JORDAN RIVER DRAINAGE MANAGEMENT PLAN

HYDROLOGIC UNIT 16020204

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INTRODUCTION

The Jordan River Drainage Unit extends from the Utah-Salt Lake County line on the south to the Great Salt Lake on the north and from the top of the Wasatch Range on the east to the top of the Oquirrh Range on the west (Figure 1). The Jordan River hydrologic unit has an area of 514,653.7 acres. The elevation of the valley floor is between 4,000 and 4,500 feet mean sea level (msl.). Twin Peaks on the east is 11,330 feet msl, and Flat Top on the Oquirrh Mountains is 10,620 feet msl. The Jordan river extends approximately 30 miles from the Utah-Salt Lake County line to the Great Salt Lake. Most of the surface water in this unit comes from the Wasatch Range on the east and from the Utah Lake drainage. Seven major streams and 13 smaller streams feed the Jordan River from the east and six small intermittent and/or ephemeral streams enter from the Oquirrh Mountain range on the west. This drainage area produces approximately 178,000 acre feet of water annually (Utah Division of Water Resources, 1997).

This unit encompasses nearly all of Salt Lake County. Land Ownership in this basin is 72% private, 6.5% State and 21% Federal (Utah Division of Water Resources, 1997). Mean monthly temperatures in the valley range from -30 in the winter to 110^0 F in the summer. The average frost free season for the valley is about 200 days from April through November (Utah Division of Water Resources, 1997). The major use of water in this unit is municipal and industrial. Other uses include irrigation and recreation (angling, water craft activities, hunting, birding, etc.). The Jordan River Drainage contains habitat important to several native aquatic species.

The Division of Water Resources (1997) stated that one of the biggest challenge managing water in this unit is the many competing values and interested parties with no one entity or agency in control. In response to this need, the Salt Lake County Board of Commissioners created an interagency Inter-jurisdictional Council named the Jordan River Sub-Basin Watershed Management Council to assist the board in fulfilling its responsibilities. The two major water suppliers are the Metropolitan Water District of Salt lake City and the Jordan Valley Water Conservancy District, however the Division of Water Rights identifies 164 irrigation companies serving in the Jordan River basin. Only 26 companies serve areas that exceed 250 acres. Several water management plans have been implemented in order to coordinate activities including, the Salt Lake City Watershed Management Plan, Salt Lake County Wasatch Canyons Master Plan and the Utah State Water Plan, Jordan River Basin (Utah Division of Water Resources, 1997). The State Water Plan (Utah Division of Water Resources, 2001) states that; "the state recognizes the importance of water conservation and has implemented requirements for water retailers and conservancy districts with more than 500 connections to prepare water conservation plans and submit them to the Division of Water Resources with updates every five years". This requirement covers 150 utilities in the state serving about 93% of Utah's population. These water plans recognize such values as water quality, the environment and recreation needs.

The Jordan River Basin Plan (Utah Division of Water Resources, 1997) states that, "prior to settlement, the Jordan River meandered through the Salt Lake Valley, cottonwood trees lined its

Figure 1. Jordan River hydrologic Unit 16020204.

path. Numerous oxbows, marsh areas and riparian zones provided habitat for a diverse wildlife community. Reportedly an excellent fishery existed. Since then the forest has been cut, river channeled, water polluted, oxbows and wetlands filled and most of the wildlife displaced."

The Utah Division of Wildlife Resources (UDWR) is developing Drainage Management Plans for Utah. The intent of these plans is to identify and provide comprehensive aquatic management objectives for hydrologic units and to outline actions necessary to meet these objectives. Management plans and projects associated with these activities include the June Sucker Recovery Plan (US Fish and Wildlife Service, 1999), the Bonneville Cutthroat Trout Conservation Agreement and Strategy (Lentsch et al., 1997), the Conservation Agreement and Strategy for least chub (Perkins et al., 1998) and the Conservation Agreement and Strategy for Spotted Frog (Perkins and Lentsch 1998). Drainage Management Plans are intended to be dynamic and flexible in order to accommodate new issues that arise.

Detrimental interactions between nonnative and native species and the introduction of diseases such as whirling disease, has made the establishment of stocking and transfer protocols necessary (Utah Division of Wildlife Resources, 1997). Management by UDWR is focusing on maintenance of healthy aquatic habitats and native species biodiversity. As well as meeting the public demand for recreational sportfishing opportunities. Specific actions will typically be developed annually as part of the UDWR work plan process.

EXISTING RESOURCES

Water Resources

The Utah Division of Water Resources (1997) has identified seven major streams and 13 smaller streams that feed the Jordan River. Streams that originate on the Wasatch Range contribute 97% of the surface water to the hydrologic unit. Six streams in the Oquirrh Mountain Range supply an additional 3% of the surface water in the unit. Major streams include City, Parley's, Big Cottonwood, Little Cottonwood, Mill, Red Butte and Emigration creeks. City, Parleys and Big Cottonwood and Little Cottonwood creeks are used for culinary water.

The UDWR has completed aquatic surveys on all of these major streams and several smaller streams. Each stream was separated into sections at tributaries and diversions. There are 235 miles of streams and braided streams identified on the GIS system. A total of 36 stream sections totaling approximately 148 miles of stream have been surveyed. In addition the UDWR has completed surveys on 16 lakes or reservoirs totaling 740 surface acres. Surveys included; estimated stream flow or volume at the time of the survey, water chemistry and fish population identification and enumerations. Streams were classified to order based on size and number and types of tributaries. There are 24- first order stream reaches, 10-second order and 4-fourth order stream reaches (Appendix A, Table 3).

Surface Supply

This hydrologic unit has experienced a decreased need for irrigation water with a concurrent transfer to Municipal and Industrial (M&I) use. The average annual supply of water to this hydrologic unit includes 308,000 acre feet from the Jordan River, 173,400 acre feet from Wasatch Mountain streams, 4,400 acre feet from Oquirrh Mountain streams, 174,300 acre feet from ground water and 170,700 acre feet imported from outside the hydrologic unit (Utah Division of Water Resources, 1997). The annual average public water supply coming from City Creek is 8,310 acre feet/year (acft/yr), Parleys Creek 8,890 acft/yr, Big Cottonwood Creek 25,920 acft/yr, Little Cottonwood Creek 21,670 acft/yr and other small mountain streams 3,400 acft/yr). Imported water for public use includes Central Utah Project water (70,000 ac-ft/yr) and Deer Creek Reservoir water (61,700 ac-ft/yr). Water is also supplied by the Welby-Jacob Exchange, ground water, and artificial groundwater recharge 149,600 ac-ft/yr) (Utah Division of Water Resources 1997).

Groundwater Supply:

Ground water is an important source of water to this hydrologic unit and the majority is of high quality and is used for culinary purposes. The current groundwater supply is estimated at 170,700 ac-ft/yr, of this amount 114, 400 ac-ft are used for drinking water with plans to increase this use to 125,410 acft/yr (State Water Plan, Utah Lake Basin 1997).

Wetlands:
The Division of Water Resources (1997) indicates there are 43,100 acres of wet meadows, marsh lands and open water areas on the valley floor in this unit. Most is found along the shoreline of the Great Salt Lake and is developed and managed by private and UDWR duck clubs and waterfowl management areas.

Limnology/Water Quality

Water Chemistry:
The UDWR collected water chemistry information from surveyed stream reaches in this unit during summer months (unpublished UDWR reports). The pH of streams in this drainage ranges between 7.5 and 8.7 with an average of about 8.0 (N=28). Dissolved oxygen for streams ranged from 7.0 to 11.0 mg/l in several of the streams with an average dissolved oxygen of 8.0 mg/l (N=29). Alkalinity, measured as total calcium carbonate, ranged from 51 mg/l in Little North Willow Creek to 308 mg/l in Emigration Creek, and total hardness is generally the same or slightly higher than total alkalinity (Appendix A, Table 6) indicating that total hardness of waters in the drainage is associated with calcium carbonate. Temperatures range from 37^0 F in Red Butte Creek to 82^0 F in the Jordan River. The pH for flat waters ranged between 7.0 to 9.0. Dissolved oxygen ranges from 5.6 mg/l in Mary Lake to 11.0 mg/l in Florence Lake ($\bar{x}$ 7.2 mg/l, N=18) (Appendix A, Table 7). Temperatures of lakes and reservoirs range between 40^0 F in Upper Red Pine and 70^0 F in Red Butte Reservoir (Appendix A, Table 8).
Pollution:

The Utah State Water Plan, Jordan River Basin (Utah Division of Water Resources, 1997), identifies water quality as a particular problem in the Jordan River. The South Valley Wastewater Treatment Facility discharges effluent directly into the Jordan River and the Central Valley Facility discharges into Mill Creek just above its confluence with the Jordan River. The remaining two wastewater treatment facilities discharge almost directly into the Great Salt Lake. In a study conducted between April 1981 to September 1982 dissolved oxygen decreased in the Jordan River from 8.1 mg/L at Jordan Narrows in the south end of the county to 4.7 mg/L at 500 north street. Biochemical oxygen demand increased from 5 mg/L to 7 mg/L in this reach.

In more recent studies completed by the Division of Water Quality, 24 stream stations were monitored. The lower portions of the Jordan River were only partially supporting for aquatic wildlife with problems of heavy algal blooms, excessive amounts of nutrients and dissolved oxygen depletions. Mill Creek was impacted by phosphorus and sediments, and the lower sections of Big Cottonwood Creek below the Forest Service boundary have been labeled non-supporting because copper levels exceed levels for aquatic wildlife. Waters of Little Cottonwood Creek are impacted by heavy metals and zinc. The Salt Lake City Watershed Management plan published in 1988 identified Emigration Creek as having the poorest quality of all the water shed primarily because there is no sewer system in the canyon. Each home is dependent on an individual septic tank system. The UDWR has not attempted to analyze pollution factors in this unit.

