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Carson River Aquatic Trail Plan

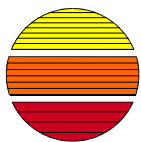
August 4, 2006



Prepared for:

CARSON CITY PARKS AND RECREATION DEPARTMENT
3303 Butti Way, Building #9
Carson City, Nevada 89701

Prepared by:



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10.0 CARSON RIVER AQUATIC TRAIL

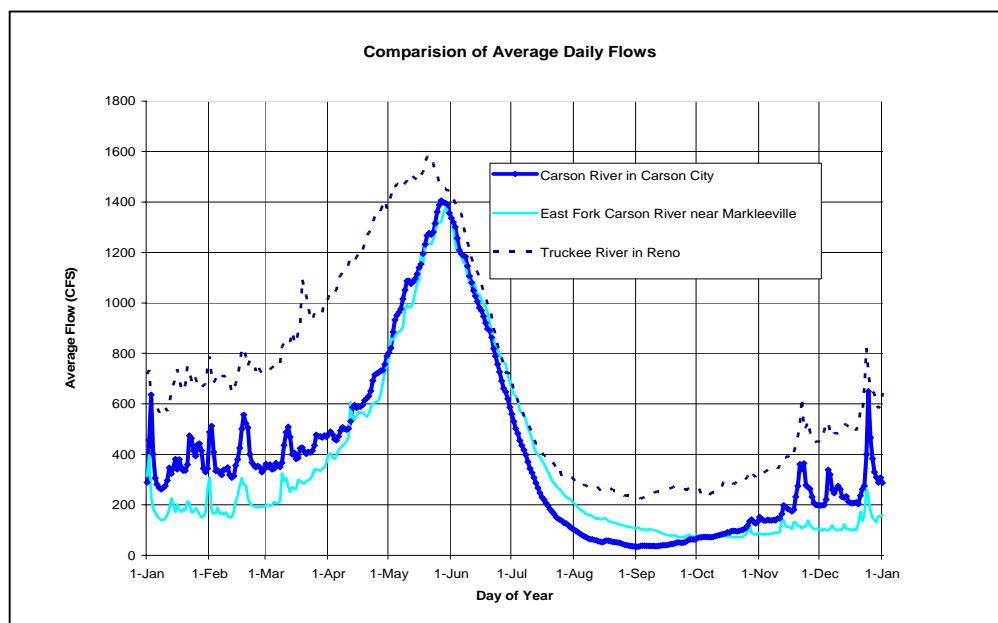
10.1 General Description of the Carson River

The Carson River begins in the Sierra Nevada Mountains and flows over 180 miles to its terminus in Lahontan Reservoir and the Carson Sink. The Carson River's primary source of water is from precipitation and snow pack in the Sierra Nevada Mountains. The East and West forks of the Carson River merge on the west side of the Carson Valley, near Genoa in Douglas County, Nevada. From Genoa, the main stem of the Carson River flows to the northeast out of Carson Valley and into Eagle Valley on the east side of Carson City. The river then turns east and cuts through the Carson River Canyon, Dayton Valley, Churchill Valley, and ultimately terminates in the Lahontan Reservoir and the Carson Sink.

10.1.1 River Hydrology

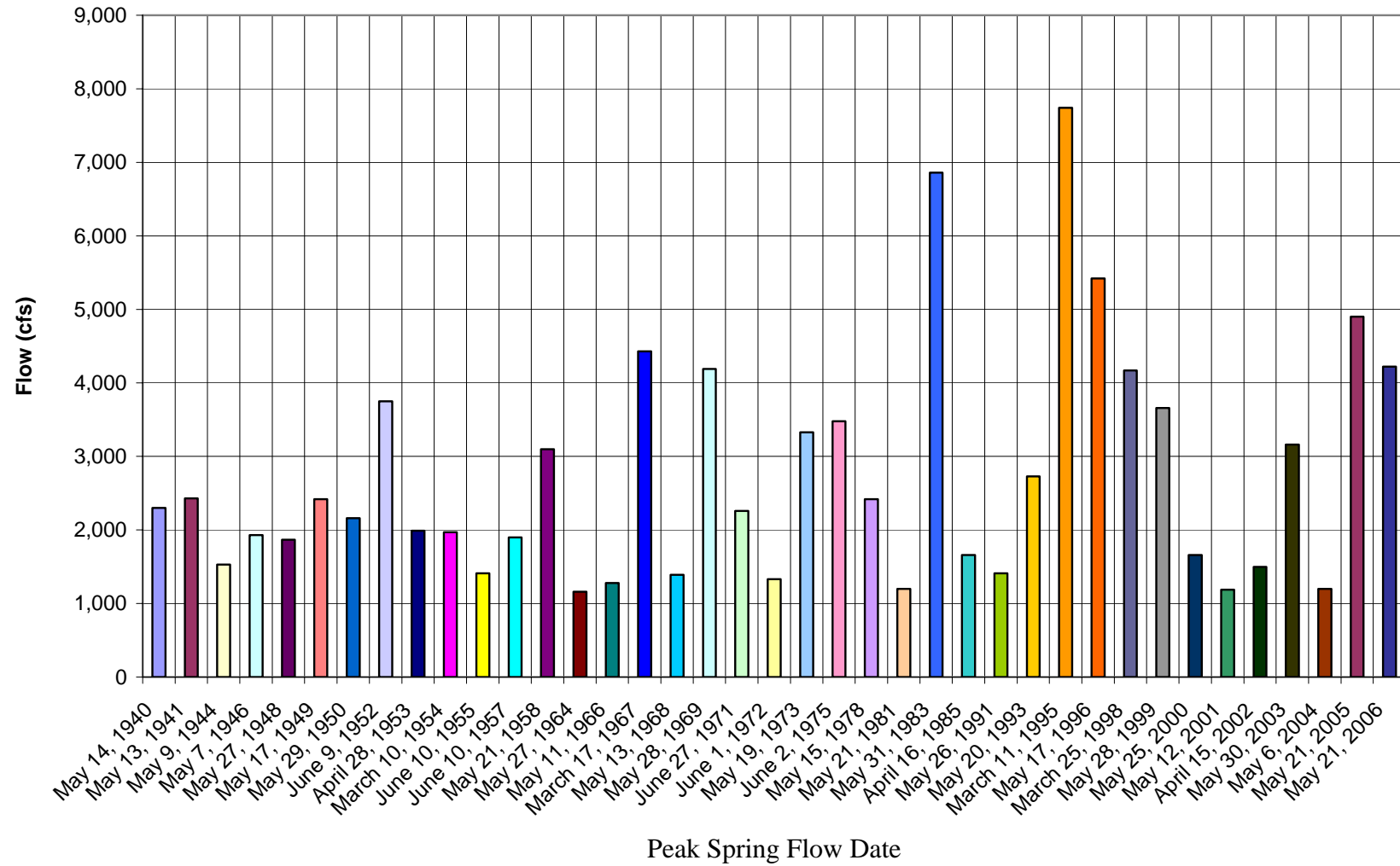
The US Geological Survey (USGS) has monitored the flow of the Carson River in Carson City since 1940. Peak spring run-off occurs between March and June. On average, the Carson River peaks on May 26th at 1,430 cubic feet per second (cfs¹). The highest flows ever recorded are associated with winter storms between November and February. The Carson River has a similar hydrograph to the Truckee River and the East Fork of the Carson River as illustrated by Figure 1. The annual spring peak flows are illustrated by Figure 2.

