

NEVADA DEPARTMENT OF WILDLIFE
STATEWIDE FISHERIES MANAGEMENT



FEDERAL AID JOB PROGRESS REPORTS

F-20-48
2012

EAST FORK AND MAIN STEM CARSON RIVER
WESTERN REGION



**NEVADA DEPARTMENT OF WILDLIFE, FISHERIES DIVISION
ANNUAL PROJECT REPORT**

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**NEVADA DEPARTMENT OF WILDLIFE, FISHERIES DIVISION
ANNUAL PROGRESS REPORT**

State: *Nevada*
Project Title: *Statewide Fisheries Program*
Job Title: *East Fork and Main Stem Carson Rivers*
Period Covered: *January 1, 2012 through December 31, 2012*

SUMMARY

The average snow-water equivalent for the Carson River Basin was 40.3% of average on April 1, 2012, according to the Natural Resource Conservation Service SNOTEL sites. Despite a low percentage, high and turbid flows were observed briefly in the spring.

In the spring, fingerling brown trout were stocked in the upper East Carson River and brown and rainbow trout near Ruhenstroth Dam throughout the spring and summer. Stocking the upper East Carson River was conducted during high flow and many of the fingerling brown trout were likely washed downstream.

Mail-in angler questionnaire data from 2011 estimated that 779 anglers spent 6,172 days to catch 11,568 fish on the Main Stem Carson River. It was estimated that 1,173 anglers spent 10,065 days to catch 28,774 fish on the East Fork Carson River.

The High Sierra Fly Casters (HSFC) approached NDOW with an interest in changing the Fisheries Management Concept in the East Carson River to designate it as a "Trophy" fishery in hopes that the designation would improve the fishery. They purchased five HOBO temperature loggers to examining if temperature was the limiting factor to trout survival. In addition to monitoring temperature, macroinvertebrates were collected, and electrofishing surveys were conducted.

BACKGROUND

Carson River headwaters originate in Alpine County, California, but approximately 85% of the watershed lies in Nevada. The East Fork begins near Sonora Pass and the West Fork begins below Carson Pass where several small streams merge. The confluence of the East and West forks is in Carson Valley, and from there the main stem travels northeast through Carson City and Dayton Valley until impounded by Lahontan Reservoir. Flows from the reservoir are controlled for downstream irrigation of the Lahontan Valley and water is also diverted into Stillwater Wildlife Management Area. The river terminates in the Carson Sink. The predominant use of water is for agriculture, however, urban development in Minden, Gardnerville, Carson City, and Dayton contributes to the river's use.

The Carson River is wide, shallow, and lacks a riparian canopy. During low water years, escape habitat for fish may exist in very deep pools along the upper river. The

fishery experiences high spring runoff, high suspended solids during runoff events, and low summer flows resulting in high summer water temperatures. The primary limiting factor of the trout fishery is warm summer water temperatures.

NDOW manages the East Carson River to the Mainstem Carson River as a put-and-take fishery, meaning management is directed toward creating fishing opportunities where limited opportunity would normally exist. Fishing regulations are consistent along the entire length of the East Fork and Main Stem of the Carson River and anglers are allowed 5 trout, 10 mountain whitefish, and 15 warmwater game of which not more than 5 may be walleye and 5 may be black bass.

Stocking plays a vital role in maintaining this fishery as carryover of trout is only observed during years with average or above average precipitation. Stocking usually occurs in spring and fall. During the summer, temperatures are generally too high for trout survival, particularly in the reaches below Carson City. In these areas, warmwater species including smallmouth bass, green sunfish, and carp provide the most angling opportunity.

OBJECTIVES

General Management Objectives:

- Conduct a general fisheries assessment through opportunistic angler contacts and mail-in, angler questionnaire data.
- Conduct a pre-stocking evaluation of road conditions, water flows, and turbidity.

Study Specific Objectives:

- Install temperature monitoring data loggers in at least three locations along the East Fork Carson River above Gardnerville.
- Monitor water flows via USGS gauge number 10309000 located on the East Fork Carson River near Gardnerville.
- Conduct electrofishing in three historical locations using either a backpack or tote-barge (method is dependent on water flows during the fall).
- Monitor aquatic invertebrate populations using the kick sample method at three established locations along the East Fork Carson River above Gardnerville.
- Conduct hook and line surveys to determine if carry over fish are present, particularly rainbow, brown, and whitefish.