Biological/Wildlife Resources

Native Fishes

This unit was historically occupied by seven native species of fish (Appendix B, Table 1) (Sigler and Miller 1963, Sigler and Sigler 1996, Lentsch et at., 1995). Including the following species:
Bonneville cutthroat trout (*Oncorhyncus clarki utah)*
Utah chub (*Gila atraria)*
Utah sucker (*Catostomus ardens)*
Mountain sucker (*Pantosteus platyrhynchgus)*
Longnose dace (*Rhinichthys cataractae*)
Bonneville Redside shiner *(Richardsonius balteatus)*
Least chub *(Iotichthys plegethontis)*

The historic native fish community persists today, although some species have experienced serious population reductions. Least chub and Bonneville cutthroat trout are Conservation species. Conservation Agreements (CA) and Conservation Strategies (CS) have been implemented for both species (Perkins et al. 1998 and Lentsch et al. 1997).
Bonneville cutthroat trout are the only native trout in this drainage unit. Bonneville Cutthroat

trout populations have been expanded into three reservoirs and 12 stream reaches in this unit (Appendix C, Table 1). Actions are being taken to secure these populations from hybridization with rainbow trout. Collections are being completed to further identify the strain purity of these fish.

Introduced Fishes

At least 12 fish species have been introduced to this unit for sport fishing, recovery, mosquito abatement, or by migration from Utah Lake (Appendix B, Table 2). Rainbow trout *(Oncorhyncus mykiss),* brown trout *(Salmo trutta)* and brook trout (*Salvelinus fontinalis*) are the major trout species introduced for sport fishing. White bass (*Morone chrysops)*, black bullhead (*Ameiurus melas)*, walleye (*Stizostedion vitreum)*, and green sunfish (*Lepomis cyanellus*) migrated out of Utah Lake and into the Jordan River. Channel catfish (*Ictalurus punctatus*) have been periodically stocked into the Jordan River for sport fishing. These cool water species are not found in the mountain streams. June sucker (*Chasmistes liorus)*was Federally classified as Endangered in 1986. A recovery plan was developed in order to identify actions required to recover the June sucker (USFWS 1999). It does not include any actions in the Jordan River hydrologic unit, but a refuge population of June sucker has been established in Red Butte Reservoir which is located in this unit.. Western mosquitofish (*Gambusia affinis)* and fathead minnow (*Pimephales promelas*) were stocked in many ponds in the valley for mosquito control. The UDWR has developed a Memorandum of Agreement (MOA) with mosquito abatement districts. The MOA established administrative processes and procedures for collection holding, propagating, transporting, distributing and releasing mosquitofish.

Amphibians

Eight native amphibian species occurred historically in this unit and may still be present (Appendix B, Table 3) (Lentsch, et al., 1995). Endemism of the Great Basin spadefoot toad *(Spea intermontanus)* and leopard frog (*Rana pipens)* remain questionable. The current distribution and status of most of these amphibians remains unclear, however UDWR is in the process of developing statewide inventory and monitoring plans to obtain additional information for these species . The spotted frog (*Rana luteiventris*) is currently classified as a sensitive species due to significant declines in populations and loss of habitat. A conservation agreement has been implemented for spotted frog (Perkins and Lentsch 1998). Most of the amphibians that occur in this unit are associated with a variety of lower elevation aquatic habitat types including riparian areas along streams, springs, ponds, lakes and other wetland types in the valley floors.

Mollusks

Oliver and Bosworth (1999) reported 15 species of mollusk in this hydrologic unit either historically or at present (Appendix B, Table 4). UDWR is in the process of developing statewide inventory and monitoring plans for mollusks to obtain additional information for these species.

Reptiles

Nineteen species of reptiles (7 lizards, 12 snakes) are thought to historically and currently occur in this unit (Appendix B, Table 5). The current distribution and status of most of these species remains unclear and UDWR is developing statewide inventory and monitoring plans to obtain additional information for these species. It is suspected that most reptile species are widely distributed throughout the habitat types in this unit (Appendix B, Table 5). The most common species found in this unit are the wandering garter snake (*Thamnophis elegan vagrans)*, the Great Basin gopher snake (*Pituophis melanoleucus deserticola)*, the western yellow-bellied racer (*Coluber constrictor mormon)* and the northern sagebrush lizard (*Sceloporus graciosus)*.

The smooth green snake (*Opheodrys vernalis blanchardi*) and the milk snake (*Lampropeltis traingulum taylori)* are listed as sensitive by the UDWR (1998).

Recreational Sport Fish Resources

The UDWR water classification system referred to in this management plan was developed by the Aquatic Section using classifications based upon sport fish management concepts.

Sport Fish Classifications

Sport fish classifications are assigned using one or a combination of three methodologies. The first methodology is the Statewide Aquatic Habitat Classification System (SAHCS) developed in the 1960's, the second methodology is the Habitat Quality Index (HQI) (Binns 1982), and the third is Applied Fluvial Geomorphology (Rosgen 1996).

Statewide Aquatic Habitat Classification System (SAHCS):

The SAHCS method is based on the importance of the water body to sport fisheries and consists of numerical ratings using three categories: aesthetics, availability, and productivity. Each of these categories is given a weighted numeral rating. The aesthetics rating is multiplied by 1, availability by 2, and productivity by 4. The score is weighted, totaled and given a numerical rating of 1-6 with 1 being the highest rating possible (blue ribbon trout stream). Ratings are as follows:

Class 1: Blue ribbon trout waters, so rated because of their productivity, aesthetics and accessibility.

Class 2: Excellent trout waters. They lack only one element which makes them less than Class 1.

Class 3: Important because they support the bulk of stream fishing pressure in Utah. Generally they have less esthetic quality and lower productivity compared to class 1 or 2 waters.

Class 4: Typically poor in quality with limited sport fish value, however, they may support native non-sport fish populations.

Class 5: Little value to the sport fishery. May support limited native fish populations.
Class 6: Streams that are de-watered for a significant period each year.

A total of 36 stream reaches and 16 reservoirs, lakes or ponds, have been classified using the SAHCS (Appendix A, Tables 1, 2 and 5). Streams were divided into stream sections, sport fish classifications were designated for each section. No streams were classified as class-1, 1 was class-2, 23 were class-3, 5 were class-4, 3 were class-5, and 4 were class-6. Two remain unclassified (Appendix A, Tables 1 and 5). No lakes or reservoirs were class one or two, 19 were class-3, 4 were class-4, 1 was class-5, and 2 remain unclassified.

Habitat Quality Index (HQI):

Stream surveys completed in recent years use the HQI method (Binns 1982). This method provides an index for trout streams and measures the following attributes: late summer stream flow, annual stream flow variation, maximum summer stream temperature, nitrate/nitrogen, fish food abundance, cover, water velocity, stream width, substrate, and bank erosion. Each of these attributes is given a number rating of 1 through 4 with 4 being the highest. The HQI rating is indicated in Kg/hectare or lb/acre of trout biomass units. HQI rating for this unit ranged from 1 to 146 lb/acre (Appendix A, Table 1).

Applied Fluvial Geomorphology (Rosgen's):

Applied Fluvial Geomorphology (Rosgen 1996) classification results in an alphabetical rating which can be compared to other streams and is directly related to channel morphology and not to any particular vertebrate or invertebrate species. This method currently has limited use in Utah, however, biologists are acquiring training for this method and it is anticipated that it will become an important tool for stream classification in Utah.

Management Classifications

Streams, reservoirs and lakes were also given a management classification based on five concepts: Intensive Yield waters (IY), Basic Yield waters (BY), Wild fish waters (WF), Special Fish Species waters (SFS), or Trophy Fish waters (TF). Stocked rainbow trout, an essential management component of IY waters, are being removed from most streams in this unit. Currently, there are no IY or TF waters in this hydrologic unit 2 stream sections are managed as BY waters, 14 stream sections are managed as WF waters and 13 stream sections are managed as SFS waters (i.e. Bonneville cutthroat trout). There are no TF or WF flat waters in this unit. Ten flat waters (102.9 surface acres) are managed as BY waters, 6 (28.5 surface acres) are IY waters,, 3 are managed as SFS waters (571.4 surface acres) and 8 (37 surface acres) have no fish are were not classified.

Social Resources

The major cities in this unit are Salt Lake City, West Valley City, West Jordan, Sandy, Kearns, Taylorsville, South Jordan, Draper, Riverton, Bluffdale, Alta, Midvale, Murray, and South Salt Lake. The 2000 population estimate for Salt Lake County was 898,387. Projections are that the county will grow at a rate of 1.57% through the year 2030. Population estimates based on this growth rate are: year 2010-1,080,990, year 2020-1,282,049 and year 2030-1,434,704 (Governors Office of Planning and Budget, 2001, 2002 Baseline Highlights). It is estimated that by 2030, the populations of these cities (the county) will have increased by nearly 60%.

The highest priority water use in the hydrologic unit is for municipal and industrial (M&I). As irrigation lands have gone out of production the highest quality irrigation water has been converted to M&I, leaving only poor quality water that will require extensive and expensive treatment in order to be converted to M&I use. Water use and projected demands for culinary and secondary irrigation (lawn and garden) are estimated to increase in the next 20 years. The Utah Division of Water Resources (1997) projects the existing average water supply to be 349,490 acre feet from all sources with a reliable source of 328,410 acre feet and project the estimated need by 2020 to be 496,500 acre feet. The Division of Water Resources (1997) identifies the following alternatives to meet the future demand: develop Utah Lake/Jordan River water, develop additional water from the Wasatch Front streams, develop additional ground water, groundwater recharge, Bear River Water Development, and conservation. Under any alternative increased development of water will limit water available for aquatic wildlife use.

MAJOR RESOURCE ISSUES

Water Development

Streams in the Wasatch Front Range have been altered by human activities including road building, housing development and recreation activities. Diversions, storm drains and flood control channelization has impacted flow, geomorphology, water quality, and associated riparian areas in the valley. It is anticipated that flows will remain unchanged in the streams above present water diversions well into the future. However, Emigration and Mill Creeks may be converted to culinary water supply in the future. If water is left in any valley stream it will undoubtedly be lower quality water diverted from the Jordan River. Aquatic wildlife management actions will need to focus on balancing the needs of the aquatic ecosystems and the needs of the growing human population. Long range planning will be more critical and will require developing a forum for creating an awareness and coordinating and planning for future water development.

