TECHNICAL MEMORANDUM

SUBJECT: **Snake/Salt River Basin Plan**
Basin Water Use Profile - Environmental

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Introduction:

Water features such as rivers, streams, and lakes are an integral part of the landscape and environment in the Snake/Salt River basin. Among the various uses of water studied as part of the Snake/Salt River basin plan, this technical memorandum looks at the use of water for environmental purposes. Many of these uses are controlled by man to maintain or improve existing conditions, while others, such as wetlands, may occur naturally and are subject to management by various means.

Maintenance Flows:

The construction of the Jackson Lake Dam in 1911 allowed for control of the flow of Snake River below Jackson Lake. This control was generally exercised to the benefit of farmers located downstream in Idaho. Peak flows that would have spilled from the lake were held back for use later in the growing season. Depending upon weather, precipitation, and other factors, the water could be released at a moments' notice, and would soon be available for use on farms located hundreds of miles downstream. However, management of the flow for optimal use by farmers does not necessarily mean that the flow will be suited for fish in the river. Frequent or large adjustments in releases from the lake that may be desired by downstream users tend to be detrimental to the fish population. Also, very low flows during the winter when the reservoir is filling can have a negative effect on fish.

Drought in the basin in the late 1980's brought concern for the fish in Snake River. Farmers wanted to save as much water as possible during the winter in order to have adequate water for irrigation the following summer. However this would compound the problem of stream flows already low due to drought. During this time, it was determined that there was storage space available to the State of Wyoming in Palisades Reservoir. This storage space was later purchased by the State. Further discussion on this contracted storage space in Palisades is presented in the Technical Memorandum entitled "Snake/Salt River Basin Plan, Palisades Reservoir Contract" prepared by Fassett Consulting.

Purchase of this storage space in Palisades Reservoir by the State of Wyoming enabled interests upstream of Idaho in Wyoming to be heard. Since all Bureau of Reclamation water contracts in Palisades Reservoir and Jackson Lake were for uses downstream in Idaho, it did not matter to the downstream users in which reservoir the water controlled by Wyoming was located. As a result, Wyoming is able to exchange water in Palisades for water in Jackson Lake. This water can then be used to augment fish flows if needed, without impact to irrigators in Idaho. According to the Wyoming Game and Fish Department, a minimum winter release of 280 cfs from Jackson Lake is desired for the Snake River fishery.

In addition to the use of water in Jackson Lake, the State of Wyoming also had opportunity for input regarding the operation of the water storage facilities at Jackson Lake and Palisades Reservoir, similar to any other space holder in these facilities. As a result, the State Engineer's Office and Wyoming Game and Fish Department now have semi-annual meetings with the U.S. Bureau of Reclamation regarding operations of the reservoir facilities.

Instream Flow Rights:

As described in the Technical Memorandum entitled "Snake/Salt River Basin Plan, Basin Water Use Profile – Instream Flows", prior to 1986 Wyoming water law stated that water must be diverted and conveyed in order to be beneficially used. However, the passing of the Instream Flow Law in 1986 changed this to allow water to be left in the stream for a beneficial use, such as for fisheries. This instream right can only be held by the State of Wyoming, and the priority system still applies to these rights. The Wyoming Legislature declared in 1986 that instream flow for maintenance or improvement of existing stream fisheries is a beneficial use of water than can be provided from natural streamflows or from storage water. The instream flow process includes three state agencies, which are the Game and Fish Department, the Water Development Commission, and the State Engineer's Office.

There are currently as of November 2002 four applications pending in the Snake/Salt River basin, two of which are on Fish Creek below Wilson, with the others on the Salt and Greys Rivers.

Wetlands Mapping:

According to their website, the National Wetlands Inventory (NWI) of the U.S. Fish & Wildlife Service produces information on the characteristics, extent, and status of the Nation's wetlands and deepwater habitats. The National Wetlands Inventory Center information is used by federal, state, and local agencies, academic institutions, U.S. Congress, and the private sector. The NWIC has mapped 90 percent of the lower 48 states, and 34 percent of Alaska. About 44 percent of the maps for the lower 48 states, and 13 percent of Alaska are digitized. Congressional mandates require the NWIC to produce status and trends reports to Congress at ten-year intervals. Additional information regarding the National Wetlands Inventory can be found at www.nwi.fws.gov. The Wyoming Water Resources Center has converted the .dlg data provided by NWI into Arc/Info vector coverages, which contain both line (riverine) and polygon (lacustrine and palustrine) wetland features.

Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification wetlands must have one or more of the following three attributes:

- at least periodically, the land supports predominantly hydrophytes
- the substrate is predominantly undrained hydric soil
- the substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year.

The wetland classification system is hierarchical, with wetlands and deepwater habitats divided among five major systems at the broadest level. The five systems include Marine (open ocean and associated coastline), Estuarine (salt marshes and brackish tidal water), Riverine (rivers, creeks, and streams), Lacustrine (lakes and deep ponds), and Palustrine (shallow ponds, marshes, swamps, sloughs). Systems are further subdivided into subsystems which reflect hydrologic conditions. Below the subsystem is the class which describes the appearance of the wetland in terms of vegetation or substrate. Each class is further subdivided into subclasses; vegetated subclasses are described in terms of life form and substrate subclasses in terms of composition. The classification system also includes modifiers to describe hydrology (water regime), soils, water chemistry (pH, salinity), and special modifiers relating to man's activities (e.g., impounded, partly drained).

There are three major wetland systems mapped within the Snake/Salt River basin. The descriptions for these systems are taken from the NWI website, which references Cowardin, et al. The three systems are described as follows:

> **Riverine:** The Riverine System includes all wetlands and deepwater habitats contained in natural or artificial channels periodically or continuously containing flowing water or which forms a connecting link between two bodies of standing water. Upland islands or Palustrine wetlands may occur in the channel, but they are not part of the Riverine System. The Riverine System is bounded on the landward side by upland, by the channel bank (including natural and man-made levees), or by wetlands dominated by trees, shrubs, persistent emergents, mosses, or lichens. In braided streams, the system is bounded by the banks forming the outer limits of the depression within which the braiding occurs.
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> The Riverine System terminates at the downstream end where the concentration of ocean-derived salts in the water exceeds 0.5 ppt during the period of annual average low flow, or where the channel enters a lake. It terminates at the upstream end where tributary streams originate, or where the channel leaves a lake. Springs discharging into a channel are considered part of the Riverine System.
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> Where a river enters a lake, the extension of the Lacustrine shoreline across the mouth of the river forms the Riverine /Lacustrine break. Oxbow lakes are placed in the Palustrine or Lacustrine Systems unless they are connected to a Riverine System by an open channel at both ends either permanently or intermittently. Run-of-the-river dams should be classified in the same manner as described above, with the Lacustrine System extending upstream to the contour approximating the normal spillway or pool elevation.

The USGS maps or USGS Water Resources Data (stream gauge data) are used as the primary data source in determining if the Riverine channel is a perennial or intermittent stream.

Lacustrine: The Lacustrine System includes wetlands and deepwater habitats with all of the following characteristics:
1. situated in a topographic depression or a dammed river channel;

2. lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30% areal coverage.

3. total area exceeds 8 hectares (20 acres).

Basins or catchments less than 8 hectares in size are included if they have at least one of the following characteristics:

1. a wave formed or bedrock feature forms all or part of the shoreline boundary; or

2. have at low water a depth greater than 2 meters (6.6 feet) in the deepest part of the basin.

Lacustrine Systems formed by damming a river channel are confined by the contour approximating normal spillway elevation or summer pool elevation. Rivers with dams and associated locks that impound water to the extent that the ecological character of the river is significantly impacted, are considered lacustrine to the upstream point that approximates spillway or normal pool elevation, or to the upstream point where riverine characteristics return.

The Lacustrine System is bounded by upland or by wetland dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens. Lacustrine systems formed by damming a river channel are bounded by a contour approximating the normal spillway elevation or normal pool elevation, except where Palustrine wetlands extend lakeward of that boundary. Where a river enters a lake, the extension of the Lacustrine shoreline forms the Riverine-Lacustrine boundary.

Palustrine: The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, emergents, mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean derived salts is below 0.5 ppt. Wetlands lacking such vegetation are also included if they exhibit all of the following characteristics:

1. are less than 8 hectares (20 acres);

2. do not have an active wave-formed or bedrock shoreline feature;

3. have at low water a depth less than 2 meters (6.6 feet) in the deepest part of the basin;

4. have a salinity due to ocean-derived salts of less than 0.5 ppt.