Figure 1. Comparison of the Truckee River, East Fork of the Carson River and the Carson River Hydrographs



¹ Cubic feet per second is the hydrologic term used to express the rate of flow in a river. It is the rate of flow representing a volume of 1 cubic foot passing a given point in 1 second. One cfs is equivalent to approximately 7.48 gallons per second or 448.8 gallons per minute.

Figure 2. Carson River Dates and Magnitudes of Peak Spring Flows



10.1.2 General River Terminology

River difficulty is described by an international scale system (1998 Revisions to The Safety Code of American Whitewater Complete). The Carson River Aquatic Trail difficulty ranges from Class I to Class III, but all classes are listed below for reference:

⤵ **CLASS I: EASY**

Fast-moving water with riffles and small waves. Few obstructions, all are obvious and are missed easily with little training. Risk to swimmers is slight, self-rescue is easy.

⤵ **CLASS II: NOVICE**

Straightforward rapids with wide, clear channels, which are evident without scouting. Occasional maneuvering may be required, but rocks and medium-sized waves can be missed easily by trained paddlers. Swimmers are seldom injured and group assistance, while helpful, is seldom needed.

⤵ **CLASS III: INTERMEDIATE**

Rapids with moderate, irregular waves, which may be difficult to avoid and can swamp an open canoe. Complex maneuvers in fast current and good boat control in tight passages or around obstacles are often required. Large waves or “strainers” such as fallen trees may be present but can be avoided. Strong eddies and powerful currents can be found, particularly at high flows. Scouting is advisable for inexperienced parties. Self-rescue is more difficult and group assistance may be required to avoid a long swim.

⤵ **CLASS IV: ADVANCED**

Intense, powerful rapids requiring precise boat handling in turbulent water. Depending on the character of the river, it may feature large, unavoidable waves and holes or constricted passages demanding fast maneuvers. Fast reliable maneuvers may be needed to scout rapids. Rapids may require "must" moves above dangerous hazards. Scouting is necessary the first time down. Risk of injury to swimmers is moderate to high, and water conditions may make self-rescue difficult. Group assistance for rescue is often essential and requires practiced skills.

⤵ **CLASS V: EXPERT**

Extremely long, obstructed, or very violent rapids which expose a paddler to above average endangerment. Drops may contain large, unavoidable waves and holes or steep, congested chutes with complex, demanding routes. Rapids may continue for long distances between pools, demanding a high level of fitness. Scouting is mandatory and often difficult. Swims are dangerous, and rescue is difficult even for experts. Proper equipment, extensive experience, and practiced rescue skills are essential.

10.1.3 River Anatomy and Common River Hazards

Eddy – When current flows past an object it creates a void behind the object. There, the current typically flows back upstream, creating an eddy.

Hydraulic – As water flows over an object it creates a depression behind the object and water flows upstream to fill that depression. A hydraulic results when the water flowing upstream is pronounced and recirculates behind the object. A boil line appears where the upstream and downstream waters separate. Hydraulics can tip over boats and hold swimmers.

Hole – A hole is the area where recirculating water meets the downstream current behind an object such as a boulder. If the edges of a hole point upstream, then the hole is difficult to get out of.

Wave – As water flows down a chute it gains speed. When the water hits the river bottom the energy is dissipated into a series of standing waves. Large waves can tip over boats.

Strainer – A strainer is an obstruction, such as a fallen tree, that allows water to flow through it but does not allow solid objects, such as a person, to pass. Common strainers are downed trees, logs, or discarded fences.

Undercut Rock – Water sometimes flows under large boulders or cliffs due to their shape and the effects of erosion. This creates a situation where objects, such as a person, can be trapped under water. If the water flowing into a rock does NOT form a pillow (white, bubbly water against the upstream side of the rock), the rock is probably undercut. Never boat or swim near and undercut rock.