Stream Hydrology

Water depletions have had a significant impact on aquatic ecosystems in the valley portions of this unit. Numerous diversions exist on nearly every stream, depleting flows and/or completely de-watering streams for portions of the year. Management actions need to identify high priority wetlands in the valleys and implement actions cooperatively with water resource agencies so that water operations minimize impacts to aquatic habitats and species. Habitats that exist above diversions should be protected from further development. A key objective will be maintaining in-stream flows that maintain aquatic habitat and protect and conserve aquatic species.

Stream Geomorphology

Alterations in geomorphology (channelization, decrease in channel maintenance flows etc.) has significantly altered several streams or stream reaches in this unit. Several reaches have been channelized such as the Jordan River and/or placed in storm drains throughout the valley. No stream flows freely through the Salt Lake Valley. Channelization of the Jordan River has resulted in changes in natural meandering of the river system, velocity, and diversity. The Jordan River is practically devoid of aquatic habitat. Decreases in channel maintenance flows (bank full discharge, magnitude and duration of flushing flows) throughout the year has also resulted in a decrease in channel integrity (diversity of instream habitat, channel meandering, oxbow formation, etc.). Management actions will need to focus on obtaining and providing flows sufficient to maintain these aquatic habitat parameters, implementing habitat enhancement projects, as well as working cooperatively with on-going water resource issues and agencies in this unit.

Stream Water Quality

Changes in water quality ultimately effect the fish and wildlife species, often times making the habitat less suitable. Significant flow reductions often result in increased water temperatures and concentrations of minerals and nutrients, decreased dissolved oxygen levels, as well as an increase in undesirable vegetation such as algae. Measures are currently being taken to address water quality issues; however, management activities will need to continue to focus on implementing actions that improve and/or maintain water quality in streams, reservoirs, lakes, and wetlands.

Aquatic Habitat Fragmentation and Loss

In addition to hydrology, geomorphology and water quality alterations, water development projects such as diversions and dams create barriers to migration of aquatic organisms. The natural occurrence of periodic floods probably provided dispersal mechanisms for many aquatic species (e.g. amphibian tadpoles). Water development projects aimed at controlling periodic flooding has reduced many species's ability to disperse. In addition, the loss of wetlands has also significantly affected dispersal of aquatic species by reducing, and in many cases eliminating

migratory corridors.

A large portion of wetland habitats (e.g. springs, seeps, and meadows) have been significantly altered. Other wetlands have been drained and filled in order to provide additional land for industrial, or residential development. Protection of remaining wetland habitats will be critical for the conservation and recovery of aquatic species. Working cooperatively with water and land resource entities, aquatic species management activities will need to focus on protecting these habitats using a variety of actions such as conservation easements and agreements, acquisition, and land use changes.

Land Use Practices and Projects

Several past and present land use practices have had negative effects on the aquatic ecosystem in this unit. The most significant were agricultural practices which have now been converted to industrial and housing development. These practices resulted in decreased stream flows, complete loss of many stream sections and poor water quality. Roads have significantly altered aquatic habitat, mostly as a result of impacts to the riparian zone.

Recreational Sport Fishery

Angling Pressure and Demand

This hydrologic unit currently provides approximately 104,840 hours of angling recreation annually including IY, BY, WF and SFS waters (Appendix C, Table 1). IY waters produce about 67,750 hours from stocked rainbow trout and wild fish, BY waters provide 9,840 hours from small ponds and reservoirs in Big and Little Cottonwood Canyons, WF waters provide 17,150 hours, and SFS waters about 10,100 hours all for Bonneville cutthroat trout. The UDWR does not anticipate that these numbers of recreation hours will decline over the next 10-20 years. The UDWR is currently removing catchable rainbow trout stocking from all streams. Streams will be managed as WF and SFS waters. Urban fishing opportunities have been increased in this unit with the construction of ponds such as the Midas Pond in South Jordan, the Draper Pond in Draper and Willow Pond in Murray. The UDWR will continue to work with cities and the county to increase opportunities for urban fishing. Decker Lake may have potential as an important urban fishery in the future. These urban fisheries will rely heavily on stocked catchable sized rainbow trout.

Habitat improvement projects may be planned for the Jordan River which could increase productivity on this stream. No attempt was made to predict increases in fishermen hours resulting from this activity.

Whirling Disease, Other diseases:

Whirling disease has been documented in this hydrologic unit in a private pond in the Walker

Lane area. This pond discharges water to Big Cottonwood Creek. Trout populations are extremely limited in this section of Big Cottonwood Creek due to de-watering. Whirling disease was not detected in brown trout collected from Big Cottonwood Creek in the vicinity of this private pond.

Species of Special Concern

Eleven species in this unit are listed as conservation, sensitive, threatened, endangered or extinct, five or mollusks (Appendix B, Tables 1, 3, 4 and 5) (UDWR Sensitive Species List, 1998). June sucker (a refuge population in Red Butte Reservoir), Bonneville cutthroat trout and spotted frog are of primary concern because of their close association with areas effected by land and water development activities. Caution will need to be taken prior to implementation of actions that may negatively impact these species. Management actions will focus primarily on implementing those actions that are identified in conservation and recovery documents that have been developed for these species.

MANAGEMENT STRATEGY

Management Goal

To manage the existing resources of the hydrological unit using an ecological approach so that environmental, scientific, aesthetic, and recreational values are maintained and/or enhanced.

Management Objectives

Objective 1: To provide a recreational sport fishery that meets public demands.
Objective 2: Meet goals and objectives established in conservation agreements developed for sensitive species through implementation of identified conservation actions.
Objective 3: Implement or assist in the actions required for recovery of June sucker.
Objective 4: Obtain population, distribution, and/or life history information for native fish, amphibians, reptiles, and mollusks that occur in this hydrologic unit with emphasis on sensitive species.
Objective 5: Identify and enhance aquatic habitats cooperatively through watershed improvement projects.
Objective 6: Coordinate actions taken in Objectives 1 through 5 in order to avoid conflicts.

Objective 1

To provide a recreational sport fishery that meets public demands:

The fishing resource potential in this hydrologic unit can not meet the public demand for fishing opportunity and residents in the unit will have to go out side the unit to meet much of their fishing demand. However, the goal of this objective will be to provide at least 104,840 angler hours of fishing annually. IY waters will provide 67,750 hours of recreational sport fishing on 5 reservoirs or ponds and other waters designated Salt Lake County Urban Water totaling 28.5 acres through annual stocking of 47,500 catchable sized rainbow trout. BY waters will provide and estimated 9,840 angler hours annually from stocking of 19,000 brook and cutthroat trout fingerling. WF and SFS stream sections should provide an additional 27,250 angler hours of fishing annually (Appendix C, Table 1).

WF streams and streams with SFS are not stocked with fish but are managed based on their ability to sustain wild fish populations. Estimates of angler use were based on measured use of the Thistle Creek fishery, (660 angler hours/mile) established by an angler survey in 1997. Streams were compared subjectively to Thistle Creek to estimate angler hours per mile. Objectives for good WF and SFS streams will be met by maintaining current classifications and productivity levels and enhancing habitat and productivity levels in localized areas (Appendix D, Table 1).

Objective 2

Meet goals and objectives established in conservation agreements developed for sensitive species through implementation of identified conservation actions:

Conservation Agreements (CA) and Conservation Strategies (CS) have been developed for the Bonneville cutthroat trout (Lentsch et al. 1997) least chub (Perkins et al. 1998) and the spotted frog (Perkins and Lentsch 1998). These documents were developed in order to expedite implementation of conservation measures to ensure the long-term conservation of these species. These documents have identified goals, objectives, and actions for each of these species. Following is a brief summary of the actions that will be implemented by the UDWR, Central Region, as part of this hydrological unit.

<u>Bonneville Cutthroat Trout</u>

The Conservation Agreement and Conservation Strategy for Bonneville cutthroat trout identifies Red Butte Creek, Red Butte Reservoir, and Little North Willow Creek as conservation populations of Bonneville cutthroat trout. The Red Butte Reservoir and Red Butte Creek populations were established following chemical treatment and transplants of fish from Little North Willow Creek. The Central Region (UDWR) located Bonneville cutthroat trout in the upper reaches of City and Emigration creeks and in Little Dell and Mountain Dell reservoirs and

Mountain Dell Creek. Hybrid rainbow-cutthroat trout were found in the lower reaches of City and Emigration creeks. The Central Region (UDWR) has established Bonneville cutthroat trout in Parleys and Lambs creeks through chemical treatments of these streams and transplants from Mountain Dell Reservoir. Cutthroat trout in Bell Canyon Creek may also be Bonneville cutthroat trout.

The UDWR decided to use the cutthroat trout in Little Dell Reservoir as a brood stock source for Bonneville cutthroat trout. Bonneville cutthroat trout have been collected annually since 1997, from Little Dell Reservoir and tested for disease following Utah Department of Agriculture and UDWR disease protocols. The decision to use the Little Dell population as a brood source was based on their availability, anticipation that fish in the reservoir would reach a larger size compared to those in the stream and increase the potential for egg production and their disease free status. Fish produced from Little Dell Reservoir will be used to assist native cutthroat trout restoration along the Wasatch front as outlined in the Bonneville cutthroat trout CA and CS. Actions that will be implemented by the UDWR, are summarized in Appendix D, Table 2.

Least Chub Conservation Agreement and Strategy

The Jordan River Hydrologic Unit is located within the Wasatch Front Geographic Management Unit (GMU) described in the least chub Conservation Agreement and Conservation Strategy (Perkins and Lentsch, 1998) . However, no least chub populations were known to exist in this hydrologic unit. The objective for the Wasatch Front GMU for this species, as identified in the CA and CS, is to survey all areas where historic locality information exists, identify and survey areas with suitable least chub habitat. If suitable least chub habitat is identified actions will focus on:

1. Acquisition, conservation easements or exclosures, wetland revegetation and water quality improvement projects
2. Non-native control
3. Re-introductions
4. Monitoring
5. Mitigation

Spotted Frog Conservation Agreement and Strategy

The Jordan River Hydrologic Unit is located within the Wasatch Front Geographic Management Unit (GMU) described in the spotted Frog Conservation Agreement and Conservation Strategy (Perkins and Lentsch, 1998) . However, no spotted frog populations were known to exist in this hydrologic unit. The objective for the Wasatch Front GMU for this species, as identified in the CA and CS, is to restore, maintain, and protect populations in five of the six subunits within their historic range. A minimum of three of the five subunits must have at least one population with an effective population size of 1000 individuals in three out of every five years. Any and all additional populations must be maintained with a minimum effective population size of 50 individuals each. It is not expected that this hydrologic unit will be identified as one of the three

to have at least one population with an effective population size of 1000 individuals.

