Powell, it is anticipated the State of Utah and the United States will have to negotiate alternate resolution for this submerged segment of the Colorado River.

The United States is the owner of most of the upland property adjacent to the Upper Colorado.[5] To date, neither the United States nor a private landowner has initiated litigation to determine riverbed ownership within this unadjudicated section. Several reports issued by the BLM contain findings of navigability along the Upper Colorado.[6]

The State of Utah, through FFSL, has not, to date, initiated any proceedings to adjudicate title to the Upper Colorado riverbed, primarily due to title adjudication priorities on other sovereign lands. FFSL believes recent precedent issued by the United States Supreme Court in 2012 in *PPL v. Montana* (565 U.S. 576) and an analysis of historical data and geomorphology present solid legal and factual grounds to claim ownership of the Upper Colorado riverbed. FFSL is currently exploring procedural options to formally adjudicate ownership.

Because this section of the Colorado River has not yet been adjudicated, interim management of the riverbed will be accomplished through cooperation with the federal government. FFSL is working to complete a temporary memorandum of understanding (MOU) with the BLM, the agency responsible for managing the federal land adjacent to the river. The MOU will govern cooperative management of the Upper Colorado section of the river from bank to bank during the pendency of adjudication. Until the MOU is in place, FFSL will manage the Upper Colorado section of the river in a way that does not conflict with current BLM management of adjacent land. Management goals and objectives in the Colorado River CMP (SWCA 2020b) will be used to guide joint management and will ensure consistent management along all five river segments. In the event an MOU is negotiated and executed, FFSL will amend the Colorado River CMP to include the terms of the MOU.

[5] In addition to the United States, there are approximately 23 private owners of land parcels adjacent to the Upper Colorado.

[6] Compare the conclusion of Mary G. von Koch on page 19 of the *Navigability Report of the Upper Colorado and Lower Dolores Rivers Within Utah* (von Koch 1987) that the Upper Colorado River was navigable except for the "section of the Colorado River known as Westwater Canyon and starting at Westwater Creek and ending 12.8 miles downstream at Cottonwood Creek" with the conclusion on page 21 in the *Navigability Report of the Upper Colorado and Lower Dolores Rivers* (Anonymous n.d. [1983]) that "in review of the history of the subject rivers and reports pre-taining [sic] to waterflow, topography, and general characteristics and in review of precedent court cases there appears no basis for a finding of navigability of the Upper Colorado and the Lower Dolores Rivers" (for purposes of issuing hydrocarbon and metalliferous leases).

If and when ownership is formally adjudicated and it is determined the State of Utah holds title to the unadjudicated section or a portion of this section, FFSL will amend the Colorado River CMP to reflect its ownership and management of the riverbed.

Mineral Leasing Application Process

FFSL is the executive authority for the management of sovereign lands and is required to prescribe standards and conditions for the authorization and development of surface resources on sovereign lands. Mineral leases issued by FFSL must be in compliance with state law, administrative rules, and the Public Trust Doctrine and must adhere to multiple-use, sustained-yield principles. Each mineral lease must also comply with this MLP. Figure 5 demonstrates FFSL's mineral leasing process.

