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Nevada Fish and Wildlife Office

JOB PROGRESS REPORT  
 NATIVE GAMEFISH  
 January 1, 2000 to December 31, 2000

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## SUMMARY

The Jarbidge bull trout population segment was given "threatened species" protection on April 8, 1999 (Federal Register Vol. 64 No. 67). The Nevada Division of Wildlife went on record stating that listing the bull trout was not warranted in Nevada. Despite the difference of opinion, the Nevada Division of Wildlife continues to conduct management emphasis towards bull trout in order to further our understanding of the species and its habitat.

A late June snorkel survey of 3.8 miles of the West Fork Jarbidge River from below the confluence of Pine Creek downstream to 0.3 mile below the confluence of Jack Creek ( 0.9 mile of river through town and 1.0 mile of river downstream of the cemetery access bridge were not surveyed) resulted in 16 different bull trout sightings. Observed bull trout length ranged between about 7.0 inches to 14 inches. Nine bull trout were estimated to be 10 inches or longer, while two fish were slightly smaller. Both a 10 inch and a 12-inch bull trout were seen in lower Jack Creek. On July 10 -11 both Jack Creek and two areas holding bull trout during the first survey were re-snorkeled. The estimated sizes of bull trout seen during the re-snorkel effort indicated that the larger river fish remained in the same areas while two bull trout seen during the Jack Creek re-survey were smaller thus, probably different fish. Bull trout were likely in an upstream migration pattern during the snorkel survey period when maximum river temperatures below Jarbidge reached 68.0°F on one occasion.

The Robinson Creek drainage (EFJR) was intensively surveyed such that we are 95% confident that no bull trout were present at a minimum density of 8.0 bull trout per mile. Intensive spot-shocking in Lower Fox Creek (WFJR) yielded only redband trout despite relatively cool water temperatures (53 OF). Intensive spot-shocking on the Forest portion of Deer Creek (WFJR) resulted in the capture of a single 220-mm TL bull trout in a pool with water 70°F. Spot-shocking the same pool a week later on July 27,2000 resulted in the capture of only redband trout. This years discovery of a bull trout in Deer Creek represents the first such record in this particular stream. It is believed that the bull trout had strayed up Deer Creek from the mainstem of the West Fork Jarbidge River.

Thermographs were deployed in Bear Creek, Upper Deer Creek tributary, and Fox Creek to assess these streams as bull trout habitat. Temperature records for both Upper Deer Creek tributary and Bear Creek were deemed unsuitable (mean maximum August temperatures of 62.4 of and 60.0°F, respectively) for bull trout juvenile rearing

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IJohnson, G. L. 1999. The status of the bull trout in Nevada. Nevada Division of Wildlife, Final Report. 17pp.

habitat. The mean maximum August temperature in Fox Creek was only 52.5°F hence, this stream because of its small size might be considered unoccupied, marginal suitable bull trout juvenile rearing habitat. A more extensive search for bull trout in Fox Creek is recommended.

The *Sa/ve/inus confluentus* Curiosity Society meeting on the Olympic Peninsula in Washington State was attended along with about 60 other personnel. Field activities included snorkeling a reach of the Quinault River where we found both salmon and large bull trout and snorkeling in the Sol Duc River to observe and photograph dolly varden (*Sa/velinus ma/rna*). Talks were of interest and emphasized the bull trout sampling protocol, radio telemetry studies, bull trout - rainbow trout temperature preference and genetics studies.

TITLE: West Fork Jarbidge River Fluvial Bull Trout Distribution Survey.

DATE: June 27 - 29, and July 10 -11,2000

FIELD PARTY: John Elliott and Gary Lee Johnson, NDOW Fishery Biologists  
Bruce Zoelick, BLM, Boise, Fishery Biologist

## OBJECTIVE

To assess the distribution and relative abundance of fluvial bull trout in the West Fork Jarbidge River downstream of the confluence of Pine Creek during early summer.

## BACKGROUND

The presence of a fluvial bull trout in the Jarbidge River System was first documented in the lower West Fork Jarbidge River during underwater surveys in July 1994<sup>2</sup>. Up to six adult bull trout were seen in the Jack Creek culvert plunge pool and a single adult bull trout was also seen in the West Fork Jarbidge River at a location about 1.5 miles north of the Nevada State line in Idaho. A single bull trout was seen in the Jack Creek culvert pool on August 8, 1995. An October 15-16, 1997 snorkel survey for fluvial bull trout in 63 pools located in the lower 2.0 miles of the West Fork Jarbidge River in Nevada failed to find any bull trout. The Jack Creek culvert was replaced with a bridge in November 1997 in hopes of allowing bull trout access to Jack Creek. Adult presumed fluvial bull trout were found in upper Jack Creek and upper Pine Creek during summer, 1999 using intensive electrofishing<sup>3</sup>. Idaho Fish and Game trapped three presumed fluvial bull trout in the West Fork Jarbidge River during their fall, 1999 weir operation. During the same period IDFG personnel trapped two presumed fluvial bull trout in their East Fork Jarbidge River weir. Bull trout captured in the weirs were given Pit tags for future identification<sup>1</sup>.

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<sup>2</sup>Zoelick, B. W.,. Armstrong, R. and Klott, J. 1996. Status of the Migratory bull trout population in the Jarbidge River drainage. Idaho Bureau of Land Management, Technical Report No. 96-5, Boise, Idaho. 21 pp.