The primary objective for the Jordan River Hydrologic Unit is to determine if habitat exits where spotted frog populations could be expanded and if so expand the species into these habitats through transplants Appendix D, Table 3).

1. Additional surveys will be conducted using standard protocols established by UDWR and in Heyer et al., 1994. These surveys will include identifying areas with available spotted frog habitat, surveying new areas with available spotted frog habitat for presence/absence of spotted frog, and surveying areas where historic locality information exists.

2. Habitat enhancement actions will include identifying areas where wetland improvements (e.g. revegetation), water acquisition, water quality improvements and bank stabilization are required with emphasis on areas occupied by spotted frog.

3. Nonnative control actions will focus on determining where detrimental nonnative species interactions occur. Once these areas are identified, eradication of detrimental nonnative species will be implemented. In areas where eradication is not possible, detrimental interactions will be controlled to the maximum extent possible. Future stocking of nonnative aquatic species will be consistent with the State of Utah Policy on Fish Stocking and Transfer (UDWR, 1997).

4. Spotted frog habitat acquisition actions will be coordinated with other sections within UDWR as well as with other involved agencies. Actions will include identification of areas of public and private lands available for land or water acquisition or conservation easements. Areas will be prioritized and either acquired or protected through easements where feasible. The primary action to be implemented by the Central Region will be to identify suitable spotted frog habitat on public and private lands available for land or water acquisition or conservation easements.

5. Monitoring protocols are currently being evaluated and revised for spotted frog. As habitat and population enhancement activities are implemented, they will be incorporated into the state-wide monitoring program. The primary action that will be implemented by the Central Region will be to locate suitable habitat in which to establish spotted frog populations.

6. Existing regulatory mechanisms will be maintained including, but not limited to: State of Utah Policy on Fish Stocking and Transfer Procedures and State of Utah, Proclamation on Collection, Importation, and Possession of Zoological Animals.

Objective 3

Implement or assist in the actions required for recovery of June sucker:

The June Sucker Recovery Plan (USFWS 1999) and a Recovery Implementation Plan (Central Utah Water Conservancy District 2001) were developed to expedite implementation of recovery measures to prevent the extinction of the June Sucker. Most of the actions identified in the June Sucker Recovery Plan will be implemented as coordinated efforts by participants to the Recovery Plan including the U.S. Fish and Wildlife Service, Central Utah Water Conservancy District, U.S. Bureau of Reclamation, U.S. Forest Service, Utah Reclamation, Mitigation and Conservation Commission, Brigham Young University, Utah State University, Utah Division of Wildlife Resources, water user groups, as well as other agencies and entities. Many actions will be the primary responsibility of the Central Region of UDWR (Appendix D, Table 4). The following actions will be primarily implemented by the Central Region of UDWR as part of this hydrological unit. Additional actions are outlined in the June Sucker Recovery Plan (USFWS, 1999).

1. Monitor June sucker populations in Red Butte Reservoir and take actions to insure their health and safety.

2. Develop and conduct interpretation and education highlighting the value of June sucker and associated recovery efforts.

3. Assist in the development and maintenance of June sucker stocks at fish culture facilities, and/or cage culture rearing of young-of-year fish.

4. Participate as technical advisor(s) for June sucker, to the Bonneville Basin Conservation and Recovery Team, and to the June Sucker Recovery Program Technical Committee.

Objective 4

Obtain population, distribution, and/or life history information for native fish, amphibians, reptiles, and mollusks that occur in this hydrologic unit with emphasis on sensitive species communities:

The majority of the information for this objective will be obtained through the statewide inventory and monitoring programs for native fish, amphibians, reptiles, and mollusks being developed by UDWR (Appendix D, Table 5). Following are the actions that are primarily the responsibility of the Central Region, UDWR to meet this objective.

1. Compile, maintain, and update literature on all native species that occur in this unit.

2. Identify gaps in locality and distribution information for all native species.

- Summarize locality and distribution information needs.

3. Develop inventory and monitoring plans for this unit.

   - Finalize species accounts for native fish, amphibian, and reptile species.

   - Develop species accounts for mollusks in this unit.

   - Develop inventory and monitoring plans for fish, amphibians, and reptiles

4. Implement inventory and monitoring plans.

   - Incorporate actions to obtain locality, distribution, and status information for native fish and amphibians into the stream survey program.

   - Conduct monitoring of Conservation Species and other sensitive species as deemed necessary. Currently, these species include:
     - Bonneville cutthroat trout
     - Spotted frog
     - Boreal toad
     - Smooth green snake
     - Milk snake

5. Maintain and update data base information for all native species that occur in this unit.

   - Obtain information for Conservation Species through activities implemented under the conservation agreements and strategies and the June Sucker Recovery Plan.

   - Obtain and compile information for native species through Certificates of Registration (COR).

   - Develop and conduct interpretation and education highlighting the value of native species and their conservation.

Objective 5

Identify and enhance aquatic habitats cooperatively through watershed improvement projects:

1. Identify and implement in-stream habitat enhancement needs in order to meet sport fish goals established under Objective 1. This may include the Jordan River, Emigration, City

and Red Butte creeks.

2. Implement and monitor aquatic habitat enhancement projects identified under Conservation Agreements and the June Sucker Recovery Plan where appropriate in order to meet the goals of Objectives 2 and 3.

3. Cooperatively identify and implement additional aquatic habitat enhancement projects that will benefit additional aquatic ecosystems in this unit. This may include Decker Lake.

4. Actively participate and maintain involvement in habitat enhancement projects being conducted by other agencies or entities.

Objective 6

Coordinate actions taken in Objectives 1 through 5 in order to avoid conflicts:

1. Implement and maintain protocols established in the State of Utah, Policy for Fish Stocking and Transfer Procedures (1997) in order to reduce detrimental interactions between aquatic communities as well as the introduction of diseases.

    - Stocking for sportfishing recreation purposes is to be consistent with and promote the mission of the Utah Division of Wildlife Resources.

    - Stocking for sportfishing recreation will be consistent with conservation and recovery program objectives and goals.

    - Stocking for purposes of establishing refuge populations may be conducted in areas where suitable habitat exists within the known historic range of the species.

    - All fish stocking and transfers must comply with requirements of the Utah Fish Health Board (Rule R58-17).

    - UDWR will continue to manage fisheries in Lone Peak Wilderness areas consistent with the MOU between the Division and U. S. Forest Service.

    - Determine that the proposed stocking is consistent with inter-agency stocking agreements, conservation agreements, and recovery programs covering the drainage or sub-drainage.

    - Cooperate and coordinate with the angling public, private landowners and other resource agencies.

2. Maintain active communication and collaboration on other resource issues such as habitat

enhancement projects, and non-native aquatic species eradication projects with the public, private landowners, resource agencies and other interested entities.

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APPENDIX A

Water Resources

Table 1: Stream sections present in the Jordan River Drainage (Hydrological Unit 16020204).

Stream (Section)	Catalog Number	Elevation Range	Stream Order	Length (miles)	CLASSIFICATIONS			Productivity (HQI)[4] lb/acre	Known Fish Species Present[5]	
					Management Class[1]	Sport Fish Class[2]	Fish Health Class[3]		Sport & Non-Native Fish	Native Fish
Jordan River	IV AA 01	4225-4237	4	13.5	3	WF	1D		CPCO	SKUT, CBUT
Jordan River	IV AA 02	4237-4270	4	8.7	3	WF	1D		CPCO, RT	SKUT
Jordan River	IV AA 03	4270-4288	4	3.9	3	BY	1D		RT, BN, SFBG, CPCO, BKBL	SCMT, SKUT, MNFH
Jordan River	IV AA 04	4288-4525	4	3.9	3	BY	1D		BHCH, RT, BSWH, WE, CPCO,	SKUT
City Creek (1)	IV AA 010	4394-6123	1	4.5	3	SFS	1D		BN	CTBV
City Creek (2)	IV AA 010	6123-7691	1	4.5	3	SFS	1D	65	RT, RT-CTBV	CTBV
Red Butte Creek (1)	IV AA 020	5171-5385	1	3.6	5	no fish	1C		no fish	
Red Butte Creek (2)	IV AA 020	5385-6852	1	2.8	3	SFS	1C	75	CTBV	CTBV
Emigration Creek (1)	IV AA 030	4852-5342	1	3.3	4	SFS	1D			CTBV
Emigration Creek (2)	IV AA 030	5342-5903	1	9.3	3	SFS	1C	112 to 320	RT, RTxCT	CTBV
Parleys Creek (1)	IV AA 040	4411-5420	1	3.7	3	SFS	1C			CTBV

[1] Sport fish classification based on accessibility, productivity, and esthetics, ranging from 1 to 6.
[2] WF= Wild Fish, BY=Basic Yield, IY=Intensive Yield, SFS=Special Fish Species, TW=Trophy Water
[3] Fish Health Security Classification of Utah Hatcheries and Receiving waters.
[4] HQI is given in lb/acre of trout.
[5] See Appendix B for species code.

Table 1. Stream sections in the Jordan River Drainage (Hydrological Unit 16020204) (continued).