PROCEDURES

General Management Objectives:

Conduct a general fishery assessment through opportunistic angler contacts and mail in, angler questionnaire data. Roving creel was conducted on four days during September, May, and June and 11 anglers were interviewed.

Mail-in angler questionnaires were sent out at the end of 2011 to 10% of anglers purchasing a Nevada fishing license. That data was summarized and estimated the number of anglers, days spent fishing, and number of fish caught.

Conduct a pre-stocking evaluation of road conditions, water flows, and turbidity; stock hatchery trout. A pre-stocking evaluation of road conditions was conducted during the spring to ensure that access would be adequate for fish trucks to reach stocking sites. A general observation of trout habitat suitability (flows, turbidity, and temperature) determined if stocking was appropriate.

Hatchery trout were stocked using a small fiberglass tank secured in the back of a four wheel drive truck. The lower East Carson River was stocked near Ruhenstroth Dam from spring through fall.

Study Specific Objectives:

Install temperature monitoring data loggers in at least three locations along the East Fork Carson River above Gardnerville. On May 10, 2012, HOB01 was deployed and on May 25, 2012, HOB0 2 through 5 were deployed to document temperatures throughout the summer on the upper East Fork Carson River. On July 1, HOB0 1 and 2 were missing. The remaining HOB0 loggers were renamed HOB0 1 through 3 and a greater effort was made to conceal them.

HOB0 loggers were placed in deep pools so that they remained covered with water for the entire season and collected the coolest water temperatures possible. Depths of HOB0 1 through 3 upon deployment were 1.3 m (4.2 ft), 1.1 m (3.6 ft), and 0.8 m (2.62 ft), respectively. GPS coordinates for HOB0 1 through 3 are presented in Table 1 and Attachment 1. Coordinates are in UTM UPS NAD83.

Table 1

HOB0 Locations

HOB01	California/Nevada border	11S 0266166 4297271
HOB02	Bryant Creek confluence	11S 0265700 4298309
HOB03	Island	11S 0316661 4327509

Steel pipe, cables and stakes were used to protect and secure the HOB0 loggers while instream (Attachment 2). Data was downloaded and loggers re-secured on July 1, August 9, September 7, and October 16, 2012.

Monitor water flows via USGS gauge number 10309000 located on the East Fork Carson River near Gardnerville. East Carson River flows were obtained from USGS gauge number 10309000 located on the East Carson River near Gardnerville, using the USGS real-time data web interface system.

Conduct electrofishing at three historical locations using either a backpack or tote-barge depending on water flows during the fall. Fish were sampled during a single pass survey of three transects on October 16, with tandem Dirigo backpack electroshockers. Transects were located at the California/Nevada border, Sheep Bridge, and Apple Orchard on the upper East Fork Carson River (Table 2) and were 230, 250, and 300 meters in length, respectively. Transect lengths was based on sampling four pools and riffles.

Table 2

Electrofishing Locations

T1	California/Nevada boarder	11S 0265690 4296737
T2	Apple Orchard	11S 0265700 4298309
T3	Sheep Bridge	11S 0266166 4297271

Temperature and conductivity were collected using a YSI 600 XL water quality analyzer after the unit was calibrated. Dirigo backpack electroshockers using pulse DC was used at varying amperage depending on the fish’s reaction. The total number of seconds spent electrofishing was recorded at each transect. Fork length was measured on all fish except speckled dace, they were counted after 50 individuals were measured at each transect. Trout were inspected for indication of hatchery origination.

Monitor aquatic invertebrate populations using the kick sample method at three established locations along the East Fork Carson River above Gardnerville. For the purpose of this study, data available on macroinvertebrates in the E. Carson was evaluated in order to determine the adequacy of the food base for fish. Information on macroinvertebrates in the East Carson River was collected in depth by Leppo and Bressler of Tetra Tech, Inc for the Nevada Department of Environmental Protection (NDEP).

Conduct hook-and-line surveys to determine if carryover fish are present, particularly rainbow, brown, and whitefish. Hook-and-line surveys were conducted on the upper East Fork Carson River on three occasions for a total of two hours. Fish were measured and noted for hatchery origination.