All water bodies visible on the aerial photography that are less than 8 hectares (20 acres) in size are considered to be in the Palustrine System unless depth information is available, or unless an active wave-formed or bedrock shoreline feature is visible. Limits: The Palustrine System is bounded by upland or by any of the other four systems. Description. The Palustrine System was developed to group the vegetated wetlands traditionally called by such names as marsh, swamp, bog, fen, and prairie, which are found throughout the United States. It also includes the small, shallow, permanent or intermittent water bodies often called ponds. Palustrine wetlands may be situated shoreward of lakes, river channels, or estuaries; on river floodplains; in isolated catchments; or on slopes. They may also occur as islands in lakes or rivers.

The major wetland systems are broken into these sub-systems within the basin:

Lower Perennial (Riverine) - This Subsystem is characterized by a low gradient and slow water velocity. There is no tidal influence, and some water flows throughout the year. The substrate consists mainly of sand and mud. The floodplain is well developed. Oxygen deficits may sometimes occur.

Upper Perennial (Riverine) - This Subsystem is characterized by a high gradient and fast water velocity. There is no tidal influence, and some water flows throughout the year. This substrate consists of rock, cobbles, or gravel with occasional patches of sand. There is very little floodplain development.

Intermittent (Riverine) - This Subsystem includes channels that contain flowing water only part of the year, but may contain isolated pools when the flow stops.

Limnetic (Lacustrine) - Extends outward from Littoral boundary and includes all deep-water habitats within the Lacustrine System.

Littoral (Lacustrine) - All wetland habitats in the Lacustrine System. Extends from shoreward boundary to 2 meters (6.6 feet) below annual low water or to the maximum extent of nonpersistent emergents, if these grow at depths greater than 2 meters. Aquatic beds are considered to be in the Littoral Subsystem unless depth information is available and indicates other classification. Aquatic beds and nonpersistent emergents that are contiguous with the Lacustrine System are considered to be Lacustrine regardless of their size. In large lakes where depth contours are mapped by USGS, the 2 meter (6.6 feet) contour line is used to separate the Littoral and Limnetic Subsystems.

Wetlands are further broken down by class. The NWI website states that class describes the general appearance of the habitat in terms of either the dominant life form of the vegetation or the physiography and composition of the substrate. Life forms (e.g. trees, shrubs, emergents) are used to define classes because they are easily recognizable, do not change distribution rapidly, and have traditionally been used to classify wetlands. Other forms of vegetation such as

submerged or floating-leaved vascular plants are more difficult to detect. Substrates reflect regional and local variations in geology and the influence of wind, waves, and currents on erosion and deposition of substrate materials. The various classes found in the basin are as follows:

[UB] Unconsolidated Bottom - Includes all wetlands and deepwater habitats with at least 25% cover of particles smaller than stones (less than 6-7 cm), and a vegetative cover less than 30%. Water regimes are restricted to the following: subtidal, permanent-tidal, semipermanent-tidal, permanently flooded, intermittently flooded, and semipermanently flooded.

[AB] Aquatic Bed - Includes wetlands and deepwater habitats dominated by plants that grow principally on or below the surface of the water for most of the growing season in most years. Aquatic beds generally occur in water less than 2 meters (6.6 feet) deep and are placed in the Littoral Subsystem (if in Lacustrine System). Water regimes include the following: subtidal, permanent-tidal, semipermanent-tidal, irregularly exposed, regularly flooded, permanently flooded, intermittently flooded, semipermanently flooded, and seasonally flooded.

[US] Unconsolidated Shore - Includes all wetland habitats having three characteristics:

(1) unconsolidated substrates with less than 75% areal cover of stones, boulders, or bedrock;

(2) less than 30% areal cover of vegetation other than pioneering plants; and

(3) any of the following water regimes: irregularly exposed, regularly flooded, irregularly flooded, seasonally flooded, temporarily flooded, intermittently flooded, saturated, seasonal-tidal, temporary-tidal, or artificially flooded. Intermittent or intertidal channels of the Riverine System or intertidal channels of the Estuarine System are classified as Streambed. Landforms such as beaches, bars, and flats are included in the Unconsolidated Shore class.

[SB] Streambed - Includes all wetlands contained within the Intermittent Subsystem of the Riverine System and all channels of the Estuarine System or of the Tidal Subsystem of the Riverine System that are completely dewatered at low tide. Water regimes include the following: seasonally flooded, temporarily flooded, intermittently flooded, irregularly exposed, regularly flooded, irregularly flooded, seasonal-tidal, and temporary-tidal.