<sup>3</sup>Bonar, S. A. Divens, M. and Bolding B. 1997. Methods for sampling the distribution and abundance of bull trout and dolly varden. Washington Department of Fish and Game, Olympia, WA 46 pp.

<sup>4</sup>partridge, F. Information in a letter dated December 7, 1999. Idaho Fish and Game, Jerome, Idaho.

## PROCEDURES

The underwater fish surveys were conducted during daylight hours on June 27 - 29, and July 10- 11, 2000. Pools suitable for one or two divers to survey were found by walking along the stream. Pools were surveyed by divers entering the water just below or at the downstream end of the pool to be surveyed. Wide pools were surveyed by two divers moving down the center of the pool. Divers searched all forms of fish cover while looking for bull trout. Fish species present in each pool were noted. Also, noted were the length of each bull trout. Fish lengths were generally estimated using a ruler for reference. Pools having bull trout were noted using a GPS locator. A survey of lower Jack Creek was conducted with the sole purpose of noting bull trout. A second survey of lower Jack Creek was conducted 12 days later, to relate the potential of fluvial bull trout to pass above several natural fish migration obstacles. In addition, both the river pool located at the confluence of Jack Creek and the pools below the confluence of Pine Creek were surveyed by snorkeling for a third time. Water and some air temperatures were usually taken where surveys began and where they ended and in the river at the Sawmill Campground where either hand held thermometer temperatures were taken or a maximum daily temperature was recorded using a Maximum or Minimum recording thermometer. The river reach from Pine Creek Campground to the bridge above town was walked while moving downstream whereas, all areas below Jarbidge that were surveyed were done so by divers walking upstream. Pools in lower Jack Creek were surveyed by one diver moving upstream to examine every pool large enough to snorkel. A total of 3.8 miles of the river and 0.5 miles of Jack Creek were surveyed during 18 hours of work over 2.5 days. An additional four hours was expended while snorkeling lower Jack Creek on July 10. Maximum pool depth and pool class classification (Appendix I) were noted at each river pool surveyed.

## FINDINGS

A total of 16 bull trout were seen in the river sample areas and two bull trout were seen in lower Jack Creek. Lengths of observed bull trout ranged from seven to 14 inches, Bull trout that were 10 inches or longer included nine fish and another two fish were thought to have been at least 9 inches. Thus, 69% of the observed bull trout in the river and in lower Jack Creek may have been potential fluvial bull trout spawners. The bull trout that were less than 10 inches may have been immature fish destined to become fluvial migrants when they mature. The first and upstream most pool snorkeled was one within Pine Creek Campground, and there were four bull trout (two adult and two immature-sized fish) present in this one class #2 pool. The aforementioned pool was located a few pools below the confluence of Pine Creek. Similarly, there were two adult-sized bull trout occupying a class #4 pool/run just below the confluence of Jack Creek. No other bull trout were seen in either of the 17 pools over 0.3 miles that were surveyed below Jack Creek or in the 25 pools over 0.45 miles of river above the confluence of Jack Creek. There were two immature-sized bull trout seen in two

different class #2 pools located in the vicinity of the river bridge that leads to the Jarbidge Cemetery. There was no time to survey the approximately 1.0 mile of river from just below the Cemetery bridge downstream to where the survey ended 0.45 miles upstream of the confluence of Jack Creek. A maximum temperature of 68°F was recorded on 6-28-00 in the river at Sawmill Campground. The same temperature was recorded in the river located just above the confluence of Jack Creek at 1515 hours on 06-28-00. At the same time the river was 68°F, Jack Creek above the influence of the river was 55.4°F and there were two fluvial adult-sized seen in different pools located in the approximate 0.25 miles of stream downstream of what are considered natural fish migration obstacles in the stream. No bull trout were seen in the pools over about 0.1 mile of stream inspected within or upstream of the fish migration obstacles.

There were a total of twelve observed bull trout and five of which were about 10 inches in length or longer, within the approximate 2.4 miles of stream between the first bridge upstream of nearby Jarbidge town upstream to Pine Creek Campground. The maximum recorded water temperature in this snorkeled reach was 62.6°F at 1355 hours on 06-28-00, as measured from near the bridge before town. At 1342 hours on 06-27-00, the river at the start of survey at Pine Creek Campground was 57°F. The lowest recorded temperature in the river was 50°F as recorded at the bridge near the old Pavlok Mine Site at 0845 hours on 06-28-00. A 50°F early morning river temperature was also measured below Jarbidge town at Sawmill Campground on 06-28-00. Bull trout radio tagging studies in the Blackfoot River in Montana indicated that peak upstream migrations of fluvial fish occurred in June, when river temperatures reached 17°C (62.6°F).

Both the Pine Creek Campground pool with bull trout and the pool at the confluence of the river and Jack Creek were snorkeled on different dates to get an indication of whether the bull trout were actively moving or just holding their positions. As stated earlier, the Pine Creek Campground pool had four bull trout when first surveyed on 06-27-00. The same pool was resurveyed on 06-29-00 and only the two largest bull trout were seen and the two bull trout that were from 7 to 8 inches long were not seen. This same pool was snorkeled again, 12 days later on 07-11-00 and only the largest of the original four bull trout was still present and the river temperature at 1450 hours was 60°F. A survey of three pools upstream and one pool below the subject pool having bull trout on 07-11-00 failed to find any bull trout. The river temperature above the confluence of Pine Creek was 59°F while lower Pine Creek was 62°F at 1425 hours on 07-11-00. The pool at the confluence of the river and Jack Creek contained two adult-sized bull trout when first surveyed on 06-28-00 and when it was resurveyed on 06-29-00, no bull trout were seen. Twelve days later on 07-10-00 there was a 12-13 inch long bull trout present in the pool at the Jack Creek confluence. The aforementioned bull trout's length was in between the lengths of the two bull trout first seen in the pool on 06-28-00 hence, it was probably a different fish. The resurvey of