FINDINGS

General Management Objectives:

Conduct a general fishery assessment through opportunistic angler contacts and mail in, angler questionnaire data. There were 11 anglers interviewed that spent 29 hrs to catch 35 fish for a catch rate of 1.21 fish per hour. Of the fish observed, 25 were rainbow trout and 10 were brown trout; average size was 223 mm (8.8 in).

The 2011 mail-in, angler questionnaire data for the Main Stem Carson River estimated anglers had an average catch rate of 1.87 fish per angler day. It was estimated that 779 anglers spent 6,172 days to catch 11,568 fish. For the East Fork Carson River, anglers had an average catch rate of 2.86 fish per angler day. It was estimated that 1,173 anglers spent 10,065 days to catch 28,774 fish. Under its current management as a Put-and Take Fishery, the angler success rate should range between 1.0 and 2.0 fish per angler day. The 2011 angler questionnaire data suggests that angling goals were exceeded for the East Fork, while the Main Stem met expectations for angler success.

Conduct a pre-stocking evaluation of road conditions, water flows, and turbidity; stock hatchery trout. A pre-stocking evaluation of flows and turbidity was conducted on the lower East Fork Carson River in March; however, an evaluation was not conducted on the upper East Fork Carson River because of the urgency of the hatchery to stocked fish. There were 43,137 fingerling brown trout stocked in March near the state line. High flows likely washed stocked fingerlings a considerable distance downstream.

The lower East Carson River near Ruhensroth Dam was stocked from spring through August. Table 3 summarizes all fish stocked into the Carson River during 2012.

Table 3

2012 East Fork Carson River Stocking Summary

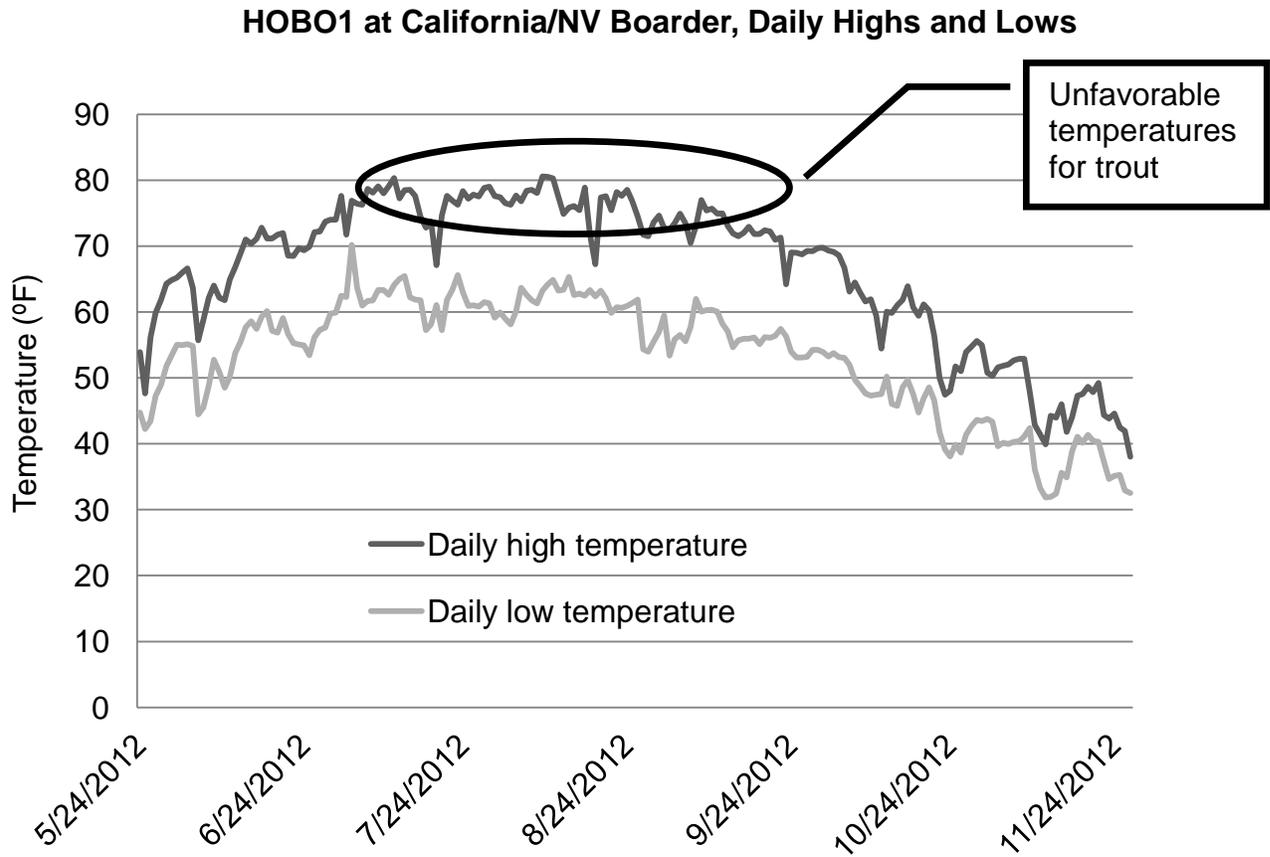
Date	Species	Strain	Number	Pounds	Size (in)
3/21/2012	RB	EAGLE LAKE	1,499	602	10.0
3/30/2012	BN	SHEEP CREEK	31,835	114	2.1
3/30/2012	BN	SHEEP CREEK	11,302	40	2.1
4/25/2012	BN	SHEEP CREEK	3,502	1,536	10.3
6/22/2012	RB	EAGLE LAKE	2,151	900	10.2
6/26/2012	RB	EAGLE LAKE	1,719	785	10.5
6/26/2012	BN	SHEEP CREEK	2,664	1,200	10.4
6/26/2012	BN	SHEEP CREEK	2,975	1,340	10.4
8/15/2012	RB	EAGLE LAKE	880	400	10.4
		TOTAL	58,527	6,917	