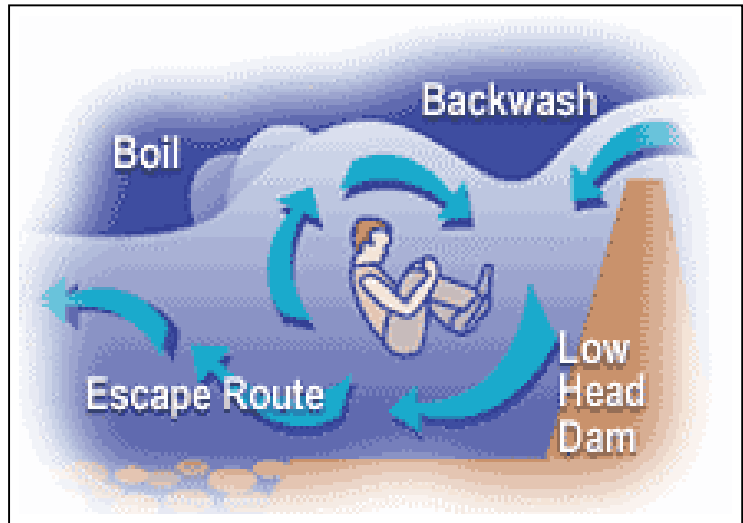
Cold Water – Immersion in cold water can result in hypothermia. Always prepare for cold water immersion. If the air and water temperature combined equal less than 120°F, wear a wet suit or dry suit.

High Water – During snow melts or heavy rain water levels can rise dramatically. The current flows more rapidly and there are often foreign objects being carried away by the water. Check the water levels before you begin any trip. High water can be extremely dangerous.

Dams and Rock Diversions – Dams and rock diversions are a special type of river hazard. Dams may or may not be navigable depending on the size of the drop and the type of hydraulic at the base of the dam. Rock diversions and concrete dams are often difficult for boaters to identify from the upstream side of the dam. Boaters may see a horizon line but do not recognize the hazard until it is too late and they are swept over the structure. Boaters also cannot see what is at the bottom of the dam unless they scout (get out of their boats and look at the dam from the shore downstream of the dam).

10.1.4 Hazardous Dams on the Carson River

There have been numerous fatalities at dams throughout the country. The force of water flowing over a dam during high water is extremely powerful, and often cannot be physically overcome by a boater, swimmer, or person wading in the water above a dam. As the water flows over the dam, it can create a circular pull of water towards the bottom of the dam. This pulls a person back **towards** the dam, then underwater and then around back towards the dam repeatedly. If the concrete dam is vertical and uniform, the hydraulic hole at the base of the dam can be river-wide



and provide no flushing current or escape route. Once caught in this "drowning machine," it can be extremely difficult to escape. Every year people are killed or seriously injured at dams. Most of these accidents could be avoided by simply staying clear of the restricted zones at dams, by understanding the dangers dams can create, by obeying all warning devices, or by modification of the dams to create safe boating passages.

Most of the rock diversions on the Carson River are irregular in shape and do not create uniform drowning holes. However, the rocks can catch debris that is damaging to equipment, can be foot-entrapment hazards, and can injure a person if they are swept over the rock diversion.

10.2 Jurisdiction

10.2.1 The State of Nevada

The Carson River is a navigable water of the United States as defined in Title 33 of the Code of Federal Regulations Chapter 329 (33 CFR 329). As such, the Carson River is a public resource and the general public has the right of navigation on the water surface. The Carson River is also a navigable water of the State of Nevada. Therefore, the State of Nevada owns the bed and bank of the river up to the ordinary and permanent high water mark. This means that the river is owned and managed by the Nevada Division of State Lands up to the line to which the water ordinarily rises in season, synonymous to the mean high water line. At the Carson River Road bridge, the ordinary high water line is approximately 1,500 cfs.

The policy regarding use of state lands is described by Nevada Revised Statutes (NRS) 321. In general, state lands must be used in the best interest of the residents of the state, and to that end may be used for recreational activities. In determining the best uses of state lands, the appropriate state agencies must give primary consideration to the principles of multiple use and sustained yield as the status and resources of the lands permit.

10.2.2 Property Adjacent to the River

The vast majority of land adjacent to the Carson River is privately owned and managed as agricultural and ranching land. In Carson City, two large ranches have been acquired for use by the public. The Silver Saddle ranch in southeastern Carson City is managed by the BLM and offers public access to the Carson River. Likewise, the Empire Ranch Golf Course and River View Park offer the public access to an area of the Carson River that was historically private property. Other areas along the river in Eagle Valley include small private parcels with homes near the river. In Carson River Canyon, there are several large undeveloped parcels and one large parcel in industrial use.

10.2.3 Water Rights

The Carson River is the primary water source for agricultural, private and municipal uses in the area. All waters within the boundaries of the State of Nevada, including surface and ground water, belong to the public and are managed on their behalf by the State. The State Engineer is responsible for the administration of Nevada Water Law, which ensures that these waters are managed so that sufficient quantities are available to preserve our quality of life and to protect existing water rights.

Nevada water law is based on prior appropriation - “first in time, first in right.” This means that the first user of water from a watercourse acquires a priority right to the water and to the extent of its use under that right. Nevada water law is set forth in NRS, Chapters 533 and 534. Court decisions further define Nevada water law. The State Engineer determines the limit and extent of the rights of claimants to water, the use to which water may be put, the quantity of water that is reasonably required for beneficial use, and where water may be used.

Carson River water rights were adjudicated through the Alpine Decree, initially filed on May 11, 1925 and issued on October 28, 1980 (*United States v. Alpine Land and Reservoir Company, et al.*). The Alpine Decree is considered the longest-running litigation over water rights adjudication in United States history.