Stream (Section)	Catalog Number	Elevation Range	Stream Order	Length (miles)	CLASSIFICATIONS			Productivity (HQI)[4] lb/acre	Known Fish Species Present[5]	
					Management Class[1]	Sport Fish Class[2]	Fish Health Class[3]		Sport & Non-native Fish	Native Fish & Amphibians
Parleys Creek (2)	IV AA 04	5420-6052	1	2.6	3	SFS	IC	110	CTBV	CTBV
Mtn. Dell Creek	IV AA 040A	5639-7382	1	5.0	3	SFS	IC	51-124	CTBV, BK	CTBV
Lambs Creek (1)	IV AA 040B	6052-6843	1	2.2	3	SFS	IC		CTBV	CTBV
Lambs Creek (2)	IV AA 040B	6843-8318	1	3.3	3	SFS	IC	56	CTBV	CTBV
Lambs Creek Rt Fk	IV AA 040B 01	6843-8404	1	1.4	3	SFS	IC		CTBV	CTBV
Mill Creek (1)	IV AA 050	4232-4400	1	3.4	4	WF	ID		BN, RT, CPCO	SKUT, CBUT, SKMT, DCLN
Mill Creek (2)	IV AA 050	4400-4892	1	2.6	6	No fish	IE		no fish	
Mill Creek (3)	IV AA 050	4892-6685	1	8.8	3	WF	IE	34	RT, BN, CT	
Mill Creek (4)	IV AA 050	6685-8718	1	3.6	3	WF	IE	53	RT, CT	
Big Cottonwood Cr (1)	IV AA 070	4235-4998	2	7.0	4	WF	ID		BN, CPCO,	DCSP, DCLN, SKMT, SKUT
Big Cottonwood Cr (2)	IV AA 070	4998-5805	2	2.0	6	no fish				
Big Cottonwood Cr (3)	IV AA 070	5805-6860	2	2.0	3	WF	ID	69	BN, RT	
Big Cottonwood Cr (4)	IV AA 070	6860-7698	2	0.8	5	WF	ID	3	BN, RT	
Big Cottonwood Cr (5)	IV AA 070	7698-8088	2	6.0	3	WF	ID	126	BN, RT, BK	
Big Cottonwood Cr (6)	IV AA 070	8088-8713	1	6.8	2	WF	ID	155	BN, BK	

Table 1. Stream sections in the Jordan River Drainage (Hydrological Unit 16020204) (continued).

Stream (Section)	Catalog Number	Elevation Range	Stream Order	Length (miles)	CLASSIFICATIONS			Productivity (HQI)[4] lb/acre	Known Fish Species Present[5]	
					Management Class[1]	Sport Fish Class[2]	Fish Health Class[3]		Sport & Non-native Fish	Native Fish & Amphibians
Big Cottonwood Cr (7)	IV AA 070	8716-9300	1	1.4	3	WF	ID	5	BK	
Little Cottonwood Cr (1)	IV AA 080	4350-4750	2	3.0	5	WF	ID		BN, RT, BHBK, BHCH, CPCO	DCLN, SKUT
Little Cottonwood Cr (2)	IV AA 080	4750-5320	2	2.0	6	no fish				
Little Cottonwood Cr (3)	IV AA 080	5320-7200	2	0.9	3	WF	IC	24	CT	CTBV
Little Cottonwood Cr (4)	IV AA 080	7200-8573	2	2.0	6	no fish	IF			
Little Cottonwood Cr (5)	IV AA 080	8573-9464	2	7.5	3	WF	IF	Predicted 161	no fish found	
Little North Willow Cr	IV AA 080A	6031-8228	1	1.7	3	SFS	ID	103-146	CTBV	CTBV
Bell Creek	IV AA 090	5574-9367	1	7.0	3	SFS	ID		CTBV	CTBV
Butterfield Cr	IV AR 430	4941-6063	1	1.6	4	no fish	IF	Predicted 2	no fish	
Bingham Creek	IV AR 440	5288-5813	1	1.7	4	no fish	IF	Predicted 1	no fish	
Barney Cyn	IV AR 450	5296-6027	1							no survey
Coon Cr	IV AR 460	5772	1							no survey

Table 2. Lakes, Reservoirs, and Ponds in the Jordan River Drainage (Hydrologic Unit 16020204).

Water Body	Catalog #	Elevation	Surface (Acres)	Maximum Depth (feet)	CLASSIFICATIONS			Known Fish Species Present[4]	
					Management [1]	Sportfish [2]	Fish Health[3]	Sport & Non-native Fish	Native Fish & Amphibians
Camp Kostopaulus	IV 408A	5200	0.5	5	3	IY	ID	RT	
Desolation Lake	IV 408B	9240	6.4	32	4	no fish	IF		tiger salamander
Dog Lake	IV 408C	9359	2	2	5	no fish	IF		tiger salamander
Catharine Lake	IV 413	9940	4.4	20	3	BY	ID	BK	
Mary Lake	IV 415	9528	23	90	3	BY	IC	BK	SKMT
Martha Lake	IV 414A	9600	3	19	4	no fish	IF		
Twin Lake	IV 421	9460	30	52	3	BY	IC	CT	SRRS, SKMT
Silver Lake	IV 420	8720	12	10	3	IY	ID	BK	SRRS
Blanche Lake	IV 412	8920	4.8	23	3	BY	IF	BK	
Florence Lake	IV 413A	8840	2	22	3	BY	IF	BK	
Lillian Lake	IV 413B	8800	6.1	36	3	BY	IF	BK	
Lost Lake	IV 414	10000	1.1	20	3	BY	IF	CT may not support fish	
Red Pine Lake	IV 418	9640	5.0	56	4	no fish	IF	no fish	
Upper Red Pine Lake	IV 418A	10000	5.5	36	3	BY	IF	CT	
White Pine Res	VI 423	10000	6.0	34	3	BY	IF	CT	
Secret Lake	IV 419	9860	5	17	3	no fish	IF		

Table 2. Lakes, Reservoirs, and Ponds in the Jordan River Drainage (Hydrologic Unit 16020204) (continued).

Water Body	Catalog #	Elevation	Surface (Acres)	Maximum Depth (feet)	CLASSIFICATIONS			Known Fish Species Present[4]	
					Management [1]	Sportfish [2]	Fish Health[3]	Sport & Non-native Fish	Native Fish & Amphibians
Bell Canyon Res	no survey	5527							
Upper Bell Res	IV 421A	9400	20	28	3	BY	IF	CT	
Mtn Dell Res	no survey	5500			3	SFS	IB	CTBV	CTBV
Little Dell Res	no survey	5722			3	SFS	IB	CTBV	CTBV
Red Butte Res	IV 416	5360	11.4	25	3	SFS	IB	CTBV,	CTBV, SKJN
Fairmont Park Pond	IV 413AA	4350	0.6	4.5	4	no fish	IF	no fish	
Decker Lake	IV 413AAA	4235 no survey							
Willow Park Pond	no survey	4257			3	IY	IF	RT	
Midas Pond	no survey	4300			3	IY	IF	RT	
Draper Pond (Sunset Park)	no survey	4450			3	IY	IE	RT, SFBG	
Urban Waters SL County	no survey					IY	IF	RT	

[1] WF= Wild fish, BY=Basic Yield, IY=Intensive Yield, SFS=Special Fish Species, TW=Trophy Water
[2] Sport fish classification based on accessibility, productivity, and esthetics, ranging from 1 to 6.
[3] Fish health security classification of Utah Hatcheries and Receiving waters.
[4] See Appendix B for species code.

Table 3. Classification of streams in the Jordan River Drainage by order (Hydrologic Unit 16020204).

Stream Order	Miles of Stream	Number of Stream Sections
1	84.8	24
2	33.2	10
3	0	0
4	30	4
Total	148	38

Table 4. Sport fish management classification of streams, lakes and reservoirs in the Jordan River Drainage (Hydrologic Unit 16020204).

Management Class	Miles of Stream	Number of Stream Sections	Lake/Reservoir Surface Acres	Number of Lakes/Reservoirs
Basic Yield	7.8	2	102.9	10
Intensive Yield	0	0	28.5	6
Trophy Fishery	0	0	0	0
Wild Fishery	73.4	14	0	0
Special Fish Species	51.3	13	571.4	3
Unclassified (no fish)	15.5	9	37	8
Total	148	38	739.8	27

Table 5. Sport fish classification summary of streams, lakes and reservoirs in the Jordan River Drainage Hydrologic Unit 16020204).

Sport fish Class	Miles of stream	Number of stream sections	Lakes/Reservoirs. Surface Acres	Number of Lakes/Reservoirs
1	0	0	0	0
2	6.8	1	0	0
3	108.2	23	697.8	19
4	17	5	15	4
5	7.4	3	2	1
6	8.6	4		
Not Rated	0	2	25	3
Total	148	38	739.8	27

Table 6: Water chemistry measurements for stream sections in the Jordan River Drainage Unit (Hydrological Unit 16020204).

Stream (Section)	Catalog #	Dissolved Ouyen mg/L	pH	Temperature (Degrees F)	Hardness mg/L	M-Alk mg/L	Nitrate/ Nitrogen mg/L	Water Quality Class*
Jordan River	IV AA 01	7.0	7.5	65-82	496	256		2B, 3B, 3D, 4
Jordan River	IV AA 02	7.0	7.5	65-82	496	256		2B, 3B, 4
Jordan River	IV AA 03	11.0	7.5	65-82	564	257		2B, 3A
Jordan River	IV AA 04	8.0	8.0	36-82	619	257		1C, 2B, 3B
City Creek (1)	IV AA 010							2B, 3A
City Creek (2)	IV AA 010	7.0	8.0	48	222	222	0.06	1C, 2B, 3A
Red Butte Creek (1)	IV AA 020	8.2	8.6	37	340	255		1C, 2B 3A
Red Butte Creek (2)	IV AA 020	8.0	8.0	53	250	250	0-1.0	1C,2B,3A
Emigration Creek (1)	IV AA 030	7.0	8.5	60		188		2B, 3A
Emigration Creek (2)	IV AA 030	8.0	8.0	66	394	308	0.2	2B, 3A
Parleys Creek (1)	IV AA 040	8.0	8.7	70	376	137		2B, 3C
Parleys Creek (2)	IV AA 04	8.0	8.0	53	342	205	0.04	1C, 2B, 3A
Mtn. Dell Creek	IV AA 040A	8.0	8.0	51	291	239	0.01	1C, 2B, 3A
Lambs Creek (1)	IV AA 040B	8.0	8.5	54	274	171	0.18	1C, 2B, 3A
Lambs Creek (2)	IV AA 040B	8.0	8.5	48	234	154	0.18	1C, 2B, 3A
Lambs Creek Rt Fk	IV AA 040B 01	7.0	8.5	51	255	119		1C, 2B, 3A
Mill Creek (1)	IV AA 050	9.2	8.4	54	256	256		2B, 3C, 4
Mill Creek (2)	IV AA 050							2B, 3A, 4

Table 6. Water chemistry measurements for stream sections in the Jordan River Drainage Unit (Hydrological Unit 16020204) (continued).