Study Specific Objectives:

Install temperature monitoring data loggers in at least three locations along the East Fork Carson River above Gardnerville. Placement of the HOBOS in May was successful. Figures 1 through 3 show temperature data gathered by the HOBOS data loggers.

Temperatures from HOB01 (California/Nevada border) were the lowest of all of the loggers. HOB01 was the most upstream logger in the system and was also located in the deepest pool. By mid June, high diel temperatures exceeded 70°F; by late June, temperatures reached the mid to high 70's (°F) and remained there until September. The high temperature observed at this location was 80.6°F on August 8 (Figure 1).

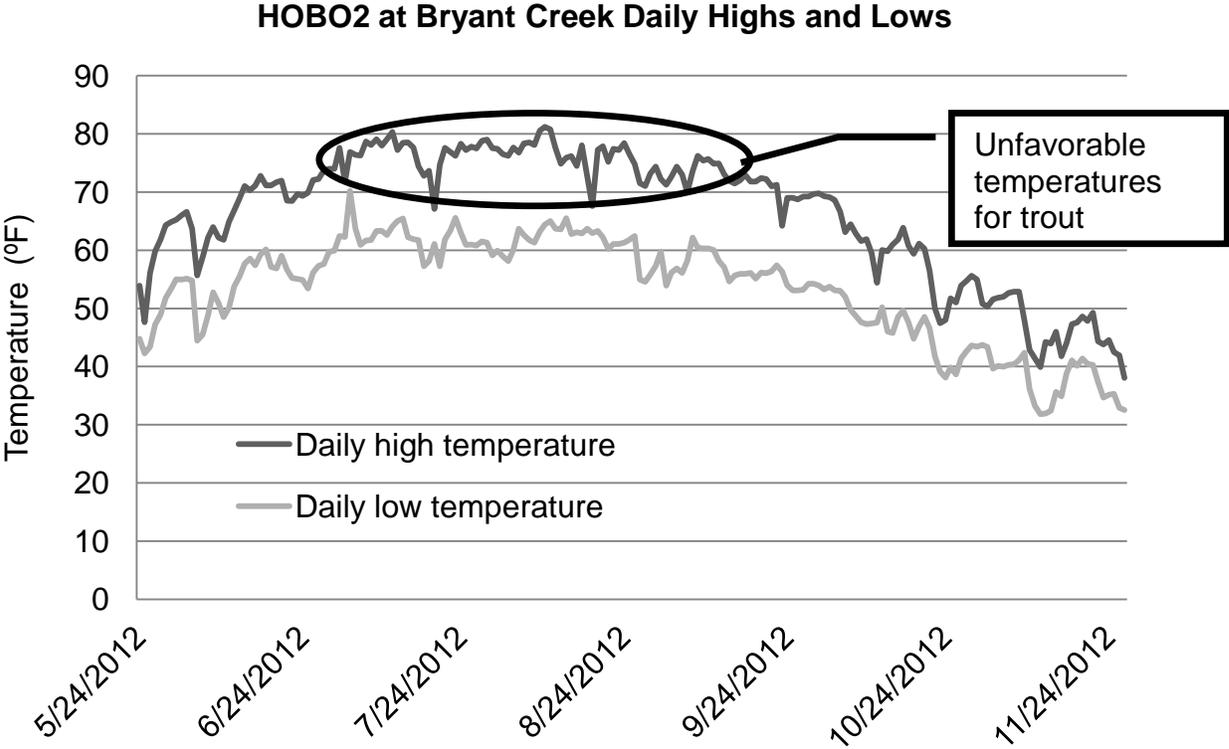
Figure 1



Temperatures from HOB02 (Bryant Creek) were slightly higher than temperatures from HOB01. Beginning in mid June, high diel temperatures exceeded 70°F; by late June, temperatures reached the mid to high 70's and remained there until September. The high temperature observed at this location was 81.2°F on August 9, 2012 (Figure 2).