10.2.4 Water Diversions

There are numerous rock diversions and dams along the Carson River, which divert water into irrigation ditches. The diversions and dams are the life-blood of agriculture and ranching along the Carson River. Typically the rock diversions need to be re-constructed after large flow events. The more substantial dams are repaired as needed.

10.3 A Description of The Existing Aquatic Trail

The Carson River through Carson City is a beautiful resource that provides a source of water, wildlife habitat, and recreational opportunities such as fishing, swimming and boating. The undeveloped nature of the Carson River offers unique scenic and recreational opportunities adjacent to the urban core. An exceptional feature of the river is that it offers two different segments that provide excellent boating opportunities to both beginner and intermediate skill levels.

The Carson River Aquatic Trail includes 13.7 miles of the Carson River from the BLM river access area off of Sierra Vista Lane in Carson City downstream to the river access at Santa Maria Ranch in Lyon County (see Map 1). There are 10.1 miles of the Aquatic Trail in Carson City and 3.6 miles in Lyon County. This river section was selected because there is currently public access to this reach of the river, active public river use, and it passes along few private parcels.

The Aquatic Trail consists of two distinct segments of the Carson River in Carson City. The Aquatic Trail is illustrated by Map 1 and 2 and briefly described below.

☉ **EAGLE VALLEY CLASS I/II FLOAT**

This float may begin at either the BLM river access area (mile 0.0) or the Carson River Park (mile 1.0), and ends at the Morgan Mill Road River Access Area (mile 4.4). This section has one small rock diversion hazard (the Anderson Dam) just downstream of the Carson River Road Bridge. The run is appropriate for beginner canoeists, kayakers and rafters. Public land abuts the river in several areas, offering shady cottonwood groves to stretch your legs or picnic. It is an excellent section for birding.



The Eagle Valley Float can be completed in as little as an hour, with paddling. The float can be stretched to several hours with stops for picnicking or birding in the cottonwood groves. The time to complete the float depends primarily on the amount of flow in the river. The minimum river flow required to comfortably float a watercraft in this section is roughly 500 cfs.

☉ **CARSON RIVER CANYON CLASS II/III WHITEWATER RUN**

This section begins at the Morgan Mill Road River Access and ends in Lyon County at the Santa Maria Ranch River Access (roughly 6 miles in Carson City and 3.6 miles in Lyon County). This section flows through a beautiful canyon that gives the feeling of seclusion and wilderness. There is one long Class III rapid roughly one mile downstream of the put-in. This rapid has a large river-wide wave at the top of the rapid and numerous holes and large waves for approximately ¼ mile downstream. There is one rock diversion hazard (Dayton



Valley Dam or Ophyr Dam) in Lyon County that should be scouted by persons unfamiliar with the diversion. There are several large Class II rapids with numerous tight meanders continuing downstream into Lyon County.

The relative remote nature of this section and its difficulty requires intermediate boating skills and is not appropriate for unguided beginners. This section offers great views of historic roads and bridges from the Comstock Era. The V&T railroad grade is adjacent to this section of river through Carson City. Currently there is only one small section of public land adjacent to the river through this section (near Rock Garden rapid in Lyon County). There are several dirt roads in this area and, unfortunately, there are several abandoned vehicles along the river. The trash is unsightly and hazardous during high flow conditions and should be removed.

The Carson River Canyon section can be boated in as little as two hours at 1,500 cfs. The minimal flow required to raft this section is roughly 800 cfs. The minimal flow required to comfortably kayak this section is roughly 500 cfs.

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Map 1 Draft Carson River Aquatic Trail

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Map 2 Draft Carson River Aquatic Trail—Carson City Only

10.4 River User Groups and Demand

According to the Outdoor Industry Foundation Outdoor Recreation Participation Study (www.outdoorindustry.org) there were 22 million people canoeing, 10 million people kayaking, and 9 million rafting in the US in 2004. The majority of these persons live in the west. As the population in Carson City and adjacent counties increase, there will be increased recreational demands on the Carson River.

Whitewater enthusiasts tend to be young adults, with an average age between 24-54. Seventy percent are married, 65 percent hold at least a four-year college degree, and their average total household income is \$75,000 to \$125,000.

The aquatic trail can be enjoyed by a wide range of boating enthusiasts of all skill levels with emphasis on the beginner and intermediate levels. Canoeists, rafters, and inner tubers are the primary users of the Eagle Valley section. Boaters can also use open-deck and enclosed plastic kayaks. It is a good section for beginners and children to hone their river skills.



The Carson River Canyon section is appropriate for intermediate kayakers and rafters or expert canoeists with proper whitewater equipment. This section is not appropriate for beginner boaters or beginner and intermediate canoeists or due to the frequency and complexity of the rapids, the potential for large strainers (fallen cottonwood trees in the main flow of the channel), and limited access.

10.5 Tourism and Economic Impacts

The economic impacts of the availability of safe river rafting and canoeing on the Carson River will come from two areas. First, the Aquatic Trail will provide a local recreational area for local river enthusiasts. Second, it will draw overnight and out-of-town visitors to the area. Both of these types of economic impacts are difficult to quantify. An economic analysis may be performed but is outside the scope of the current study.

An economic analysis for the Truckee River Recreation Plan was conducted in 2000 and underestimated the positive economic impact of implementing improvements to the Truckee River. The results of the economic analysis predicted that river related uses would generate an economic impact of approximately \$1.9 to \$4.1 million, annually. This level of economic activity was projected to generate 33 to 67 jobs and generate tax revenues in the amount of \$123,000 to \$263,600, annually. The economic model assumptions were conservative in

terms of total use and recreational expenditures when compared to the range of expected use in the plan. The potential maximum level of use could result in a total annual economic impact to the Reno/Sparks area that is 3 to 5 times the amount estimated by the conservative model.