Stream (Section)	Catalog #	Dissolved Ouyen mg/L	pH	Temperature (Degrees F)	Hardness mg/L	M-Alk mg/L	Nitrate/ Nitrogen mg/L	Water Quality Class*
Mill Creek (3)	IV AA 050	8.0	8.0	48	342	257	0.06	2B, 3A, 4
Mill Creek (4)	IV AA 050	8.0	8.0	49	359	206	0.05	2B, 3A, 4
Big Cottonwood Cr (1)	IV AA 070	9.0	8.0	68	120	188	0.24	2B, 3A, 4
Big Cottonwood Cr (2)	IV AA 070							2B, 3A, 4
Big Cottonwood Cr (3)	IV AA 070	8.0	8.0	57	154	103	0.03	2B, 3A, 4
Big Cottonwood Cr (4)	IV AA 070	8.0	8.0	52	222	154	0.03	1C, 2B, 3A
Big Cottonwood Cr (5)	IV AA 070	8.0	8.0	57	188	137	0.01	1C, 2B, 3A
Big Cottonwood Cr (6)	IV AA 070	8.0	8.0	56	154	120	0.02	1C, 2B, 3A
Little Cottonwood Cr (1)	IV AA 080	8.2	8.2	46		205		2B, 3A
Little Cottonwood Cr (2)	IV AA 080							2B, 3A
Little Cottonwood Cr (3)	IV AA 080	8.0	8.0	64	137	120	0.07	2B, 3A
Little Cottonwood Cr (4)	IV AA 080							1C, 2B, 3A
Little Cottonwood Cr (5)	IV AA 080	8.0	8.0	60	137	103	0.07	1C, 2B, 3A
Little North Willow Cr	IV AA 080A	7.6	7.5	58	51	51	0.168	1C, 2B, 3A
Bell Creek	IV AA 090	no survey						1C, 2B, 3A
Butterfield Cr	IV AR 430	8.0	8.0	64	257	205	<0.01	2B, 3D, 4
Bingham Creek	IV AR 440	no survey						2B, 3D, 4
Barney Cyn	IV AR 450	no survey						2B, 3D, 4
Coon Cr	IV AR 460	no survey						2B, 3D, 4

Table 7: Water chemistry measurements for reservoirs, lakes and ponds, springs, and other wetlands in the Jordan River Drainage (Hydrologic Unit 16020204).

Water	Catalog Number	D.O.	PH	Temp (F)	Hardness	M-Alk	Water Quality Class[1]
Camp Kostopaulus	IV 408A	8.0	8.5	65			2B, 3A
Desolation Lake	IV 408B	7.4	7.9	64	34	34	2B, 3A, 4
Dog Lake	IV 408C			64			1C, 2B, 3A
Catharine Lake	IV 413	7.0	9.0	66	51	51	1C, 2B, 3A
Mary Lake	IV 415	5.6	8.0	53	51	34	1C, 2B, 3A
Martha Lake	IV 414A	8.2	8.2	59	43	34	1C, 2B, 3A
Twin Lake	IV 421	7.4	7.5	58	17	17	1C, 2B, 3A
Silver Lake	IV 420	7.8	7.5	55	34	17	1C, 2B, 3A
Blanche Lake	IV 412	8.8	8.0	57	34	34	1C, 2B, 3A
Florence Lake	IV 413A	11	7.0	54	51	34	1C, 2B, 3A
Lillian Lake	IV 413B	8.0	7.0	54	51	34	1C, 2B, 3A
Lost Lake	IV 414	8.6	7.0	52	<17	<17	1C, 2B, 3A
Red Pine Lake	IV 418	8.8	7.0	49	34	34	1C, 2B, 3A
Upper Red Pine Lake	IV 418A	9.4	7.2	40	26	17	1C, 2B, 3A
White Pine Res.	IV 423	10.2	7.0	50	17	17	1C, 2B, 3A
Secret Lake	IV 419	8.0	7.0	58	17	17	1C, 2B, 3A
Upper Bell Res	IV 421A	6.4	8.0	56	68	68	1C, 2B, 3A
Mtn Dell Res	no survey						1C
Little Dell Res	no survey						1C

Table 7. Water chemistry measurements for reservoirs, lakes and ponds, springs, and other wetlands in the Jordan River Drainage (Hydrologic Unit 16020204) (continued),

Water	Catalog Number	D.O.	PH	Temp (F)	Hardness	M-Alk	Water Quality Class[1]
Bell Canyon Res	no survey						
Red Butte Res	IV 416	9.0	8.5	70	239-288	239-288	1C, 2B, 3A
Fairmont Park Pond	IV 413AA	8.0	7.5	54	496	342	2B, 3A, 4
Decker Lake	IV 413AAA	no survey					2B, 3B, 3D, 4
Willow Park Pond	no survey						2A, 2B, 3A, 3B, 3D
Midas Pond	no survey						2B, 3A, 3B, 3D
Draper Pond	no survey						2B, 3A, 3B, 3D
Urban Waters SL County	no survey						2B, 3A, 3B, 3D

[1] (Utah Department of Environmental Quality, Division of Water Quality, 2001).
Class 1: Culinary raw water source
Class 1C: Domestic use with prior treatment.
Class 2: In-stream recreational use and aesthetics
Class 2A: Primary human contact-swimming
Class 2B: Secondary human contact-boating, wading etc
Class 3: In-stream use by aquatic wildlife
Class 3A: Habitat maintenance for cold water game fish, water-related wildlife and food chain organisms
Class 3B: Habitat maintenance for warm water game fish, water-related wildlife and food chain organisms
Class 3C: Habitat for non-game, water related wildlife and food chain organisms
Class 3D: Habitat for waterfowl, shore birds, water -related wildlife and food chain organisms
Class 4: Agricultural-livestock and irrigation water
Class 5: Great Salt lake general use-primary and secondary human contact, water-related wildlife and mineral extraction
Class 6: General use restricted and/or governed by environmental and health standards and limitations

APPENDIX B

Biological and Wildlife Resources

Table 1: Native fish species occurring in the Jordan River Hydrologic Unit, 16020204.

Species	Species Code	Status	General Habitat Type Use
Bonneville cutthroat trout (*Oncorhyncus clarki utah*)	CTBV	CS	cold streams, lakes, and rivers
Utah chub (*Gila atraria*)	CBUT		warm quiet waters with aquatic vegetation ranging from clear lakes to irrigated ditches
Longnose dace (*Rhinichthys cataractae*)	DCLN		stream riffles and rocky shores of lakes
Mountain sucker (*Catostomus platyrhynchus*)	SKMT		riffles in clear, cold creeks and rivers in mountains
Utah sucker (*Catostomus ardens*)	SKUT		reservoirs, lakes and streams
Least chub (*Iotichthys phlegethontis)*	CBLT	CS	inhabits small springs that are well vegetated
Bonneville redside shiner (*Richardsonius balteatus hydrophlox*)	SRRS		streams, springs, turbid rivers, lakes and reservoirs

CS = Conservation Species.

Table 2: Introduced fish species occurring in the Jordan River Drainage (Hydrological Unit 16020204).

Species	Species Code	Purpose of Introduction	General Habitat Type Use
Rainbow trout *(Onchoryncus mykiss)*	RT	Sportfish	wide range of habitat including small farm ponds to large, deep lakes, rivers
Brown trout *(Salmo trutta)*	BN	Sportfish	wide range of habitat including large, deep lakes, rivers and small streams
Brook trout (*Salvelinus fontinalis)*	BK	Sportfish	cool, clear headwater streams and spring-fed streams and lakes
Walleye (*Stizostedion* vitreum)	WE	Sportfish	prefer cold clean lakes and clear rivers
Green sunfish *(Lepomis cyanellus)*	SFGR	Sportfish	small, warm streams, ponds, and shallow areas of lakes at low elevations
White bass *(Morone chrysops)*	BSWH	Sportfish	large streams, lakes and impoundments
Common carp *(Cyprinus carpio)*	CPCO	Food source/sportfish	most warm to cool water habitat types
Black bullhead *(Ameiurus melas)*	BHBK	Sportfish	small warmwater ponds, reservoirs, shallow lakes, intermittent creeks, muddy backwaters
Channel catfish *(Ictalurus punctatus)*	BHCH	Sportfish	warm shallow lakes and reservoir, deep pools or runs in small to large rivers
June sucker (*Chasmistes lioris*)	SKJN	E	lakes (endemic to Utah Lake)
Western mosquitofish *(Gambusia affinis)*	MS	Mosquito abatement	warmwater lakes, rivers, creeks, ponds, springs, and ditches
Fathead minnow *(PIMEPHALES promelus)*	MNFH	Mosquito abatement	slow moving streams, lakes and ponds

Table 3: Amphibians occurring in the Jordan River Drainage (Hydrologic Unit 16020204).

Species	Status	General Habitat Type Use
Tiger salamander *(Ambystoma tigrinum)*		quiet water of ponds, streams, lakes, reservoirs
Leopard frog *(Rana pipiens)*		slowly flowing streams, springs, marshes, ponds, canals, and reservoirs
Spotted frog *(Rana luteiventris)*	CS	streams, rivers, marshes, springs, pools, ponds, and small lakes
Boreal chorus frog*(Pseudacris triseriata)*		any type of wetland, lakes, and reservoirs
Woodhouse toad *(Bufo woodhousei)*		near wetlands/streams associated with grasslands, sagebrush flats, woods, desert streams, flood plains
Western boreal toad (*Bufo boreas)*	SP	desert streams and springs, grassland, woodlands, and mountain meadows
Great Basin toad *(Bufo cognatus)*		near wetlands/streams associated with prairies, deserts, and grasslands
Great Basin spadefoot toad *(Spea intermontanus)*		near wetlands/streams associated sagebrush flats, semi-desert shrub lands, and pinyon-juniper woodlands

CS = Conservation Species, SP = Sensitive species due to declining populations.