[SB] Streambed - Includes all wetlands contained within the Intermittent Subsystem of the Riverine System and all channels of the Estuarine System or of the Tidal Subsystem of the Riverine System that are completely dewatered at low tide. Water regimes include the following: seasonally flooded, temporarily flooded, intermittently flooded, irregularly exposed, regularly flooded, irregularly flooded, seasonal-tidal, and temporary-tidal.

[EM] Emergent - Characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most

years. These wetlands are usually dominated by perennial plants. All water regimes are included except subtidal and irregularly exposed.

[FO] Forested - Characterized by woody vegetation that is 6 m tall or taller. All water regimes are included except subtidal.

[SS] Scrub-Shrub - Includes areas dominated by woody vegetation less than 6 m (20 feet) tall. The species include true shrubs, young trees (saplings), and trees or shrubs that are small or stunted because of environmental conditions. All water regimes except subtidal are included.

The wetlands mapping produced by the National Wetland Inventory and converted by the Wyoming Water Resources Center is included in the GIS mapping for the Snake/Salt River basin plan. The mapping is at a scale of 1:24,000.

Wetlands in the basin provide food, shelter, and breeding habitat for waterfowl and other wildlife. Wetlands may also improve water quality by contributing to the removal of nutrients, sediment, and other impurities in water, in turn protecting rivers and lakes. Also, wetland can help control erosion and flooding during high water events.

Wetlands Projects:

Many wetland creation and enhancement projects were constructed throughout the Snake/Salt River basin by the Soil Conservation Service and the Natural Resource Conservation Service (NRCS) in the 1990's. Various projects near Jackson were constructed as part of the mitigation plan for Jackson Lake rehabilitation due to loss of wetlands, and are located in the Gros Ventre, Buffalo Fork, and South Park areas.

At the upper end of the Palisades Reservoir, the Wyoming Game and Fish Department had created a wildlife viewing area adjacent to Highway 89. However, much of the wildlife and waterfowl would leave when the reservoir level would drop and leave the area dry. NRCS, with funding help from U.S. Bureau of Reclamation, Wyoming Game and Fish Department, U.S. Forest Service, and the Town of Alpine, designed a wetland area that would keep water in the area to provide wildlife habitat year round. A system of seven dikes was constructed, up to seven feet in height, with clay cores and gravel shells. The design called for the lower dikes to be under water when the reservoir was full, and 35 islands were placed in the created pond areas. The water for the wetland area is diverted from Salt River, and as much as 30 cfs of water can be diverted. By creating a flow-through system, problems with mosquitoes and moss were avoided. Nearly all of the water that flows through the system returns to Palisades Reservoir. Overall, the wetland area was designed to be 50% vegetation and 50% open water. The water levels in each pond can be adjusted using boards in the overflow structure. The end result has approximately 115 acres of surface water in the total area of 300 acres. Construction costs at the time were $260,000. Currently, the facility is operated by the Wyoming Game and Fish Department, who is also the holder of the associated water rights.

Snake River Restoration Project:

The Upper Snake River Restoration Project is located in the Jackson valley, and is intended to rehabilitate and restore fishery and wildlife habitat along the Snake River. In the 1950's, approximately 22 miles of dikes and levees were constructed along the Snake River in an effort to reduce flooding. For example, the elevation of the community of Wilson is actually lower than that of the nearby river bed, and extensive flooding would occur during a 100 year event. The levees now protect residents in the area from flood events, and the 100 year flood plain is now within the levee system in this area. These structures reduced the flood plain from approximately 25,000 acres to 2,500 acres throughout the Jackson valley. As a result of the reduced area available to the river during flood events, river velocities can increase to the point that the river bed is unstable. Aggradation has occurred in locations along the river, notably in the area of the bridge near Wilson. Over the years this has greatly reduced fish and wildlife habitat along the river, as well as vegetation. In an effort to restore some of what was lost, Teton County and the Teton Conservation District have sponsored this project, along with the U.S. Corps of Engineers. According to the USCOE, this will be a $54 million project spanning 14 years.

A feasibility study was conducted from 1997 to 2000, which included 13 sites of ½ to 2 miles in length. These areas have utilized techniques such as eco-fences and ponds to help protect habitat during high water and to collect sediment during low water times. This has been a learning experience, as the river channel has shifted away from some of the improvements following construction. The goal is to have 50% habitat restoration in 50 years by constructing spur dikes, barbs, brush fences, ponds, channel excavations, headgate improvements, and vegetative restoration. Funding through the USCOE may not occur and the project may be done locally, which will likely reduce costs.