Temperatures from HOB03 (Sheep Bridge) were similar to HOB0s 1 and 2, but again slightly higher. The higher temperatures could be partially attributed to the position of HOB03 higher in the water column than HOB0s 1 and 2. The high temperature at HOB03 was 82.1°F (Figure 3).

Figure 2



Temperatures logged at all three locations indicated that trout are exposed to high summer temperatures during low water years. Diel temperature fluctuations exist, allowing some relief from the high temperatures on most days; however, during one 24 hr period, low diel water temperature did not drop below 70°F. Deep pools provide some escape habitat for a small number of large salmonids. Given that the data loggers were placed in the deepest pools in the area, it is unlikely that most trout are capable of holding over when a low water year occurs.

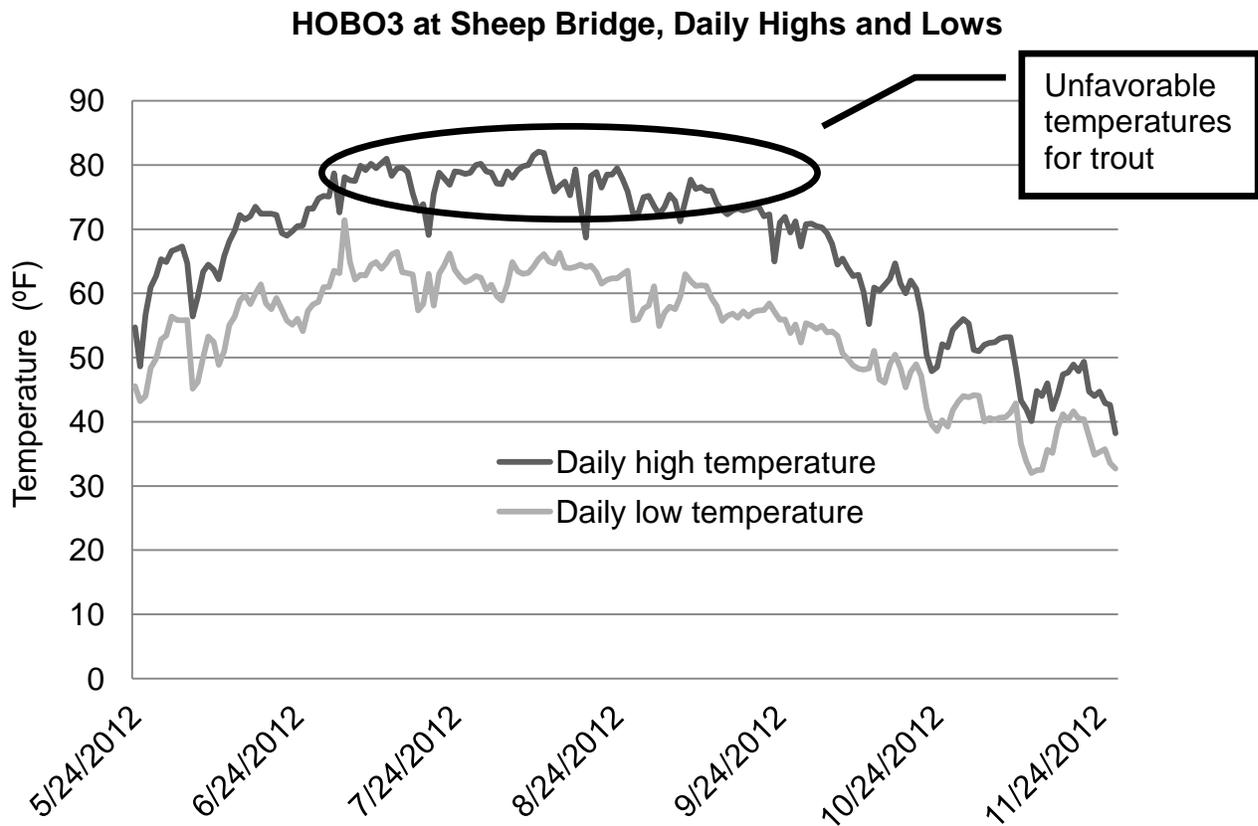
Temperatures and escape habit limit the fishery on the Carson River, especially in the lower section, but this study showed that upper East Fork Carson River is also limited in low water years.