Table 4: Mollusks occurring in the Jordan River Drainage (Hydrologic Unit, 16020204).

Species	**Status**	**Present Condition, location, habitat**
Western pearl shell (*Margaritifera calcata*)	E	Formerly may have been found in 11 locations. Thought to be extirpated from the state now.
Winged floater (*Anodonta nuttalliana)*		This species is know historically but has not been reported since 1940.
Oregon floater (*Anodonta oregonensis*		Abut three historical records of this species in Utah. At least one populations was in Salt Lake County.
Unnamed pebblesnail (*Fluminicola sp.)*		Seven occurrences are listed for this species.
Mud amnicola (*Amnicola limosus)*	R	Known only from historical reports.
Pygmy fossaria (*Fossaria parva)*		Four occurrences are known in Utah all or historical. It is possible that no living specimens of this species have been found in Utah.
Swamp lymnaea (*Lymnaea stagnalis)*		Eleven occurrences that seem to represent fresh material have been reported in Utah. Reported in lakes, springs, ditches and swamps.
Glass physa (*Physa shinneri)*		Seven historical occurrences of this species have been reported. Scanty information suggest this species lives in shallow bodies of water, either perennial or seasonal, or temporary ponds.
Protean physa (*Physella virgata)*		This species is known at least historically from scattered localities throughout Utah. It is a fresh water species found in most or the clear water streams, springs, and ditches of Dixie. Common in Fish Springs.
Coarse rams-horn (*Planorbella binneryi)*		Reported in Salt Lake County and in 13 historical locations. Reported mainly from lakes, but a pond, creeks and canals have been reported.
Sharp sprite (*Promenetus exacuous)*		About 7 or 8 historical occurrences of this species have been reported. It was reported as comparatively rare in Utah. Most reports have been from lakes.
Cross snaggletooth (*Gastrocopta quadridens)*		Only two historical records one from Lambs Canyon. No habitat information.
Widespread column (*Pupilla muscorum)*		Five historical occurrences reported in Utah. Habitat information is lacking but two reported localities are canyons descending west from the Wasatch mountains.
Crestless column (*Pupilla hebes)*		Ten historical localities.
Mitered vertigo (*Vertigo concinnula)*		Seven historical occurrences. All known records in Utah are from montane areas.

Table 4: Mollusks occurring in the Jordan River Drainage (Hydrologic Unit 16020204) (continued).

Species	**Status**	**Present Condition, location, habitat**
Cross vertigo (*Vertigo modesta)*		Eleven occurrences have been published. Reported from swampy ground.
Mellow column (*Collumella columella)*		Two localities for this species have been reported, no useful information about abundance. Reported along a creek in high canyons.
Mill Creek mountain snail		Found only in Mill Creek Canyon. Found in moist coniferous forests on north facing slopes.
Lyrate mountainsnail (*Oreohelix haydeni)*	SP	21 colonies have been reported. In five colonies they were plentiful or common. Found at the edges of coarse angular limestone.
Santa Rita ambersnail (*Succinea grosvenori)*		Reported historically in 7 locations, 4 in north central Utah. No habitat information.
Rustic ambersnail (*Succinea rusticana)*		Reported from three locations one in Salt Lake County. May inhabit small streams choked with watercress.
Texas glyph (*Glyphyalinia umbilicata)*		Reported in three locations in Utah, one in Salt Lake County.
Black gloss (*Zonitoides nitidus)*		Reported from 6 localities in the Wasatch Mountains, including Salt Lake and Utah Counties. Found on the moist banks of streams at the waters edge.

SP = Sensitive species due to declining populations, E = Endangered species, R = Rare.

Table 5: Reptiles occurring in the Jordan River Drainage (Hydrological Unit 16020204).

Species	Status	General Habitat Type Use
Long-nosed leopard lizard *(Gambelia wislizenii wislizenii)*		sandy or gravelly soil with sparse vegetation
Northern sagebrush lizard *(Sceloporus graciosus graciosus)*		sagebrush, open forested areas, canyon bottoms
Side-blotched lizard *(Uta stansburiana)*		semi-arid regions with coarse, gravelly soil
Great Basin whiptail *(Cnemidophorus tigris tigris)*		semi-arid deserts to open woodlands
Short horned lizard *(Phrynosoma douglassi)*		open rocky or sandy plains to forested areas
Northern desert horned lizard *(Phrynosoma platyrhinos playrhinos)*		sandy, gravelly soil and flat arid stretches
Great Basin skink (*Eumeces skiltonianus utahensis)*		riparian areas with organic soils, open oak/juniper-pinyon woodlands
Ringneck snake (*Diadophis punctatus regalis*		mountain snake, common in small canyons where periodic water is available
Wandering garter snake *(Thamnophis elegans vagrans)*		most moist areas near water
Valley garter snake *(Thamnophis sirtalis fitchi)*		highly variable usually near water
Great Basin rattlesnake *(Crotalus viridis lotsus)*		west/southwest facing rocky outcrops, talus slopes, and stony canyons
Desert striped whipsnake *(Masticophis taeniatus taeniatus)*		arid brushy grasslands to rugged mountain terrain
Great Basin gopher snake *(Pituophis melanoleucus deserticola)*		most habitat types
Desert night snake *(Hypsiglena torquata deserticola)*		semi-arid sandy or rocky habitats
Western yellow-bellied racer *(Coluber constrictor mormon)*		most habitat types
Rubber boa (*Charina bottae utahensis*)		mountain regions, forests, meadows
Smooth green snake (Opheodrys vernalis blanchardi)	SP	common in mountain forests and in or near shrubs and low trees along water courses
Sonoran Mountain kingsnake (*Lampropeltis pyromelana infralabialis*		moist forested area where there is thick cover for protection
Milk snake (*Lampropeltis traingulum taylori)*	SP	riparian areas, rocky hillsides, damp meadows and brushy habitats

SP = Sensitive species due to declining populations

APPENDIX C

Sport Fish Management Classifications

Table 1. Summary of sport fish management classifications for the Jordan River Drainage (Hydrologic Unit 16020204).

INTENSIVE YIELD WATERS (IY)			
Description	Provide fishing opportunities where angling pressure is heavy or where the habitat is marginal for fish growth and survival. These fisheries are sustained by stocking of catchable sized fish.		
Standard Objectives	1. Maintain an average catch rate of 0.5 fish /hr (± 0.25 fish/hr) or 4 oz/hr (± 2 oz/hr) 2. Provide a minimum of 70 % return to the creel in numbers for all catchable sized fish stocked. 3. Maintain an average of 500 angler-hours/acre/year. 4. Maintain an average weight of 2.8 fish/lb stocked catchable trout.		
Water Name	**Species**	**Quota**	**Projected Angler Hours[1]**
Camp Kostopaulus Pond	Rainbow trout	500	700
Silver Lake	Rainbow trout Brook rout	12000 2500	16800 1250
Draper Pond	Rainbow trout	2000	2800
Midas Pond	Rainbow trout	3000	4200
Willow Park Pond	Rainbow trout	20000	28000
SL County Urban Waters	Rainbow trout	10000	14000

[1]Fisherman hours based on a 70 percent return of stocked fish and a catch rate of 0.5 fish per hour.

Table 1. Summary of sport fish management classifications for the Jordan River Drainage (Hydrologic Unit 16020204) (continued).

WILD FISH WATERS (WF)			
Description	Allows the fish species and its habitat to dictate what can naturally be produced and sustained. Fisheries are maintained solely through natural reproduction . Whether or not this group can produce substantial fishing opportunities is not the primary management issue.		
Standard Objectives	1. Maintain an average catch rate of 0.5 fish /hr (± 0.25 fish/hr) or 4 oz/hr (± 2 oz/hr) 2. Maintain the an average size of 11 inches (range 9-14) for harvested trout species 3. Maintain these standards by regulation rather than stocking.		
Water Name	**Species**	**Quota**	**Project Angler Hours**
Big Cottonwood Creek (4)	Brown trout, Rainbow trout	no stocking	80 10 AH/mile
Big Cottonwood Creek (6)	Brown trout, Rainbow trout, Brook trout	no stocking	3400 500 AH/mile
Big cottonwood Creek (3)	Brown trout, Rainbow trout	no stocking	200 100 AH/mile
Big Cottonwood Creek (1)	Brown trout, Rainbow trout	no stocking	70 10 AH/mile
Big Cottonwood Creek (5)	Brown trout, Rainbow trout	no stocking	3960 660 AH/mile
Little Cottonwood Creek (3)	Cutthroat trout	no stocking	90 10 AH/mile
Jordan River (1)	Carp, Utah sucker	no stocking	2700 200/mile
Little Cottonwood Creek (5)	Cutthroat trout	no stocking	750 10 AH/mile
Big Cottonwood Creek (7)	Brook trout	no stocking	70 50 AH/mile
Little Cottonwood Creek (1)	Brown trout, Rainbow trout	no stocking	30 10 AH/mile

Table 1. Summary of sport fish management classifications for the Jordan River Drainage (Hydrologic Unit 16020204) (continued).

WILD FISH WATERS (WF)			
Description	Allows the fish species and its habitat to dictate what can naturally be produced and sustained. Fisheries are maintained solely through natural reproduction . Whether or not this group can produce substantial fishing opportunities is not the primary management issue.		
Standard Objectives	1. Maintain an average catch rate of 0.5 fish /hr (± 0.25 fish/hr) or 4 oz/hr (± 2 oz/hr) 2. Maintain the an average size of 11 inches (range 9-14) for harvested trout species 3. Maintain these standards by regulation rather than stocking.		
Water Name	**Species**	**Quota**	**Project Angler Hours**
Mill Creek (1)	Brown trout, Rainbow trout		340 10 AH/mile
Jordan River (2)	Carp, Utah sucker, rainbow trout		1740 200 AH/mile
Mill Creek (4)	Brown trout, Rainbow trout		1080 300 AH/mile
Mill Creek (3)	Brown trout, Rainbow trout		2640 300 AH/mile

[1]Projected hours are based on Thistle Creek angler surveys estimated at 660AH/mile, (Wiley and Thompson 1997) and best judgement for fishermen hours per mile based on population size.