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'Swanberg, T. 1997. Movements and habitat use by fluvial bull trout in the Blackfoot River, Montana. Transactions of the American Fisheries Society 126:735-746.

lower Jack Creek on 07-10-00 included all of the pools first examined on 06-28-00 plus an additional length of stream above where the first survey ended. A total of 100 pools were snorkeled in Jack Creek during the resurvey with about 60 of the pools being above the fish migration obstacles. No bull trout were seen above the fish migration obstacles. One 8-9 inch bull trout was seen in pool #22 and a second similar-sized bull trout was seen in pool #31 beneath a 2-ft high water fall migration obstacle. These two bull trout were likely different fish from the 12 inch and 10-inch bull trout that were seen in lower Jack Creek on 06-28-00. These first seen bull trout may have moved above the obstacles and headed for upper Jack Creek sometime during the twelve days previous to the resurvey of Jack Creek. It would seem unlikely that the original two bull trout would have been overlooked during the resurvey of Jack Creek. Based on snorkeling activities in the river and in Jack Creek, bull trout appeared to be actively migrating during the survey period in late June through mid-July. River temperatures at the time of survey suggest that bull trout migrations from the lower river could have been well underway prior to July.

Redband trout were ubiquitous in both pools of the river and in Jack Creek. There were only eight of 159 surveyed pools in the river that Redband trout were not noted and all eight of these pools were mostly non quality #4 type pools and one #5 pool that averaged 1.54 ft (0.98 - 1.97) deep. Mountain whitefish were seen in 18% of the pools surveyed above Jarbidge town, 15% of the pools below Jarbidge town to just below the Cemetery bridge, 12% of the pools in the 0.45 miles of river above the confluence of Jack Creek, and in 44% of the pools in the 0.3 miles of river below the confluence of Jack Creek. The highest frequency of quality pools (44%) was in the surveyed reach below Jack Creek where stream discharge was also the greatest. The 0.45 miles of surveyed river above Jack Creek confluence had a quality pool frequency of 38%. Quality pool frequency in the 2.45 miles of river above Jarbidge town to Pine Creek Campground was only about 15%. Likewise, quality pool frequency between below Jarbidge town to just below the Cemetery bridge was only 17%. Historic stream channelization and large organic debris removal in portions of the river from above the confluence of Pine Creek downstream to below Jarbidge town has undoubtedly effected the ability of the river to form/maintain quality pool habitat.

Despite their abundance in the river, sculpin were only seen in nine of 159 river pools snorkeled. Their preference for riffle habitat and habit of hiding among the bottom rocks could explain their apparent absence in most pools. Longnose dace were only noted in one pool located above the confluence of Jack Creek. This species is not that common in Nevada within the Snake River Drainage System however, they were found during the course of electrofishing in the West Fork Jarbidge River in summer, 1998.

## RECOMMENDATIONS

(1) Snorkeling could be used to make annual counts of bull trout in order to determine trend in the population of fluvial bull trout. These surveys could be conducted by a

multi-agency team and include the entire West Fork Jarbidge River below Pine Creek.

(2) Snorkeling could be used to locate potential bull trout specimens for capture and radio-tagging in early-summer.

(3) Radio-tagging could best be used to determine time and rate of both spring and fall bull trout migrations and destination of spawning and wintering areas.

## APPENDIX I

TITLE: Robinson Creek Drainage (EFJR) Intensive Fish Population Survey

DATE: July 24 - 26,2000

FIELD PARTY: Gary Lee Johnson, Fisheries Biologist  
Bret Barngrover, Rob Compson, and Phil Tousignant, Conservation  
Aides

## OBJECTIVE

To determine the presence or absence of bull trout in the Robinson Creek drainage with confidence.

## BACKGROUND

Robinson Creek and its tributary, Jim Bob Creek were first surveyed to determine fish population status and stream habitat condition in the summer of 1993. Only redband trout were found inhabiting these streams. Spot stream temperature data taken during the survey provided inconclusive information on whether or not the Robinson Creek drainage would be suitable bull trout rearing habitat. A thermograph record from upper Robinson Creek from 07/12 -10/16/99 indicated a temperature regime similar to the one gathered in upper Pine Creek (WFJRD) during 1999. Upper Pine Creek was found to contain a small population of bull trout during August 1999. The fact that bull trout were not detected in the Robinson Creek drainage in 1993 may have been due to their low density hence, more intensive sampling was warranted to discern the presence or absence of bull trout.

## PROCEDURES

Fish population survey design to detect bull trout was determined from reviewing a Washington Department of Fish and Wildlife paper.<sup>6</sup> Sampling efficiency (capture efficiency) rate was determined from previous capture efficiencies of trout in the Robinson Creek drainage during single-pass electrofishing that was conducted during 1993. The mean capture efficiency was 74%. The mean density of bull trout was estimated to be 0.5 bull trout per 100 meters of sampled stream. At the aforementioned bull trout encounter density and capture efficiency, there needed to be eight, 100 m sample stations. A total of 10 sample stations on Robinson Creek and one sample station on Jim Bob Creek were actually surveyed. Odd numbered sample sites were

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<sup>6</sup>Bonar S. A., M. Divens, and B. Bolding. 1997. Methods for sampling the distribution and abundance of bull trout and dolly varden. Washington Department of Fish and Game, Olympia, WA 46 pp.

located at previously surveyed sites that had fish present and the even numbered survey sites were placed between the original sampled sites. All sampled sites were pre-plotted on a USGS 7.5 minute topographic map.