Monitor water flows via USGS gauge number 10309000 located on the East Fork Carson River near Gardnerville. Flow exceeded 1,000 cfs for only four days in April, peaking at 1,670 cfs. Summer flows were meager and by October a low flow of 35 cfs was observed. This year's flow is shown in Figure 4, along with one average and one above average water year, observed in 2010 and 2011, respectively (Figure 4).

Conduct electrofishing in three historical locations using either a backpack or tote-barge electroshocker depending on water flows during the fall. For this survey, the total effort expended was 88.15 min covering 780 m of river. Water

temperature was 54°F, 61.6°F, and 64.5°F at T1 through T3, respectively. The increase in temperature was due to increasing ambient temperature. Conductivity was about 160 $\mu\text{S}/\text{cm}$ at all three transects.

Figure 3



Electroshocking was successful in determining population composition of the East Carson River fishery in 2012 (Figure 5). However, low flows forced the use of backpack shockers rather than the tote barge, resulting in many fish being missed. Because of this, abundance was not estimated. In addition, no large fish were netted.

There was a total of 272 fish captured. A small number of salmonids represented the catch partially because backpack shockers were used and partially because low flow conditions created limitations on trout survival.

Eight brown trout were observed, five catchable and three fingerlings. The largest brown trout was 320 mm (12.5 in). Three catchable browns were from the hatchery and two were either stocked as fingerlings or were wild. Origination of the fingerlings was also unclear. It is difficult to distinguish browns stocked as fingerlings from those spawned in the wild because fin wear from the hatchery is often quickly regenerated.