Cutthroat Trout Management:

The Wyoming Game and Fish Department has created and implemented a cutthroat trout management program for various species of cutthroat across Wyoming. This program is outlined in the publication "Status and Management of Yellowstone Cutthroat Trout", produced by the Wyoming Game and Fish Department in 1999. In the Snake/Salt River basin, this program is managed for the success of the Yellowstone cutthroat trout. At the current time, Snake River cutthroat are considered the same species as Yellowstone cutthroat, although there are visual differences between the two. For example, the Yellowstone have larger spots, while the Snake River have smaller, more numerous spots. According to the above mentioned publication, there currently is no DNA evidence to support a separate species for the Snake River cutthroat trout. Interestingly, it is possible for fish to travel from the Snake River basin into the Yellowstone River basin by way of Pacific Creek and Atlantic Creek on Two Ocean Pass. In this location, the stream splits into two, with one flowing into the Yellowstone drainage and the other into the Snake, providing a free waterway to cross the divide.

According to the management plan, there has been a decline in Yellowstone cutthroat due to habitat loss and genetic introgression. Specific threats to the species include stocking, angling pressure, habitat loss, whirling disease, and the New Zealand mud snail. Genetic purity has been a major concern of some groups, and has prompted them to petition to list the Yellowstone cutthroat as an endangered species.

Early observations of Yellowstone National Park indicate that while trout were abundant in the streams in which they were found, there were many streams that did not contain cutthroat due to natural barriers and other factors. As a result of the desire to increase fishing opportunities in the Park, game fish began to be stocked in 1889. This stocking included both native and non-native species. The stocking of Yellowstone cutthroat was conducted using eggs and fingerlings from various sources throughout the region, which has likely impacted the genetic purity of the fish in most places. In order to facilitate the management of the species, studies have been conducted using DNA methodology that has produced classifications dependent upon the degree of hybridization in the fish population. This classification system is used by both Wyoming and Colorado in the management of cutthroat trout.

Management in the Jackson Region

A fish management crew was established for the Snake/Salt River basin in 1955 in Jackson. Their management responsibilities primarily include enhancement of the wild trout fishery and preservation of the native Snake River cutthroat trout. According to the Yellowstone cutthroat management document, there are 987 streams and lakes in the region, of which 701 are suitable for trout. Of the waters suitable for fish, 653 contain native cutthroat populations. Nearly all of these water features contain Snake River cutthroat, with only three containing Yellowstone cutthroat. Interestingly, the Snake River cutthroat is the only subspecies of cutthroat trout that has increased in numbers over time. This is generally due to the widespread introduction of the fish outside of its historical range, as well as continued strength within the Snake/Salt River basin.

Various management activities have been incorporated by the Jackson crew of the Wyoming Game & Fish Department to ensure success of the Snake River cutthroat trout. Major spawning habitat projects have been conducted over the last 30 years to improve the year to year increase of the fish population. Special regulations have been implemented to protect the wild trout fishery. The main example of this is the reduced limit of two trout per day in wilderness areas, which are most likely to hold pure strains of cutthroat. This regulation has been in effect for nearly 30 years. Likewise, additional brook trout can be kept by anglers in an effort to reduce the impact on the native fishery by this introduced species. Other management techniques such as spawning season closures, slot limits, and trophy regulations have also been implemented.

Present Cutthroat Management

The Wyoming Game and Fish Department has managed the fisheries in the Snake/Salt River basin primarily as a wild trout fishery. Stocking has been eliminated on all wild trout streams in the basin, with the exception of the Salt and Hoback Rivers. However, stocking is required in some areas where factors such as temperature, icing, reduced winter flows, and inadequate spawning habitat limit the success of the fishery. Cutthroat trout used for stocking in the basin have been obtained from the Auburn fish hatchery, which initially utilized fish taken from Flat Creek in 1953. The Jackson National Fish Hatchery also utilized fish from this source. In 1987, fish were taken from Lower Bar BC Spring Creek for creation of another cutthroat broodstock at the Wigwam state hatchery. Genetic testing has since revealed that the Wigwam fish population is much more genetically pure than the Auburn fish population. Additional DNA testing is to be

conducted throughout the basin to determine the integrity of the native fish stocks in various streams and rivers. Additional work is being conducted to determine if genetic markers can be found to distinguish Snake River and Yellowstone cutthroats. Results from this testing will help with future management decisions regarding stocking and so forth. In other areas of Wyoming, upstream barriers and other management tools have been used to manage native fish stocks. This is not, however, anticipated in the Snake/Salt River basin.