Upon locating a sample site in the field, the start of electrofishing began at a natural pool/riffle break. A tape was run up the stream margin to demarcate each 100 ft (30.5 m) section. Redband trout capture data was tallied separately for each 100-ft section and the last 28 ft (8.5-m) of the 100 m sample site was also tallied separate on field forms. Redband trout were differentiated by relative size, i.e., catchable ( $\geq 6$  inches total length as determined from holding the fish on a pre-measured 6-inch portion of dip net); sub-catchable (approximately 3.5 to  $< 6$  inches); fingerling (1.5 to  $< 3.5$  inches); and young-of-year fish that were less than an inch long. A Dirigo 850 backpack electroshocker unit was used to enable dip net capture of fish in each stream section. Captured fish were released below the work area to prevent recapture. Identified misses were recorded in each electrofished segment.

Estimates of the number fish (spp.) per 100 m at each sample site were calculated by adding total fish (spp.) captured and fish (spp.) seen but missed at each station. The number of fish (spp.) per meter was converted to number of fish (spp.) per mile and all sample sites within the occupied range of the species were averaged. Species abundance estimates were derived from multiplying the mean number of fish (spp.) per mile x occupied length of stream.

Stream habitat measurements recorded at each sample station included both air and water temperatures (OF). The following stream habitat variables were recorded at each sample site: length of unstable streambank, number and length of quality pools, relative turbidity, bank cover vegetation type, relative density and vigor; relative riparian area density; relative amount of sedimentation, estimated percent stream shading, percent livestock damage and vegetation utilization, beaver activity, upland vegetation types, and invertebrate types and relative abundance. Stream flow was measured by the float method through a one meter length of relative uniform stream at most sample sites. Discharge was calculated using a roughness constant of 0.8 as indicated in the formula below:

$$\text{Discharge (cms/cfs)} = \frac{\text{mean width} \times \text{mean depth} \times \text{length} \times 0.8}{\text{mean time (seconds)}}$$

## FINDINGS

No bull trout were found at any of the eleven sampled sites in the drainage (see map). Redband trout were present at all eleven sample sites located in the drainage. Within Robinson Creek there were an average density 948 redband trout per mile. The sampled redband trout population was comprised of 12.7% catchables and 87.3% sub-catchables. Young-of-year redband trout while excluded from density and population estimations, were seen in shallow water at six of the 10 sample sites in Robinson

Creek. An estimated 3886 redband trout occupied 4.1 miles of Robinson Creek. The single sample station on Jim Bob Creek located about 0.25 miles upstream of Robinson Creek had an average density of 290 sub-catchable redband trout per mile, that inhabit the approximate lower 0.5 mile of Jim Bob Creek.

The redband trout population that was present in summer 2000 was about twice that of estimates made in 1993. Using fish capture data only from the first 100 ft at 88-1, 88-3, 88-5, 88-7, 88-9 on Robinson Creek, the mean redband density averaged 993 fish per mile. These same 88's in 1993 had a mean redband density of 475 fish per mile. The fish population survey conducted in 1993 was preceded by a drought in 1992, which could explain the lower density estimate in 1993 compared to the one made in 2000. Another interesting comparison can be made using the mean fish density estimate of all Robinson Creek 88's and both the estimate derived from just the first 100 ft shocked at each 88 at all 10 88's or just the original five (1993) 88's that were found to have redband trout (see below).

1088's -100 m (328.1 ft)	948 redband trout per mile.
1088's - First 100 ft (30.5 m)	993 redband trout per mile
Original five 88's - First 100 ft (30.5 m)	993 redband trout per mile

A redband trout density estimate of the same magnitude could have been derived by conducting electrofishing through 100 ft of stream at five of the original 88's. By the same token, according to the methods found in Washington Department of Fish and Wildlife's previously cited publication, sampling would have had to have been increased to 40 - 100 m sample sections of stream to detect bull trout present at a density of 0.1 fish/100 m. With the sampling of 10 - 100 m sample sections as was done in 2000, we are 95% confident that bull trout are not present at a minimum density of 0.5 bull trout per 100 m. Bull trout captures at eleven 100 m 88's in Jack Creek in 1999 amounted to an average of 0.636 bull trout per 100 m sample section. Bull trout captures at nine 100 m 88's in Pine Creek in 1999 amounted to an average of 1.33 bull trout per 100 m sample site. A higher bull trout capture rate in Pine Creek was due to the fact that sampling was confined to the upper 1.5 miles of stream whereas, sampling in Jack Creek was spread throughout the 2.7 mile length of stream below a natural fish barrier. Sampling in Robinson Creek in 2000 was conducted over the entire 4.9 miles of fish occupied stream. Bull trout have a habit of occupying the uppermost fish inhabitable portions of streams. The uppermost portions of stream generally provide the coldest water in a stream due to closeness to the water source(s) and higher elevation.