Figure 4

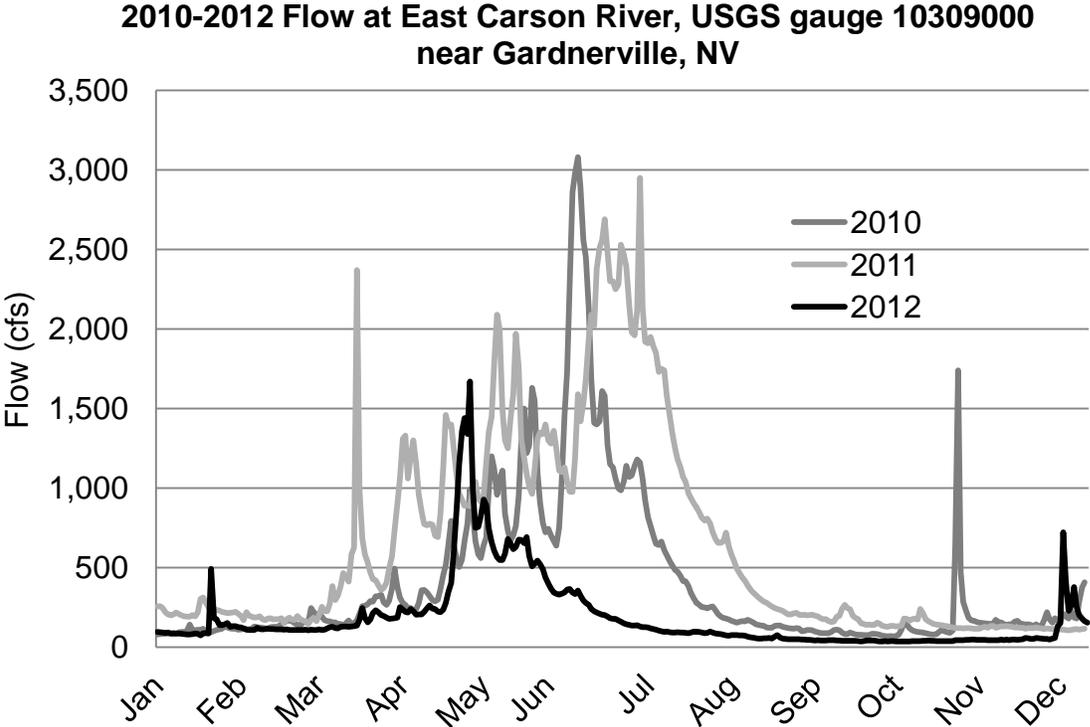
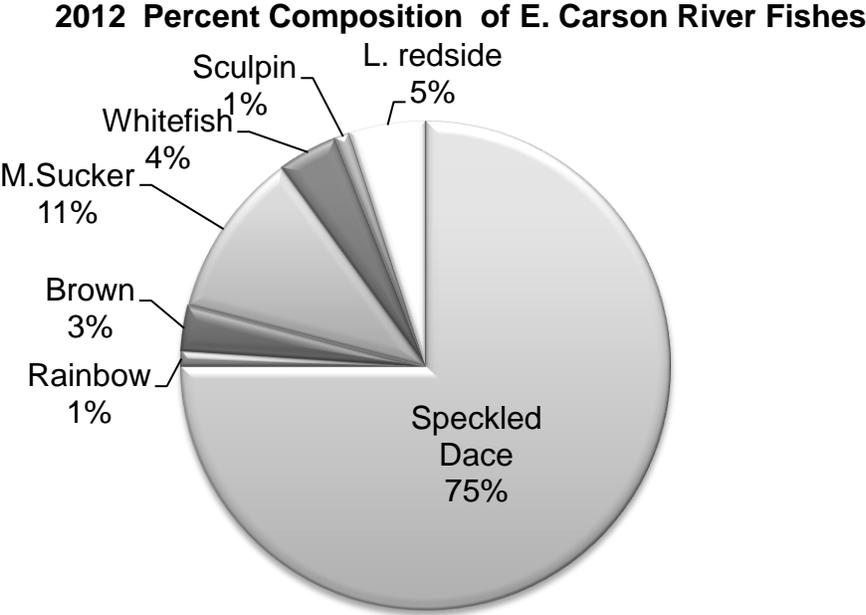


Figure 5



Two wild rainbow trout were observed, one catchable and one fingerling. The rainbow fingerling was captured at the California/Nevada border, indicating some reproduction. The adult was 282 mm (11.1 in).

Larger trout were observed escaping the electric field near the deepest pools, some appeared large enough to have held over from the prior year. Observations of large fish escaping were not numerous and it was difficult to quantify holdover of trout.

Mountain whitefish were the most numerous salmonid; one adult and 10 fingerlings, indicating successful spawning recruitment. The presence of whitefish and sculpin were indicators of good water quality. An abundance of forage fish was also observed.

Monitor aquatic invertebrate populations using the kick sample method at three established locations along the East Fork Carson River above Gardnerville. NDEP established the Nevada Multimetric Index (NVMMI) as a tool to assess biological integrity of Nevada's rivers using macroinvertebrates. The NVMMI utilizes attributes such as taxa richness, number of individuals in a particular taxa group or ecological categories, sensitive or insensitive taxa, observed feeding mechanisms, and the presence of essential habitat elements to rate the macroinvertebrates. The overall abundance and richness within the E. Carson River system was rated as fair as defined in the NVMMI (Leppo and Bressler, 2007). Based on those results, the benthic macroinvertebrate population provides an adequate food base for the predatory fish in the E. Carson River community.

Conduct hook-and-line surveys to determine if carryover fish are present, particularly rainbow, brown, and whitefish. Hook-and-line sampling efforts produced two brown trout and two rainbow trout in 2 hrs, yielding a catch rate of 2 fish per hour. The trout were all less than 305 mm (12 in) and appeared to be wild, carried over trout. Hook-and-line sampling was conducted in spring and early summer, before low flow conditions, indicating holdover from 2011.