Whitewater rafting and kayaking may increase the number of overnight visitors and day trip visitors as well as the level of expenditures made in the local economy. The economic analysis conducted for the Truckee River Recreation Plan assumed no overnight visitors for whitewater rafting and a level of daily expenditures that is significantly less than expenditures typically made at other whitewater rafting rivers. The analysis assumed that Truckee River whitewater rafting would generate \$59 per user per day whereas the actual economic impact could be as high as \$154 per user per day.

Increasing the level of use on the Carson River will depend on a number of factors such as the willingness of the community to promote events and river use, and the overall quality of the experience as a result of the constructed facilities.

Both the Truckee and the East Fork of the Carson River are run commercially. The unique aspect of the Carson River is that it offers both whitewater and flat water paddling. Both Lyon County and Carson City could benefit from equipment rental and shuttle fees. In addition, the Truckee River whitewater park draws boaters from across the country. These boaters want to explore other local rivers and the Carson River is a natural choice.

10.6 Connectivity to Other Trails

The Carson River is currently connected with other trails with Silver Saddle Ranch, River View Park, and Ambrose Natural Area along the east side of Eagle Valley. Several existing dirt roads and proposed trails parallel the river through the Carson River Canyon. Future connectivity as envisioned in the Carson City Trails Master Plan will allow persons to walk, bike, or ride horses along sections accessible by boat to enjoy the Carson River corridor.

10.7 Liability

The Carson River is a navigable water of the State of Nevada and as such the State has sovereign capacity to the bed and bank up to the mean high water line. Above the mean high waterline, the bulk of the Carson River corridor is private property. Many private landowners have concerns regarding liability if someone gets hurt on their property. This section describes the protection provided by Nevada Revised Statute (NRS) 41.510. The complete statute text is provided in Table 10-1.

If a person engaged in recreational activities trespasses, or if such a person is given permission to use private property, private landowners are protected by NRS 41.510. Water sport activities that may require the use of private land such as portaging a dam is a type of recreational activity specifically covered by NRS 41.510 and this statute would be a “bar to recovery”. A “bar to recovery” means that a person could file a lawsuit but a trial and judgment against a landowner would be highly unlikely. This statute, however, will not protect a landowner who is responsible

for willful or malicious acts or if the landowner is charging a fee to use the property for the recreational purpose.

Under NRS 41.510:

- A landowner is not required to keep the land safe for entry or use by others for any recreational activity
- A landowner is not required to give warning of any hazardous condition, activity or use of any structure on the land to persons entering for those purposes.
- By giving permission, a landowner does not extend any assurance that the premises are safe or assume responsibility or liability for any injury to person or property caused by any act of persons to whom the permission is granted.

Even though a landowner is not required to give warning, if an owner of a diversion dam is aware of a specific hazard created by the dam then the failure to give notice could possibly be construed under NRS 41.510(3)(a)(1) as a willful or malicious failure to warn. This might be problem, for example, in the event rebar was sticking up out of a dam or some type of known but concealed hazard exists. If the dam is built and maintained according to a certain standard, such as a state standard, and the only danger is strong current and hydraulics caused by the dam, then the NRS would provide the limitation of liability.

If a dam is removed in such a way as to reduce or eliminate a potential danger then the former owner will enjoy the protection of the NRS liability limitation. If the dam is modified in a way to specifically provide a safer route then the best way to limit liability is to place a sign that one passage is safer than another. However, if signs are placed on the property, the signs must be maintained.

If a dam is modified so the resulting wave at the base of the dam is a fun place to play, then the owner is still protected by NRS 41.510. According to a 1977 Federal case decided under Nevada State law, the doctrine of attractive nuisance has not been adopted, and if there is no evidence of a willful failure to warn or guard, and no monetary payments for the access to the river, then attractive nuisance is not a concern.

Carson City will coordinate with landowners adjacent to the Anderson Dam below Carson River Road bridge and the Mexican Dam operators to consider a means of providing notice to the aquatic trail users that traveling over the dam may be a hazardous activity.

Table 10-1. Complete Text of Nevada Revised Statute 41.510

**LIABILITY OF OWNERS, LESSEES AND OCCUPANTS OF PREMISES TO PERSONS
USING PREMISES FOR RECREATIONAL PURPOSES**

NRS 41.510 Limitation of liability; exceptions for malicious acts if consideration is given or other duty exists.

1. Except as otherwise provided in subsection 3, an owner of any estate or interest in any premises, or a lessee or an occupant of any premises, owes no duty to keep the premises safe for entry or use by others for participating in any recreational activity, or to give warning of any hazardous condition, activity or use of any structure on the premises to persons entering for those purposes.

2. Except as otherwise provided in subsection 3, if an owner, lessee or occupant of premises gives permission to another person to participate in recreational activities, upon his premises:

(a) He does not thereby extend any assurance that the premises are safe for that purpose or assume responsibility for or incur liability for any injury to person or property caused by any act of persons to whom the permission is granted.

(b) That person does not thereby acquire any property rights in or rights of easement to the premises.

3. This section does not:

(a) Limit the liability which would otherwise exist for:

(1) Willful or malicious failure to guard, or to warn against, a dangerous condition, use, structure or activity.

(2) Injury suffered in any case where permission to participate in recreational activities, was granted for a consideration other than the consideration, if any, paid to the landowner by the State or any subdivision thereof. For the purposes of this subparagraph, the price paid for a game tag sold pursuant to [NRS 502.145](#) by an owner, lessee or manager of the premises shall not be deemed consideration given for permission to hunt on the premises.