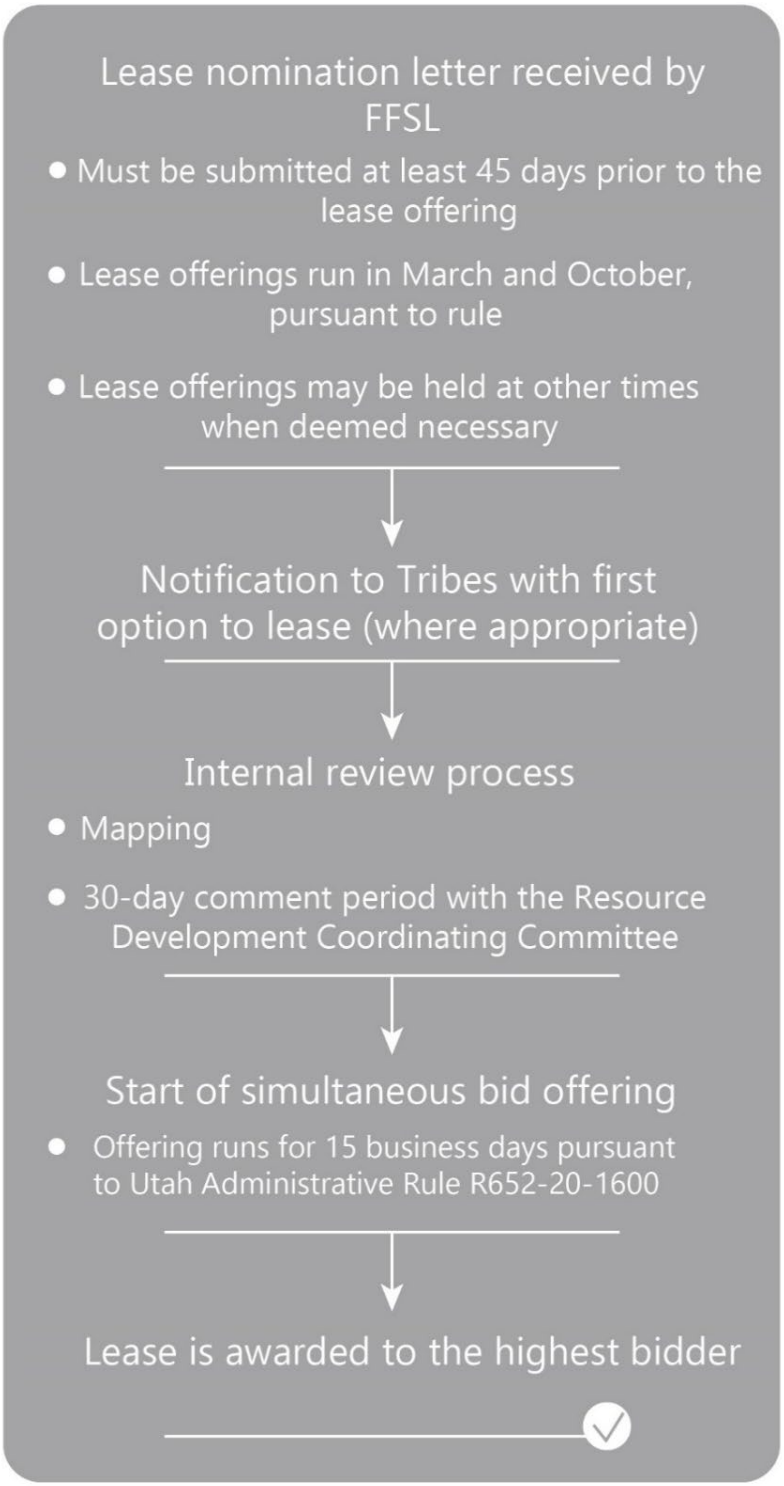

Figure 5. FFSL's mineral leasing process.[7]

[7] This diagram is for illustrative purposes only. FFSL follows all applicable legal doctrines, statutes, and regulations for mineral leasing.

Royalty Rates and Revenues

Currently, and until royalty rates are adjusted pursuant to rulemaking, revenues generated by mineral leases on sovereign lands in the Green and Colorado Rivers are modest compared to mineral leases on other sovereign lands in Utah, such as Great Salt Lake. The minimum annual rental on any mineral leases on sovereign lands is $20 (Utah Administrative Code R652-20-1000[1][C]). Annual royalties vary for oil and gas, other hydrocarbon substances, and mineral commodities on sovereign lands. Table 3 lists the royalty rates for oil and gas, coal, and other mineral commodities on sovereign lands in Utah.

Table 3. Royalty Rates for Oil and Gas and Mineral Commodities

Commodity	Royalty Rate
Oil	12.5%*
Gas	12.5%*
Sulfur	12.5%*
Other hydrocarbon substances	6.25%*
Coal	8%
Oil shale	5%†
Asphaltic/bituminous sands	7%‡
Gilsonite	10%
Fissionable metallic minerals	8%
Non-fissionable metallic minerals	4%
Gemstone/fossil	10%§
Magnesium	1.5%
Salt	$0.50/dry ton
Phosphate	5%
Potash and associated minerals	5%
Gypsum	5%
Clay	5%
Geothermal resources	10%
Building stone/limestone	5% (except 2% for calcined lime)
Volcanic materials	5%
Industrial sands	5%

Source: Utah Administrative Code R652-20-1000.

Note: Royalty rates are published for reference purposes and are subject to change. Current royalty rates may be found in the applicable regulations.

* During the first 10 years of production and increasing annually thereafter at the rate of 1% to a maximum of 16.7%.

† 5% during the first 5 years of production and increasing annually thereafter at the rate of 1% to a maximum of 12.5%.

‡ May be escalated after the first 5 years of production at the rate of 1% per year to a maximum of 12.5%.

§ On January 1, 2001, the royalty rate per ton started being adjusted annually by the Producer Price Index for Industrial Commodities as provided under R652-20-1000(e) using 1997 as the base year.

Areas of Potential Resource Conflicts

Reasonably foreseeable resource conflicts along the Green and Colorado Rivers may affect the potential for mineral leasing. Table 4 lists the some of the potential resource conflicts by river segment.