Stream discharge was "low" due to the USGS predicted streamflows being only 40% of normal. Actual measured discharges in Robinson Creek ranged from 0.58 cfs at 88-9 located above the confluence of Jim Bob Creek to a maximum of 1.35 cfs located at 88-1, located 0.2 mile up from its mouth. Jim Bob Creek only had a discharge of .23 cfs. A pipeline diversion in upper Jim Bob Creek diverts some of the stream flow. Measured air temperatures in mid-afternoon (1520 - 1538 hrs) during the survey were as follows: 88-1 (5920 ft) was 89°F on 7/24/00; 88-6 (6755 ft) was 77°F on 07/25/00,

and 88-9 (7035 ft) was 73°F on 07-26-00. Maximum recorded stream temperatures recorded each day of survey were as follows: 65°F at 88-1 (5920 ft), 55.5°F at 88-5 (6580 ft); and 58°F at S8-10 through 88-8 (6960 -7200ft). The late afternoon stream temperature in Jim Bob Creek was 57°F. The maximum recorded temperature in Robinson Creek below the confluence of Jim Bob Creek during the period 07/12/99 to 10/16/99 was 59.36°F, as was recorded in late August. The overall, thermograph record in Robinson Creek was very similar to the thermograph record from the bull trout occupied reach of Pine Creek. Stream shading was generally "good" due to a moderate to heavy riparian area consisting of primarily alder, willow, baneberry, Western black currant, wild rose, and tall forbs and grasses and, an occasional tree such as juniper, aspen or subalpine fir. Streambank vegetation and overhanging branches and limbs made walking up the stream difficult at many of the 8S's. Only an average of 5% of the streambanks were considered to be unstable. As much as 16% of the stream bank was unstable at SS-4 located very near the road. Quality pool habitat comprised an average of 15% of the sampled stream length at each 88. The presence of active beaver dams increased the amount of quality pool habitat at 8S-3 where about 48% of the sampled stream length was composed of quality pool habitat. Sedimentation was judged to be "light" at all 8S's except, in beaver ponds located at 8S-3 where sedimentation was "heavy." Cattle had not yet grazed in the drainage this year and there was only a slight amount of past ungulate damage noticed along the streambanks at and between SS's.

#### RECOMMENDATIONS

- (1) Future intensive surveys for bull trout in Robinson Creek should be done during a normal or above normal streamflow year.
- (2) Intensive sampling could be confined to the upper half of stream and the lower 0.5 mile of each headwater fork (Robinson Creek and Jim Bob Creek).

TITLE: Deer Creek Drainage (WFJR) Intensive Bull Trout Search

DATE: July 19 and 27, 2000

FIELD PARTY: Gary Lee Johnson, Fisheries Biologist; Bret Barngrover, Rob Compson, and Phil Tousignant, Conservation Aides

## OBJECTIVE

To determine the presence or absence of bull trout in Deer Creek.

## BACKGROUND

The Forest portion of Deer Creek was first surveyed to determine stream habitat condition and fish population status in summer, 1992 which was a drought year. Presumed redband trout occupied the 4.4 miles of Deer Creek on the Forest and about 0.8 mile of an unnamed tributary stream. Stream conditions were rated "fair" to "good." Deer Creek appeared to have insufficient flow and possibly, excessive stream temperatures for juvenile bull trout survival. On August 7, 1995, personnel with the Idaho State BLM Office and the Boise, USFWS Office snorkeled a total of 335 feet over a 0.2 miles located on the BLM portion of Deer Creek in an effort to locate bull trout. Only redband trout were seen. Stream temperature taken during the 1992 survey provided inconclusive information on whether or not Deer Creek would be suitable bull trout rearing habitat. A thermograph was deployed in the unnamed tributary of Deer Creek on June 19, 2000 to get a complete thermal record. Owing to the fact that bull trout can exist in a stream at very low densities, it was imperative that more intensive sampling be conducted. A complete survey of the Forest portion of stream was deemed most appropriate to determine bull trout presence or absence.

## PROCEDURES

A Dirigo® 850 backpack electroshocker unit was used to enable dip net capture of fish in each stream section. Captured fish were released below the work area to prevent recapture. Shocked redband trout were identified and released. Captured bull trout were measured and weighed prior to release. A Garmin® GPS 12 CX locator was used to note the end of electrofishing, spring inflows, and locations where hand thermometer air and water temperature data were taken.

## FINDINGS

On July 19 electrofishing was conducted from the 4x4 road crossing upstream to about 0.2 mile above the unnamed tributary. Flow in the unnamed tributary were deemed to low for electrofishing. Redband trout were numerous throughout the sampled area where the stream temperature was as high as 66°F. Sampling of a

quality pool located just below the 4x4 road stream crossing resulted in the capture of a single adult bull trout as well as redband trout. The bull trout was 220 mm (TL) and 110 gm. The temperature of water that the bull trout was found in was 70°F while the air temperature was 75°F at 1545 hours. A limited amount of sampling (about 200 feet) for bull trout was conducted in lower Deer Creek however, overhanging streambank vegetation made electrofishing difficult at best. Only redband trout were found in lower Deer Creek.

On July 27 electrofishing extended from the Forest boundary upstream 2.4 miles to the pool that the bull trout had earlier been found, only redband trout were found. Stream temperatures recorded on July 27 ranged from 51°F @ 0945 hours near the Forest Boundary to 73°F @ 1345 hours at a location about 0.7 mile downstream of the 4x4 road crossing. The discharge in Deer Creek on July 27 was 0.82 cfs at a location about 0.5 mile upstream of the Forest Boundary. Within the first mile or so of Deer Creek upstream of the Forest Boundary there were several small spring flows noted entering Deer Creek. Individual spring temperatures ranged from 46°F to 55°F. The spring temperatures were in all cases cooler than the prevailing temperature in Deer Creek.