Table 1. Summary of sport fish management classifications for the Jordan River Drainage (Hydrologic Unit 16020204) (continued).

BASIC YIELD WATERS (BY)			
Description	Provides the majority of fishing opportunity throughout the state. Management focus is on family oriented recreation utilizing the habitat capability for growing fish to a catchable size in the wild.		
Standard Objectives	1. Maintain an average catch rate of 0.5 fish /hr (± 0.25fish/hr) or 4 oz/hr (± 2 oz/hr) 2. Provide a positive net return to the creel when comparing a pound of stocked fish versus a pound of harvested fish 3. Maintain the an average size of 11 inches (range 9-14) for harvested trout species		
Waters Name	**Species**	**Quota**	**Projected Angler Hours[1]**
Jordan River (3)	Channel catfish	5000 when available	1170 300 AH/mile
Jordan River (4)	Channel catfish	5000 when available	1170 300 AH/mile
Upper Red Pine Lake	Cutthroat trout	2000	1000
Upper Bell Canyon Lake	Cutthroat trout	2500	1250
White Pine Reservoir	Cutthroat trout	1500	750
Catharine Lake	Brook trout	2500	1250
Mary Reservoir	Brook trout	2500	See IY Waters
Twin Lake Reservoir	Cutthroat trout	2500	1250
Blanche Lake	Brook trout	1500	750
Florence Lake	Brook trout	1000	500
Lillian Lake	Brook trout	1500	750
Lost Lake	no stock	0	0

[1]Projected fishermen hours are based on a 25% return with a catch rate of 0.5 fish/hours.

Table 1. Summary of sport fish management classifications for the Jordan River Drainage (Hydrologic Unit 16020204) (continued).

SPECIAL FISH SPECIES WATERS (SFS)			
Description	Management focuses on conservation and enhancement of populations of genetically unique special fish species within their historic habitats and their use for recreational value in the sport fish program when possible.		
Standard Objectives	1. Maintain populations as per guidelines developed in conservation and recovery plans.		
Waters Name	**Species**	**Quota**	**Projected Angler Hours[1]**
Red Butte Reservoir	Bonneville Cutthroat trout	no stocking	no fishing
Mountain Dell Reservoir	Bonneville cutthroat trout	no stocking	no fishing
Little Dell Reservoir	Bonneville cutthroat trout	10000	5000
Parleys Creek (1)	Bonneville cutthroat trout	no stocking	260 100 AH/mile
Parleys Creek (2)	Bonneville cutthroat trout	no stocking	780 300 AH/mile
Emigration Creek (2)	Bonneville cutthroat trout	no stocking	930 100 AH/mile
Lambs Creek (1)	Bonneville cutthroat trout	no stocking	220 100 AH/mile
Lambs Creek (2)	Bonneville cutthroat trout	no stocking	330 100 AH/mile
Lambs Creek Rt Fk	Bonneville cutthroat trout	no stocking	no fishing
Red Butte Creek (2)	Bonneville cutthroat trout	no stocking	no fishing
City Creek (1)	Bonneville cutthroat trout	no stocking	0
City Creek (2)	Bonneville cutthroat trout	no stocking	900 200 AH/mile

[1]Projected hours are based on Thistle Creek angler surveys estimated at 660AH/mile, and best judgement for fishermen hours per mile based on population size.

Table 1. Summary of sport fish management classifications for the Jordan River Drainage (Hydrologic Unit 16020204) (continued).

SPECIAL FISH SPECIES WATERS (SFS)			
Description	Management focuses on conservation and enhancement of populations of genetically unique special fish species within their historic habitats and their use for recreational value in the sport fish program when possible.		
Standard Objectives	1. Maintain populations as per guidelines developed in conservation and recovery plans.		
Waters Name	**Species**	**Quota**	**Projected Angler Hours**
Mtn Dell Creek	Bonneville cutthroat trout	no stocking	1000 200 AH/mile
Bell Creek	Bonneville cutthroat trout	no stocking	350 50 AH/mile
Little North Willow Creek	Bonneville cutthroat trout	no stocking	170 10 AH/mile

APPENDIX D

General Management Actions

Table 1. Actions needed to provide a recreational sport fishery that meets public demands.

The following waters provide less than 500 angler hours of fishing annually and are supported by wild fish. Natural reproduction supports the population. They are generally small in size and/or access is limited by property ownership or remote location. There is little opportunity to expand fishing opportunities.	
Water Name	**Actions**
Big Cottonwood Creek sections 1, 3, 4, 7 Little Cottonwood Creek sections 1, 3 Mill Creek sections 1, Lost Lake Florence Lake	1. Monitor fish populations on a 10-year cycle. 2. Investigate any environmental impacts with subsequent recommendation for mitigation. 3. On a 5-year cycle review their status to determine if any significant changes have occurred that would upgrade their status. 4. Consider their potential to support native species such as; Bonneville cutthroat trout, least chub, leatherside chub, sculpin, dace etc.

Table 1. Actions needed to provide a recreational sport fishery that meets public demands (continued).

The following waters provide in excess of 1000 angler hours of recreation annually. They are supported by wild fish that maintain their population through natural reproduction. They are located on public land.	
Water Name	**Actions**
Big Cottonwood Creek section 1, 4, 5, 6 Jordan River section 1, 2, Little Cottonwood Creek section 5 Mill Creek section 3, 4	1. Monitor fish populations on a 5-year cycle. 2. Plan and complete habitat improvement projects that will increase productivity and angler use. 3. Improve stream flows when possible. 4. Do not allow any impacts that would detrimentally impact the fish population

Table 1. Actions needed to provide a recreational sport fishery that meets public demands (continued).

The following waters provide in excess of 1000 angler hours of recreation annually. They are supported by wild fish that are maintained by natural reproduction and/or by annual stocking of sport fish species.	
Water Name	**Actions**
Silver Lake Draper Pond Midas Pond Willow Park Pond SL County Urban Waters Jordan River (3,4) Catharine Lake Twin Lake	1. Monitor fish populations annually either through fish populations surveys or angler surveys. 2. Adjust stocking of fish as needed. 3. Plan and complete habitat improvement projects that will increase productivity and angler use. 4. Improve fishing opportunities with boat ramps, fishing piers, shore line access, etc. 3. Improve stream flows when possible. 4. Do not allow any impacts that would detrimentally impact the fish population

Table 2. Summary of actions needed to meet Objective 2, for Bonneville cutthroat trout

The following waters may provide important habitat for Bonneville cutthroat trout and may provide fishing recreation.	
Water Name	**Actions**
Red Butte Reservoir Mountain Dell Reservoir Little Dell Reservoir Parleys Creek section 1, 2 Lambs Creek section 1, 2 Lambs Creek Right Fork Emigration Creek section 1, 2 Red Butte Creek section 2 City Creek section 1, 2 Mountain Dell Creek Bell Creek Little North Willow Creek	1. Monitor fish populations on a 3-year cycle. 2. Review their status to determine if they should be placed in a different category. 3. Acquire access where ever necessary to protect this habitat and where possible provide public use. 4. Plan and complete habitat improvement projects that will enhance the fish population. 5. Do not allow any impacts that would detrimentally impact the fish population. 6. Maintain brood stock in Little Dell Reservoir.

Table 3. Summary of action needed to meet Objective 2 for Columbia spotted frog.

Future Actions									
Water Body	**Surveys**	**Genetic Analysis**	**Range Expansion**	**Habitat Enhancement**	**Nonnative Control**	**Habitat Acquisition**	**Monitoring**	**Mitigation**	**Regulations**
Jordan River	Completed 1991	no spotted frogs present	Spotted frog could be introduced into this habitat	UDWR initiated a Jordan River Wetlands Project	Bull frogs are present as well as nonnative fish (bass sp., bullhead, carp)		Annually if spotted frog are introduced		Population would be protected at this site
Great Salt Lake wetlands, duck clubs	Completed 1991	No spotted frogs present.	Spotted frog could be introduced into this habitat	Some habitat enhancement could be competed if it were decided to transfer spotted frog to this site	Bull frogs are present as well as nonnative fish (bass sp., bullhead, carp)	Some Property belongs to UDWR	Annually if spotted frog are introduced		Population would be protected at this site

Table 4. Summary of actions necessary to meet Objective 3 recovery of June sucker.

Flat water and Tributaries in this Hydrolgic Unit	**Task Description**[1]			
Red Butte Reservoir Refuge Population	Red Butte Reservoir was selected as a refuge site.	3200 June sucker were initially stocked from the state prison population. Additional fish should be added to enhance the genetics of this population.	Red Butte dam need to be improved to secure this habitat for the long term.	Monitor and maintain this population. Reduce the size of the population if necessary, transfer excess fish to Utah Lake.

Table 5. Summary of actions needed to meet Objective 4 to obtain population, distribution and/or life history information for native fish, amphibians, reptiles and mollusks that occur in this hydrologic unit.

Actions	Anticipated time for completion
Compile, obtain and update literature on all native species that occur in this unit.	All known literature has been searched and compiled into a data base.
Identify gaps in locality and distribution information for all native species.	Gaps in locality and distribution information will be summarized by 2004.
Develop inventory and monitoring plans for this unit.	Inventory and monitoring plans have been completed for sensitive and T&E species. Inventory and monitoring plans for species that are not considered sensitive or T&E will be incorporated into the water survey plans and implemented in 2004.
Implement inventory and monitoring plans.	Inventory and monitoring plans for sensitive and T&E species are being implemented. Monitoring occurs annually for boreal toad in Peruvian Canyon and periodically in the areas around Silver Lake and Lake Mary. Inventory and monitoring plans for species not considered to be sensitive will be implements in 2004.
Maintain and update data base information for all native species that occur in this unit.	The data base for sensitive and T&E species is being maintained. A data base for species not considered to be sensitive will be maintained beginning in 2003.
Monitor and implement controls of nonnative competitive species.	Bull frogs exist all along the Jordan River and in many ponds in the valley. Some effort will be taken to control bullfrog populations to reduce their impact on native amphibians.

Final revision 7/19/03.