Table 4. Potential Resource Conflicts and Upland Ownership Patterns by River Segment

River Segment	Potential Resource Conflicts	Upland Ownership Patterns
Green River		
Uinta Basin	Dinosaur National Monument Stewart Lake Wildlife Management Area Ouray National Wildlife Refuge BLM areas of critical environmental concern Potential wild and scenic river segments Boater access points Cultural resources Wetland and riparian areas Agricultural areas ESA-listed fish and plant species	Federal lands managed by NPS, BLM, and USFWS Private ownership Individual Ute allotments Tribal lands managed by the Ute Indian Tribe and BIA State lands
Green River Valley	Potential wild and scenic river segments Wild and scenic river (recreational) Wilderness area National scenic and historic trails LR Thayn walk-in-access area Boater access points Cultural resources Wetland and riparian areas Agricultural areas Tusher Diversion Dam ESA-listed species City of Green River's plan to develop a river walk trail system	Federal lands managed by BLM Significant private ownership City of Green River
Labyrinth Canyon	Canyonlands National Park BLM areas of critical environmental concern Potential wild and scenic river segments Wild and scenic river segment (scenic) Adjacent wilderness study area Wilderness area Lower San Rafael River Wildlife Management Area Boater access points Cultural resources Wetland and riparian areas ESA-listed species Recreation values Scenic values	Federal lands managed by BLM and NPS State lands Private ownership

River Segment	Potential Resource Conflicts	Upland Ownership Patterns
Colorado River		
Above Westwater	Potential wild and scenic river segments Boater access point Wetland and riparian areas ESA-listed species Recreation values Scenic values Unadjudicated ownership	Federal lands managed by BLM Significant private ownership
Westwater Canyon Wilderness Study Area	Adjacent wilderness study area Potential wild and scenic river segments Boater access point Cultural resources Wetland and riparian areas ESA-listed species Recreation values Scenic values Unadjudicated ownership	Federal lands managed by BLM Private ownership
The Moab Daily	Arches National Park Scott M. Matheson Wetlands Preserve Cottonwood Bench Ranch Conservation Easement BLM areas of critical environmental concern Potential wild and scenic river segments Adjacent wilderness study areas National scenic and historic trails Boater access points Cultural resources Wetland and riparian areas Agricultural areas ESA-listed plant and wildlife species ESA-listed species Recreation values Scenic values	Federal lands managed by NPS and BLM Private ownership State lands Nature Conservancy and state wildlife management areas City of Moab
Meander Canyon	Canyonlands National Park BLM areas of critical environmental concern Important bird area Potential wild and scenic river Boater access point Cultural resources Wetland and riparian areas ESA-listed species Recreation values Scenic values	Federal lands managed by BLM and NPS State lands

River Segment	Potential Resource Conflicts	Upland Ownership Patterns
Glen Canyon	Glen Canyon National Recreation Area Important bird area Boater access points Cultural resources Wetland and riparian areas ESA-listed species Recreation values Scenic values Stranded and/or submerged title	Federal lands managed by the NPS Navajo Nation lands

MANAGEMENT DIRECTION

The goals and objectives below reflect the intention of FFSL to protect and sustain the Pubic Trust resources while providing for their use. Each goal is supported by objectives that can be used to achieve the goal. Table 5 presents management goals and objectives for the leasing of oil and gas resources on sovereign lands. Table 6 presents management goals and objectives for the leasing of mineral resources on sovereign lands.

Table 5. Oil and Gas Resources Goals and Objectives

Oil and Gas Resources Goal 1: Balance oil and gas resource development on sovereign lands while minimizing negative impacts, protecting Public Trust resources, and protecting the natural environment.
Objective: Foster coordination and cooperation in the management of all resources on the Green and Colorado Rivers with oil and gas applicants, and with local, state, federal, and tribal agencies with management authority adjacent to or on the Green and Colorado Rivers.
Objective: Enforce all applicable regulations, mitigation, and best management practices during oil and gas operations and appropriate reclamation after developments cease.
Objective: Coordinate closely with DOGM for leases adjacent to Class 6 areas.
Objective: Adhere to the goals and objectives in the Green River CMP (SWCA et al. 2020a) and in the Colorado River CMP (SWCA et al. 2020b) when evaluating lease applications.

Table 6. Mineral Goals and Objectives Common to All Classes

Mineral Resources Goal 1: Balance mineral resource development on sovereign lands while minimizing negative impacts, protecting Public Trust resources, and protecting the natural environment.
Objective: Foster coordination and cooperation in the management of all resources on the Green and Colorado Rivers with mineral applicants, and with local, state, federal, and tribal agencies with management authority adjacent to or on the Green and Colorado Rivers.
Objective: Enforce all applicable regulations, mitigation, and best management practices during mineral resource development and extraction operations and appropriate reclamation after projects cease.
Objective: Coordinate closely with permitting agencies for leases adjacent to Class 6 areas.
Objective: Adhere to the goals and objectives in the Green River CMP (SWCA et al. 2020a) and in the Colorado River CMP (SWCA et al. 2020b) when evaluating lease applications.

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