There were active beaver dams noted in Deer Creek in 1992, and only failed dams! dam remnants were noted in the same area in 2000. One old dam appeared as though it would prevent upstream movement of fish. Under higher flows the old dam may not preclude fish upstream movement. The bull trout found in Deer Creek on July 19 most likely migrated up from the West Fork Jarbidge River during May when stream flows would have been greater and stream temperatures lower, By June 19 when the Deer Creek tributary thermograph was set, Deer Creek at the 4x4 road crossing was already 60°F at 1450 hours. Due to excessive stream temperatures, Deer Creek is currently not suitable for juvenile bull trout production.

## RECOMMENDATIONS

- (1) Livestock use should be made compatible with vegetative recovery of beaver impacted areas and maintaining overall "good" stream conditions to promote maximum stream canopy to ameliorate stream heating.
- (2) Deer Creek headwaters area should be examined to gather knowledge as to whether or not improvements in livestock grazing should be sought.
- (3) Fish population survey work in upper Deer Creek should be conducted in 2001 in order to determine if bull trout again show up.

TITLE: Fox Creek (WFJR) Intensive Bull Trout Search

DATE: July 19 - 20,2000

FIELD PARTY: Bret Barngrover, Rob Compson, and Phil Tousignant, Conservation Aides

## OBJECTIVE

To determine the presence or absence of trout in Fox Creek.

## BACKGROUND

The Fox Creek fish population has been sampled on two occasions. Fox Creek was first surveyed to determine fish population status and stream habitat condition in the summer of 1992. Redband trout were found inhabiting the lower two sample sites and no fish were captured or seen at the two upper sample sites. The upstream distribution of fish was limited by presumed gradient barriers. The lowest three sample sites were resurveyed during summer 1998. As in 1992, only the lowest two sample sites had redband trout. A 57°F spot stream temperature taken during the 1992 survey conducted in early-August provided inconclusive information on whether or not Fox Creek would be suitable bull trout rearing habitat. A thermograph was deployed in Fox Creek on June 20, 2000 to get a complete thermal record. Owing to the fact that bull trout can exist in a stream at very low densities, it was imperative that more intensive sampling be conducted. Since, the fish-inhabited portion of Fox Creek was estimated to 0.5 mile, it was deemed reasonable to sample the entire length of fish occupied stream to detect the presence of bull trout.

## PROCEDURES

A Dirigo 850 backpack electroshocker unit was used to enable dip net capture of fish in each stream section. Captured fish were released below the work area to prevent recapture. Redband trout were differentiated by relative size, Le., catchable ( $\geq 6$  inches total length as determined from holding the fish on a pre-measured 6-inch portion of dip net); sub-catchable (approximately 3.5 to  $< 6$  inches); and fingerling (1.5 to  $< 3.5$  inches). Species abundance estimates were derived from fish totals per length of sampled streams. A Garmin® GPS 12 CX locator was used to note the end of electrofishing as well as other locations where hand thermometer air and water temperature data was taken.

## FINDINGS

No bull trout were found throughout the lower approximate 0.3 mile of electrofished stream. There were a total of 38 redband trout noted (3 catchables, 27

sub-catchables, and 8 fingerlings). Electrofishing efficiency was deemed "poor" through the lower 0.1 mile of stream where low water fish barriers were noted as numerous. The maximum temperatures were noted on July 19 at 1130 hrs when the air water temperature in lower Fox Creek were 72°F and 53°F, respectively.

#### RECOMMENDATION

(1) Future intensive surveys for bull trout in Fox Creek should extend upstream beyond the occupied range of redband trout.

TITLE: Jarbidge Stream Temperature Studies

DATE: June 19 - October 26

FIELD PARTY: Gary Lee Johnson, Fishery Biologist

### OBJECTIVE

To determine the summer thermal suitability of Jarbidge River tributary streams for bull trout occupation.

### BACKGROUND

Bull trout have been referred to as a glacial relict species due to its preference for the coldest reaches of streams within its native range in the Pacific Northwest. The species proclivity for inhabiting cold headwater habitat has been well documented in the Jarbidge River Basin. The ease of gathering constant temperature data with today's thermographs has allowed for an ever growing collection of water temperature records for the summer-fall period. The combination of thermograph records and fish distribution data, best characterizes temperature suitability for various bull trout life stages. Agencies having collected thermograph data in the Jarbidge River basin include NDOW, IDFG, BLM, USFS, and the USFWS.

### PROCEDURES

Optic StowAway®Temp Loggers were set by NDOW in 2000 during the period June 19 through June 20. The thermographs were pulled from the various streams during the period October 25 through October 26, 2000 (Table 1). Air and water temperatures were taken with a hand-held thermometer when both the thermographs were set and pulled.

Table 1. Jarbidge River drainage temperature monitoring sites, NDOW, 2000.

STREAM LOCATION	ELEVATION (FT)	PERIOD OF RECORD
Bear Creek	6400	06/20 - 10/26
Deer Creek (upper tributary)	7080	06/19 - 10/25
Fox Creek	7040	06/20 - 10/26

The thermographs were set to record the maximum temperature in each one hour period throughout a day. The Boxcar® Pro 4.0 software program was used to

analyze the thermograph data. From the mentioned data set, the single maximum temperature, the 3-day maximum mean, 7-day maximum mean, and the mean daily maximum temperature in August were all calculated. The entire temperature data set was examined to calculate the mean daily maximum temperature and the 3-day and 7-day mean daily temperature maximum.