As mentioned previously, major spawning habitat improvement projects have been conducted throughout the basin. These projects have included techniques such as washed gravel placement, development and maintenance of spawning riffles, silt removal, and riparian rehabilitation. This work has been done with cooperation of various conservation groups.

Future Cutthroat Management

Future management of the cutthroat fishery will include protocols to deal with whirling disease. This disease has devastated fish populations of particular rivers in other states such as Montana, although rainbow trout populations have seen the most severe impact. Regulations now require all imported fish to be certified free of the pathogen. Also, disinfection procedures using chlorine are used within the Game and Fish Department to prevent further spread of the disease. Fish facilities are inspected annually for this and other problems, as are areas downstream of fish hatcheries. In waters where the parasite has been found, such as the Salt River, sampling is conducted on a two year cycle. Other waters that are currently free of whirling disease are sampled on a four year cycle. At this time, there have been no recorded losses of trout to the disease. Education of the public is also a major focus to prevent further spread of the disease. The Game and Fish Department has created and distributed signs and brochures regarding procedures to avoid spreading the problem to adjacent tributaries and waters.

In addition to whirling disease, a threat to the fishery could come from the New Zealand mud snail. While the snail itself is not harmful to fish, they can reproduce in dramatic numbers and compete with other food sources for trout. In certain areas in the Madison River in Montana, as many as 300,000 snails have been found in one square meter. The snails themselves do not provide an adequate food source for trout. The snails have been detected in Yellowstone Park, as well as in the Snake River above Jackson Lake in the Polecat Creek area. However, they have not been a problem in the Snake/Salt River basin at this point. Future management objectives are aimed to prevent spread of the snails to new streams and rivers by education of the public, as well as continued monitoring.

As stated by the management plan, most objectives have been in place for over 25 years, although additional recommendations may come from DNA testing and other recent issues. The following are possible management scenarios presented by the plan.

1. Continue sampling and analysis of genetic integrity throughout basin to determine classification.
2. Maintain current wild fishery, with investigations into the genetics of hatchery fish.
3. Work to protect and improve fishery habitat with input from agencies, landowners, and other organizations.

4. Monitor fish stocks by inventory of distribution, abundance, habitat condition, and so forth.
5. Restore Yellowstone cutthroat stocks to historic waters when possible.
6. Continue and enhance educational programs regarding native fish.
7. Utilize passage barriers to protect highly rated wild fish. Also, remove passage barriers to allow increase in native range.
8. Maintain and expand Yellowstone cutthroat broodstock to preserve distinct population.
9. Use restrictive regulations as necessary to protect specific fish populations.
10. Continue to monitor native fish for health problems such as whirling disease and for the presence of exotic species such as New Zealand mud snails.

Big Game Habitat:

A significant portion of the Snake/Salt River basin serves as habitat for various big game animals. Much of this habitat is considered crucial in that a particular species cannot maintain its population in a specific herd over the long term without utilizing that habitat. There are many other areas that are not classified as crucial to wildlife, yet are utilized by them in different parts of the year. While big game habitat is not necessarily a use of water, water features in these areas are necessary for survival. The Snake/Salt River basin serves as habitat for elk, moose, mule deer, big horn sheep, and antelope. GIS files outlining big game habitat for various species have been created by the Wyoming Game and Fish Department, and are included in the GIS mapping for the Snake/Salt River basin plan.

The National Elk Refuge is located just north of Jackson, and covers approximately 25,000 acres. In the winter, the Refuge is home to more than 7,500 elk. The area includes nearly 1,600 acres of wetlands and marshlands, and is home to 47 different species of mammals and nearly 175 species of birds. The National Elk Refuge is managed by the U.S. Fish and Wildlife Service.

In addition to the National Elk Refuge, there are five other elk management and feeding areas across the basin. These areas are managed by the Wyoming Game and Fish Department, and are located at Alpine, Forest Park, Dog Creek, Camp Creek/Horse Creek, and South Park. These feedgrounds were established to substitute for natural winter range lost to human development and to prevent elk from competing with domestic livestock for winter hay.

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