(3) Injury caused by acts of persons to whom permission to participate in recreational activities was granted, to other persons as to whom the person granting permission, or the owner, lessee or occupant of the premises, owed a duty to keep the premises safe or to warn of danger.

(b) Create a duty of care or ground of liability for injury to person or property.

4. As used in this section, "recreational activity" includes, but is not limited to:

(a) Hunting, fishing or trapping; (b) Camping, hiking or picnicking; (c) Sightseeing or viewing or enjoying archaeological, scenic, natural or scientific sites; (d) Hang gliding or paragliding; (e) Spelunking; (f) Collecting rocks; (g) Participation in winter sports, including riding a snowmobile, or water sports; (h) Riding animals or in vehicles; (i) Studying nature; (j) Gleaning; (k) Recreational gardening; and (l) Crossing over to public land or land dedicated for public use.

(Added to NRS by 1963, 799; A 1971, 192; 1973, 898; 1981, 157; 1991, 185, 2156; 1993, 1191; 1995, 54, 790)

10.8 River Safety

Persons can safely use the Carson River Aquatic Trail by following standard river safety guidelines. American Whitewater has developed a set of comprehensive guidelines, a copy of which is provided in the Appendix. The mission of American Whitewater is to conserve and restore America's whitewater resources and to enhance opportunities to enjoy them safely. The safety code was prepared using the best available information and has been reviewed by a broad cross-section of whitewater experts. The code is a collection of guidelines for individuals to avoid and minimize their risks and river accidents.

River accidents and deaths are tracked by the American Whitewater Safety Committee and statistics and accident details area available on their web page at www.americanwhitewater.org/content/Safety/. Since 2000, the number of whitewater fatalities nationwide has ranged between 30 and 58 per year. The majority of these fatalities (78) have occurred in California. Between 1975 and 2005, two fatalities were reported in Nevada. In 2006 through May, there were three reported whitewater fatalities in the western states. One of these was on a Class V river and two were on Class III rivers with high water and the victims came out of their boats and were drowned by strainers (thick tree branches in the river current).

Both the Lyon County and the Carson City Fire Departments respond to calls for help in and along the Carson River through Carson River Canyon. Certain response units have specialized training and equipment to help river accident victims.

The Carson City Fire Department personnel are trained to the awareness level and are in the process of obtaining the operations level of training. The operations level of training is the industry standard. There are two higher levels of training available to firefighters—Technician and Specialist.

The Central Lyon County Fire Department personnel are trained to the awareness level. There are no current plans for additional training. The Lyon County Sheriff's Search and Rescue has a division located in Dayton and provides training for boat and water rescue.

10.9 Proposed Aquatic Trail Components—Needs, Opportunities and Constraints

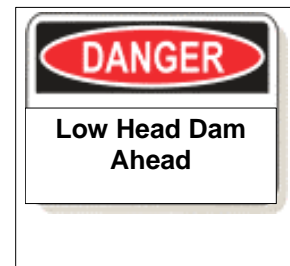
The primary drivers for improvements to the Carson River Aquatic Trail are public health and safety and respect for private property are. Each of these needs, as well as opportunities for improvements are described below.

1. Public Safety Improvements

Public awareness must be raised regarding all aspects of river safety and navigation. Every year, there are abandoned rubber, plastic, wooden or metal boats found in the eddies and rocky rapids in Carson River Canyon. This is evidence that persons without the proper training and equipment attempt to boat through the canyon. Public safety can be improved through signage, in-stream hazard reduction, and public education as described below.

A. Signage

- ☞ **River information signs:** These signs include “you are here” maps with information regarding the river, access, safety, private and public land locations along the river. They may also have information regarding natural, historical and/or cultural resources. These signs would be placed at all river access points.
- ☞ **Staff Gauge:** A staff gauge could be affixed to the bridge abutment at Deer Run Road that indicates the river flow level.
- ☞ **Guideposts:** Small signs to mark points of interest.
- ☞ **Direction signs:** On-street signs to direct people to river access areas.
- ☞ **River access signs:** Identify river access points and parking areas
- ☞ **Dam and river safety signage:** Bold visible signs upstream of hazard areas such as:
 - Hazards ahead. Advanced skills required
 - Low Head Dam Ahead
 - Rafts and kayaks only beyond this point
 - Submerged hazards above and below dams
 - Strong unpredictable currents above or below the dam
 - Dangerous reverse currents below dams



B. In-Stream Hazard Reductions

- ☞ **Strainer removal:** Strainers periodically obstruct the main flow of the channel in both river sections and should be cut and removed.
- ☞ **Coordinated river cleanup:** There are car bodies and other large appliances dumped along the edge of the river through Carson River Canyon.



- ☞ **Rock diversion alteration:** The private diversion dam downstream of Carson River Road should either be altered to allow safer passage by canoes or signed to warn boaters of the hazard. The existing dams are illustrated by Figures 3 and 4 for Anderson Dam in Carson City and and Ophyr Dam (Dayton Valley Dam) in Lyon County.



Figure 3. Anderson Dam from Carson River Road



Figure 4. Ophyr Dam

C. Public Outreach

- 📄 **River Safety Education:** River safety education should be expanded through classes for kids and adults in a river setting.
- 📄 **River Map Publication and Distribution:** The river map with the river safety information will assist recreationists in understanding river hazards.
- 📄 **River Guidebook Publication:** A river guidebook would be a companion to the river map with detailed physical, historical, and cultural information.
- 📄 **Public Service announcements and news articles:** Public service announcements and news articles can help with public awareness especially during high flows in the spring. Information should include the following key messages:
 - Be aware of cold, swift water
 - Always wear a personal floatation device when near water
 - Never boat alone
 - Never fish alone when near a dam
 - Never boat on a section of river unless you know what the difficulty level is and you have the proper equipment and training
 - Never swim near a dam or rock diversion
 - Always heed and obey warning signs



2. River Access Improvements

River access improvements are needed to minimize impacts to the natural environment and avoid conflicts with private landowners.