## FINDINGS

**Bear Creek:** The Bear Creek thermograph was located about 150 ft upstream of the water diversion pond. Maximum temperatures were recorded in late-July into early-August. The maximum recorded temperature was 65.08°F and the 3-day and 7-day mean maximum temperature were 64.50°F and 63.35°F, respectively. The maximum daily mean temperature was 60.53°F. The mean maximum 3-day and 7-day mean daily temperature was 57.01 of and 55.43°F, respectively. The mean maximum August temperature was 60.00°F whereas, the 30-day, mean maximum temperature was 61.74°F. There were 81-days that the Bear Creek temperature was above 53.6°F (12°C). The maximum stream temperature first dropped below 48°F on September 22, and stayed below 48°F after October 2.

A fish population and stream habitat survey of Bear Creek was completed in June 1992 and redband trout were found occupying the approximate 1.4 miles of stream above the water diversion structure. The water diversion structure would prohibit any upstream movement of fish up Bear Creek. The temperature data indicates that Bear Creek would be unsuitable for juvenile bull trout rearing. Stream discharge at the time the thermograph was removed was only 0.275 cfs as measured at the pond spillway. No redband trout were found at a sample station located in the reach below the water diversion.

**Deer Creek:** The Deer Creek thermograph was located in the unnamed tributary located 0.2 mile upstream of the Deer Creek 4x4 road crossing on the Forest portion of stream. The thermograph was fastened in the stream about 0.2 mile up the tributary from the confluence of Deer Creek. The warmest temperatures occurred during late July into early August during which the daily maximum, 3-day mean maximum, and 7-day mean maximum temperatures were 68.74°F, 67.87°F, and 66.24°F, respectively. The maximum mean daily, mean daily 3-day maximum and 7-day mean daily maximum temperature were 59.99°F, 59.28°F, and 57.65°F, respectively. The August mean maximum temperature was 62.45°F whereas, the mean maximum 30-day temperature was 64.43°F. There were 89 days that the temperature was above 53.6°F (12°C). The maximum temperature first dropped below 48°F on September 22 however, the temperature didn't remain below 48°F until October 10. Redband trout were observed in both Deer Creek and in the unnamed tributary where young-of-year redband trout were common.

Only redband trout were found during spot-shocking conducted on July 19 from the 4x4 road crossing upstream and into and up the unnamed tributary 0.1 mile. Spot-

shocking in the pool located just below the 4x4 stream crossing resulted in the capture of one 220 mm (TL) bull trout. This bull trout capture represented the first documented record of the species in Deer Creek. The stream temperature taken at the time of capture was 70°F at 1545 hr. The unnamed tributary had a hand-held temperature reading of 62.0°F at 1530 hr and the thermograph maximum reading on July 19 was 62.64°F. A continuation of the spot-shocking of Deer Creek from the Forest Boundary upstream to the 4x4 road crossing on July 27 only resulted in the capture of redband trout. Discharge in Deer Creek ranged from 0.728 cfs on July 27 to 0.314 cfs on October 25. The discharge in the unnamed tributary was 0.42 cfs on June 16 and to low for measurement (estimated at about 0.1 cfs) on October 25. Only in the event that Deer Creek summer stream temperature could be decreased considerably and stream discharge could be increased to at least 1.0 cfs, then might the Forest portion of stream be favorable for bull trout spawning and rearing. If such conditions prevailed, it is good to know that bull trout are able to ascend Deer Creek.

Fox Creek: The Fox Creek thermograph was located about 0.9 mile upstream of the West Fork Jarbidge River. The warmest period of record was in early August at which time the maximum, 3-day mean maximum, and 7-day mean maximum temperatures were 59.97°F, 59.4°F, and 58.63°F, respectively. The maximum mean daily, 3-day and 7-day daily mean maximum temperatures were 56.58°F, 56.17°F and 55.32°F, respectively. The mean maximum temperature in August was 52.53°F whereas, the 30-day mean maximum temperature was 57.30 during the period July 20 thru August 18. There were 55 days during the recording period that the temperature exceeded 53.6°F. The temperature first fell to 48°F on September 21 but it didn't remain at 48°F or lower until October 1. The discharge of Fox Creek on October 26 was 0.5 cfs.

Only redband trout were found in Fox Creek during extensive spot-shocking throughout the lower 0.5 mile offish occupied habitat. Only redband trout were found in Fox Creek during previous fish population surveys conducted August 3-4, 1992 and on September 16, 1998.

## DISCUSSION

Temperature is one of the most important factors affecting the distribution of bull trout. Temperature records from the three local bull trout areas (upper West Fork Jarbidge River, upper East Fork Jarbidge River, and upper Dave Creek) are the coldest fish bearing stream reaches in the Jarbidge River drainage. These same three stream reaches contain the highest densities of bull trout and are most likely areas for spawning and rearing. Maximum water temperature never rose above 54.41°F at either of the three monitoring sites. All three of these sites have a north-facing drainage basin. In the Flathead River drainage of Montana, the highest densities of juvenile bull trout were found in reaches where maximum temperatures were 53.6°F or less and juveniles were rarely found in streams with summer water temperatures exceeding 59.0°F (Fraleay

et al., 1989). In British Columbia bull trout streams, within the temperature range of 53.6°F - 55.4°F, rainbow trout densities dominated bull trout densities (Haas, 0000). On September 29, 1999, in the upper East Fork Jarbidge River thermograph location where the maximum temperature rose to 54.41 of, there were three redband trout for every bull trout through the 100-ft sample area. The vast majority of the Jarbidge River system will likely always have a summer water temperature regime more suitable for redband trout occupancy than for bull trout occupancy. Laboratory studies have shown that bull trout optimal growth and upper lethal temperatures are lower than concurring brook trout, rainbow trout, and brown trout, suggesting a possible mechanism for replacement of bull trout by these nonnative salmonids, and for a high degree of isolation of remaining populations (Selong J., et al. 0000).