MANAGEMENT REVIEW

The East Carson River fishery is severely limited under low flow conditions by high water temperatures caused by the wide, shallow river channel and lack of adequate vegetative cover. Carryover of trout is observed along the upper east fork during years of average or above precipitation, however, very little or no carryover occurs otherwise.

Trout fishing along the East Fork Carson River, particularly upstream of Gardnerville, has remained consistent throughout the years. When a "wet cycle" occurs for a few consecutive years, fishing improves as trout are able to carryover and reproduce. During drought cycles, fish are not able to survive the low flow and high temperatures so fishing declines.

The HSFC proposed that a change in regulations and designation of the water as a “Trophy” fishery may be helpful in improving the fishery. The HSFC donated five HOBO temperature monitoring devices and provided volunteers to help with the study. In order to provide the justification to change the regulations, the potential to meet requirements for a “Trophy” fishery were evaluated. Designation of a management concept is determined based on the biological potential that an individual fishery has based on current conditions. Guidelines for “Trophy” designation as defined by NDOW’s Fishery Management Concepts are stated as follows:

Exceptional growth potential and providing “trophy” or “memorable” sized fish. A water that produces an occasional trophy fish is not necessarily a trophy fishery unless this is the management objective for that water. A trophy fishery provides a significant portion of the harvest as a fish of a size most anglers remember catching, while a trophy fish is one of a size worth acknowledging. Sustained carryover of a fish from one season to another for a significant portion of the population and exceptional fish growth potential are generally characteristics of a trophy fishery. Special regulations may be necessary to reduce mortality on smaller fish being released by anglers. Minimum size for trout should be 16 inches, with a significant percentage reaching 24 inches or approximately 5 pounds. Angler success rates should range between 0.5 and 1.7 fish per hour and 0 to 1.0 fish per angler day.

It is easy to see why HSFC expressed an interest in improving this fishery, the mail-in surveys reflect a great deal of successful use in 2011, which is indicative of the upper east fork in good water years. However, 2012 and 2013 mail-in surveys should reflect a decline of the fishery based on this low water year.

This basic habitat study, aimed at evaluating water temperature, flows, reproductive and escape habitat, food source and food availability, was helpful in determining limiting factors for the East Fork Carson River above Gardnerville. Based on these findings, it is unlikely that the East Fork Carson River will, under current conditions, meet the guidelines established in the NDOW Fisheries Management Concepts for a designation greater than “Put-and-Take,” if for no other reason than the high water temperatures observed during this first year of the fishery study. Because results of electrofishing surveys did not produce enough data to quantify carryover during this low water cycle, more data will be necessary to help solidify the decision to maintain the fishery under the current management concept.

RECOMMENDATIONS

General Management Objectives:

- Conduct a general fishery assessment through opportunistic angler contacts and mail in, angler questionnaire data.
- Conduct a pre-stocking evaluation of road conditions, water flows, and turbidity.

Study Specific Objectives:

- Install temperature monitoring data loggers in at least three locations along the East Fork Carson River above Gardnerville.
- Monitor water flows via USGS gauge number 10309000 located on the East Fork Carson River near Gardnerville
- Conduct electrofishing in three historical locations using either a backpack or tote-barge depending on water flows during the fall.
- Report on current extensive macroinvertebrate work on the E. Carson River that is being conducted by the Sierra Nevada Aquatic Research Laboratory, David Herbst, Ph.D.
- Conduct hook-and-line surveys to determine if carryover fish are present, particularly rainbow, brown, and whitefish.

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Fisheries Biologist
Western Region

Date: February 2013

REFERENCES

Leppo, E. W. and D. Bressler. 2007. Benthic Macroinvertebrates Index Development and Physical Habitat Evaluation for Truckee River, Carson River, & Walker River. Contract #C90-97908104-0, Tetra Tech, Inc. to Nevada Division of Environmental Protection. http://ndep.nv.gov/bwqp/file/mmi_phab_report_2007.pdf.



Attachment 2

HOBO'S were anchored to shore with cable and stake, or to vegetation when adequate.



Steel pipe cases were constructed to protect HOBO's instream.