- 📄 All formal river access areas need the following:
 - **Trashcans:** Trash cans reduce the amount of litter along the river.
 - **Restrooms:** Restrooms are essential in maintaining sanitary conditions at high use areas such as put-in and take-out locations.
 - **Defined parking areas:** Defined parking and river access will minimize vegetation trampling.
 - **Sign-In/Out Register:** The river put-in locations should have a sign-in register. The Take-out locations should have sign-out registers for comments.
- 📄 Coordination with Lyon County is necessary to ensure a safe, reliable take-out area for the Carson River Canyon Class III run at the Santa Maria Ranch.
- 📄 **Improvements to the Morgan Mill Road river access point:** The Morgan Mill Road river access point is difficult to see from the river and difficult to use because the river current is very swift near shore. This river access area can be improved through vegetation management and rock placement to create a larger eddy along the shore.

3. Natural Resource Management Improvements

Weed invasions present a major concern for the Carson River function and values for native species, species diversity, recreation, and water availability. Russian olive, tamarisk, and white top are invasive species that take over where native vegetation such as willow would naturally occur along the river. Carson City and Lyon County should coordinate with the Nevada Cooperative Extension, Nevada Division of Forestry and private landowners in developing a weed management program for the Aquatic Trail corridor.

4. Regional Coordination and Partnership Improvements

- ☞ Private, public, and local coordination is needed to improve public safety and river hazard awareness.
- ☞ Regional coordination is needed to provide a minimum of one area to stop and rest within the scenic Carson River Canyon. This area could be within Carson City or Lyon County.
- ☞ Coordinate with local civic groups in conducting an annual river clean-up day.

10.9.1 Cost Estimates

The cost estimates below are provided for projects within both Carson City and Lyon County. The Aquatic Trail traverses between the two counties and will only be complete when both counties implement the needed improvements. General low and high cost estimates for hard structures are provided to guide planning. Costs were not estimated for coordination and land acquisition.

AQUATIC TRAIL IMPROVEMENTS ESTIMATED COSTS—CARSON CITY

| Item | # | Low Cost (each) | Low Total | High Cost (each) | High Total | Note/Location |
|---|---|-----------------|-----------------|------------------|------------------|------------------------------|
| SIGNAGE | | | | | | |
| River information | 3 | \$500 | \$1500 | \$2,000 | \$6,000 | At each river access area |
| Staff Gauge | 1 | \$500 | \$500 | \$1,000 | \$1,000 | At Deer Run Road |
| Guideposts and hazard signs | 1 | \$100 | \$100 | \$300 | \$300 | Morgan Mill |
| | 1 | \$100 | \$100 | \$300 | \$300 | Anderson Diversion |
| | 1 | \$100 | \$100 | \$300 | \$300 | Deer Run Road Bridge |
| Street sign | 3 | \$100 | \$300 | \$300 | \$900 | At each river access area |
| Access sign | 3 | \$100 | 300 | \$300 | \$900 | At each river access area |
| Subtotal: | | | 2,900 | | \$9,700 | |
| STREAM HAZARD REDUCTION | | | | | | |
| Strainer removal | 2 | \$100 | \$200 | \$500 | \$1,000 | As needed |
| River clean-up | 1 | \$0 | \$0 | \$100,000 | \$100,000 | As needed |
| Rock diversion alteration | 1 | \$500 | \$500 | \$25,000 | \$25,000 | Anderson Dam |
| Subtotal: | | | \$700 | | \$126,000 | |
| PUBLIC OUTREACH | | | | | | |
| River Safety Education | | | Varies | | Varies | |
| River Map Publication | | | Varies | | Varies | |
| River Guidebook Publication | | | Varies | | Varies | |
| Public Service Announcements | | | Varies | | Varies | |
| RIVER ACCESS IMPROVEMENTS | | | | | | |
| Trash cans | 2 | \$500 | \$1,000 | \$2,000 | \$4,000 | BLM / Morgan Mill |
| Restrooms | 2 | \$10,000 | \$20,000 | \$75,000 | \$150,000 | BLM / Morgan Mill |
| Defined parking & river access | 2 | \$3,000 | \$6,000 | \$10,000 | \$20,000 | BLM / Morgan Mill |
| Sign-in Registers | 3 | \$500 | \$1,500 | \$2,000 | \$6,000 | At each river access area |
| Subtotal: | | | \$28,500 | | \$180,000 | |
| MAINTENANCE | | | | | | |
| Annual maintenance | | | | | \$2,500 | Along river and access areas |
| Grand Total Estimated Costs—Carson City: | | | \$32,100 | | \$318,200 | |