It is not clear, what particular temperature metric may be the most important in determining bull trout occupancy. When either daily maximum, 3-day mean maximum, 7-day mean maximum, or mean August maximum water temperature were used to rank the 1998 and 1999 temperature monitored stream reaches, the ranking was the same (Appendix I). When the Fox Creek temperature data is included in the larger data set, the mean maximum August temperature of 52.53°F would have Fox Creek ranked between the upper East Fork Jarbidge River and Trib. B of Slide Creek. Despite a low mean maximum August temperature, Fox Creek had a 3D-day maximum mean temperature of 57.30°F during the period July 20 through August 18. Using the 3D-day mean maximum temperature as a surrogate for the mean maximum August temperature would rank Fox Creek below upper Pine Creek (note that this is the actual order of the data). When Fox Creek temperature metrics of both maximum recorded temperature and 7-day maximum mean temperature are used to rank the stream, it would fall in between upper Robinson Creek and upper Pine Creek. When the 3-day maximum mean temperature is used to rank the stream data sets, Fox Creek falls between upper Pine Creek and lower Cougar Creek. Bull trout have not been found in Robinson Creek or lower Cougar Creek. All three areas have redband trout populations. When the maximum daily mean temperature metric is compared among monitored streams, Fox Creek ranks closest to sites without bull trout (lower Cougar Creek, lower Bear Creek, and the upper Deer Creek Tributary). The combination of low flows (0.50 cfs on October 26) and relatively warm summer temperatures (July 20 - August 18) in Fox Creek, indicate that the stream is unsuitable for early rearing of bull trout. Using the same criteria, it is even more evident that both Bear Creek and Deer Creek are clearly unsuitable habitat for early rearing of bull trout.

## RECOMMENDATION

(1) Additional temperature monitoring should be conducted in other areas of the Deer Creek drainage, Pine Creek and Cougar Creek.

## REFERENCES

- Bonar, S., Divens, M., and Bolding, B. 1997. Methods for sampling the distribution and abundance of bull trout and dolly varden. Washington Department of Fish and Wildlife Technical Report, Olympia, Washington. 46pp.
- Fraley, J., and Shepard, B. 1989. Life history, ecology, and population status of migratory bull trout (*Salvelinus confluens*) in the Flathead Lake and River System, Montana. Northwest Science 63: 133-143.
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## APPENDIX I

Jarbidge River drainage thermograph sites and temperature (OF) metrics, NDOW 1998, 1999 and 2000.

Stream Descriptor	Elevation (Feet)	Mean August Maximum Temp.	Maximum Temp.	3-Day Maximum Mean Temp.	7-Day Maximum Mean Temp.	Maximum Mean Daily Temp.
Upper Dave Cr.	7600	43.00	44.16	43.97	43.40	41.68
UpperWFJR	7400	51.10	52.98	52.70	52.26	50.69
Upper EFJR	7360	51.72	54.41	54.04	53.69	49.80
Trib. B - Slide Cr.	7400	52.70	55.87	54.85	54.64	50.59
Slide Cr.	7160	53.80	56.66	55.92	55.39	51.72
Fall Cr.	6560	53.99	57.15	56.50	55.84	53.12
Upper Jack Cr.	6720	54.54	57.54	57.20	57.06	54.65
Lower Jack Cr.	6320	55.70	58.67	58.10	57.46	56.11
Upper Robinson Cr.	7030	56.06	59.38	58.71	58.36	53.80
Upper Pine Cr.	7280	56.38	60.33	59.20	58.80	53.40
Fox Creek	7040	52.53	59.97	59.40	58.63	56.58
Lower Cougar Cr.	6800	58.80	61.94	61.27	60.80	57.30
Lower Bear Creek	6040	60.00	65.08	64.50	63.35	60.53
Upper Deer Cr. Trib.	7080	62.45	68.74	67.87	66.24	59.99

TITLE: *Salvelinus confluentus* Curiosity Society Workshop

DATE: August 13 - 18

Field Party: Gary Lee Johnson, Fishery Biologist and other biologists from Washington, Oregon, Idaho, Montana, and British Columbia.

#### OBJECTIVE

To attend and participate in the annual *Salvelinus confluentus* Curiosity Society meeting at Hoy River, Washington in 2000.

#### PROGRESS

The bull trout workshop was attended and a presentation was given on the Nevada bull trout scene. The meeting site was at the USFS Snider Work Center near Olympic National Park near the Sol Duck River. There were two half-day sessions of talks and one full-day of field surveys. The SCCS Workshop continues to be the best forum to learn about current bull trout management and research. Our attendance at the workshop continues to be appreciated by hosts and valuable knowledge and contacts are always made.

#### RECOMMENDATION

Nevada should continue to participate at this workshop.