AQUATIC TRAIL IMPROVEMENTS ESTIMATED COSTS—LYON COUNTY

| Item | # | Low Cost Each | Low Total | High Cost Each | High Total | Note/Location |
|---|---|---------------|-----------------|----------------|------------------|--------------------------------------|
| SIGNAGE | | | | | | |
| River information | 1 | \$500 | \$500 | \$2,000 | \$2,000 | “you are here” at Santa Maria Ranch |
| Guideposts & hazard signs | 1 | \$100 | \$100 | \$300 | \$300 | Ophyr Dam |
| | 1 | \$100 | \$100 | \$300 | \$300 | At Santa Maria Ranch |
| Street sign | 1 | \$100 | \$100 | \$300 | \$300 | At river access area at Highway 50 |
| Access sign | 1 | \$100 | \$100 | \$300 | \$300 | At river access area in neighborhood |
| Subtotal: | | | \$900 | | \$3,200 | |
| STREAM HAZARD REDUCTION | | | | | | |
| Strainer removal | 2 | \$100 | \$200 | \$500 | \$1,000 | As needed |
| Rock diversion alteration | 1 | \$1,000 | \$1,000 | \$25,000 | \$25,000 | Ophyr Dam |
| River clean-up | 1 | \$0 | \$0 | \$100,000 | \$100,000 | Length of River |
| Subtotal: | | | \$1,200 | | \$126,000 | |
| PUBLIC OUTREACH | | | | | | |
| River Safety Education | | | Varies | | Varies | |
| River Map Publication | | | Varies | | Varies | |
| River Guidebook Publication | | | Varies | | Varies | |
| Public Service Announcements | | | Varies | | Varies | |
| RIVER ACCESS IMPROVEMENTS | | | | | | |
| Trash cans | 1 | \$500 | \$2,000 | \$2,000 | \$2,000 | |
| Restrooms | 1 | \$10,000 | \$10,000 | \$75,000 | \$75,000 | |
| Defined parking & river access | 1 | \$3,000 | \$3,000 | \$10,000 | \$10,000 | |
| Sign-out/comment register | 1 | \$500 | \$500 | \$2,000 | \$2,000 | |
| Subtotal: | | | \$15,500 | | \$89,000 | |
| MAINTENANCE | | | | | | |
| Annual maintenance | | | | | \$2,500 | Along river and access areas |
| Grand Total Estimated Costs—Lyon County: | | | \$17,600 | | \$218,200 | |

10.10 Funding Opportunities for Implementation and Maintenance

There are a myriad of funding solutions for implementation of recreational improvements. This section describes some potential funding sources and mechanisms.

Question 1 Funds: \$10 million is earmarked for recreation, restoration and enhancement projects on the Carson River corridor. All Question 1 funds must be sold to projects by November 5, 2008. Some projects may continue to see reimbursements as late as 2011. All bond funds sold are to be expended within three years of issuance. For this reason, projects that are deemed ready to implement should rank higher to insure timely expenditure of funding.

Nevada Department of Wildlife: The Nevada Department of Wildlife (NDOW) can work through their federal aid program to procure grants and funds. The funding available depends on the scope of the project. Habitat and access improvements would be eligible for funding.

Concessionaire Fees: In order to pay back improvements made to the Yampa River, the county instituted a “per-head” tax on the river equipment concessionaires. The park paid for itself within the first year and subsequent funds allowed the county to increase the maintenance and development of other recreation facilities. A similar fee could be imposed on Carson River concessionaires for equipment rental or guided river trips.

Donations: In Farmington, New Mexico, a significant percentage of the annual city budget was devoted to construction of their whitewater park. The total park costs should have been \$300,000 but because of donated labor and materials it cost \$60,000.

General Funds, Capital Funds, and Redevelopment Funds: Cities such as Vail, Colorado, Farmington, New Mexico, and Boulder, Colorado paid for their river parks and improvements with capital funds. Carson City could potentially use city funds to partially pay for improvements.

⊃ GRANTS

Recreation Trails Program: Nevada State Parks administers the Recreational Trails Program in Nevada by awarding grants to successful applicants each year, on a competitive basis. Applicants may apply for up to \$100,000; a minimum 20% match is required for each trail project. Funding may be used to construct new trails, enhance existing trails, build trailside facilities, as well as to modify and remove dams. Eligible applicants include individuals, private organizations, municipal, county, and State and Federal government entities.

Land and Water Conservation Fund (L&WCF) Program: The Land and Water Conservation Fund Act of 1965 is a federal program that provides matching grants to states and through the states to local governments for the acquisition and development of public outdoor recreation areas and facilities. The L&WCF assistance is provided on a 50/50 matching basis to individual projects. These projects are submitted through the state liaison officer to the National Park Service for approval. There have been 240 projects funded by L&WCF since 1965.

3 PRIVATE FOUNDATIONS

The Conservation Fund: The Conservation Fund forges partnerships to protect America's legacy of land and water resources. Through land acquisition, community initiatives, and leadership training, the Fund and its partners demonstrate sustainable conservation solutions emphasizing the integration of economic and environmental goals. Access and trails, including river trails, are types of projects that would match well with the goals of the Fund.

American Conservation Association, Inc.: Grants from \$5,000 to \$40,000 in areas including the environment, conservation of natural resources and recreation.

The William T. Kemper Foundation: Grants from \$1,000 to \$50,000 in areas including community development, the environment and recreation.

The William Kenney Watershed Protection Foundation: Grants from \$5,000 to \$15,000 in areas including work to protect rivers in the western United States.

The Union Pacific Foundation: UP concentrates its support in communities where the company has significant operations (including Nevada) and provides grants in areas related to natural resources and the environment among other things.

David and Lucile Packard Foundation: Grants up to \$300,000 (based on previous grantees) to nonprofits in areas including conservation and the community.

Watershed Protection Foundation: Grants from \$7,500 to \$15,000 to 501(c)3 organizations that seek to protect river ecosystems in the west.

Power Bar Inc. Direct Impact on Rivers and Trails (DIRT) Grants: Grants from \$1,000 to \$5,000 for projects that create, maintain, improve or restore access to valued recreational areas.

REI Community Recreation Grants: Grants range from \$500 to \$5,000 (financial support or REI-crafted gear) to nonprofit organizations for support of recreation opportunities linked to muscle-powered recreational activities.

DRAFT

Appendix A

Guidelines for Safe River Kayaking