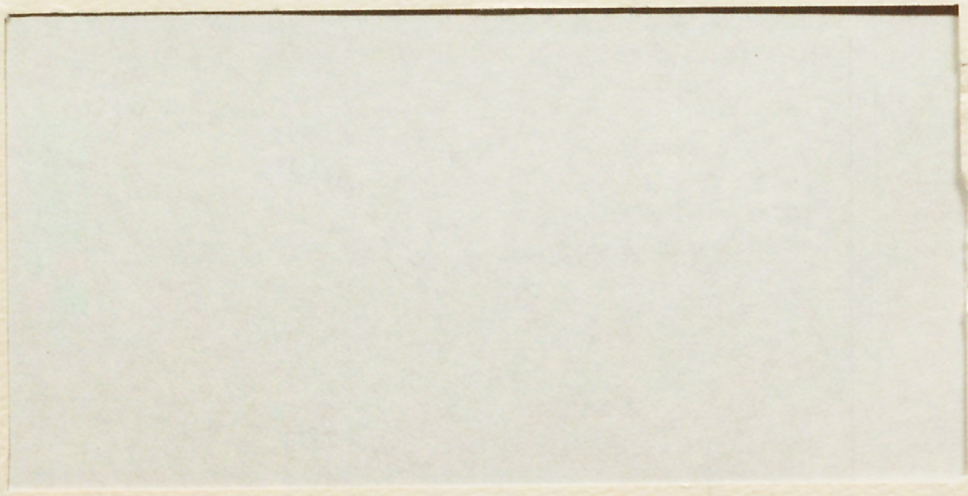
FISHERIES RESOURCE EVALUATION
CACHE CREEK EIS

PR-44-1

BIO/WEST, Inc.

Aquatic and Terrestrial
Resource Management and Problem Solving



FISHERIES RESOURCE EVALUATION
CACHE CREEK EIS

PR-44-1

Submitted to

Land Management Services
P. O. Box 2116
Jackson Hole, Wyoming 83001

Prepared by

Paul B. Holden
and
James R. Campbell

Submitted by

BIO/WEST, Inc.
P. O. Box 3226
Logan, Utah 84321

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INTRODUCTION

The U.S. Forest Service and U.S. Geological Survey are preparing an Environmental Impact Statement on proposed oil exploration in the Cache Creek area of the Teton National Forest, near Jackson, Wyoming. This fishery study represents a portion of the EIS data gathering effort by the U.S. Forest Service. The objective of this study was to provide a complete evaluation of the fisheries that would be potentially impacted by the proposed oil development, primarily related to the construction of access roads to proposed drilling sites.

STUDY AREA

Figure 1 shows the general location of the study area in northwestern Wyoming. This area is well known for its scenic attractions, primarily Grand Teton National Park. It is also well known for its cutthroat trout (Salmo clarki) fishery in the Snake River and its tributaries.

Figure 2 shown the area of the study in more detail. Streams inventoried in this study included Cache Creek, Game Creek, Horse Creek, and Little Granite Creek. Cache Creek and Game Creek are tributaries to Flat Creek, a tributary of the Snake River. Horse Creek drains directly into the Snake River. Little Granite Creek flows into Granite Creek, a tributary of the Hoback River, a major tributary of the Snake River.

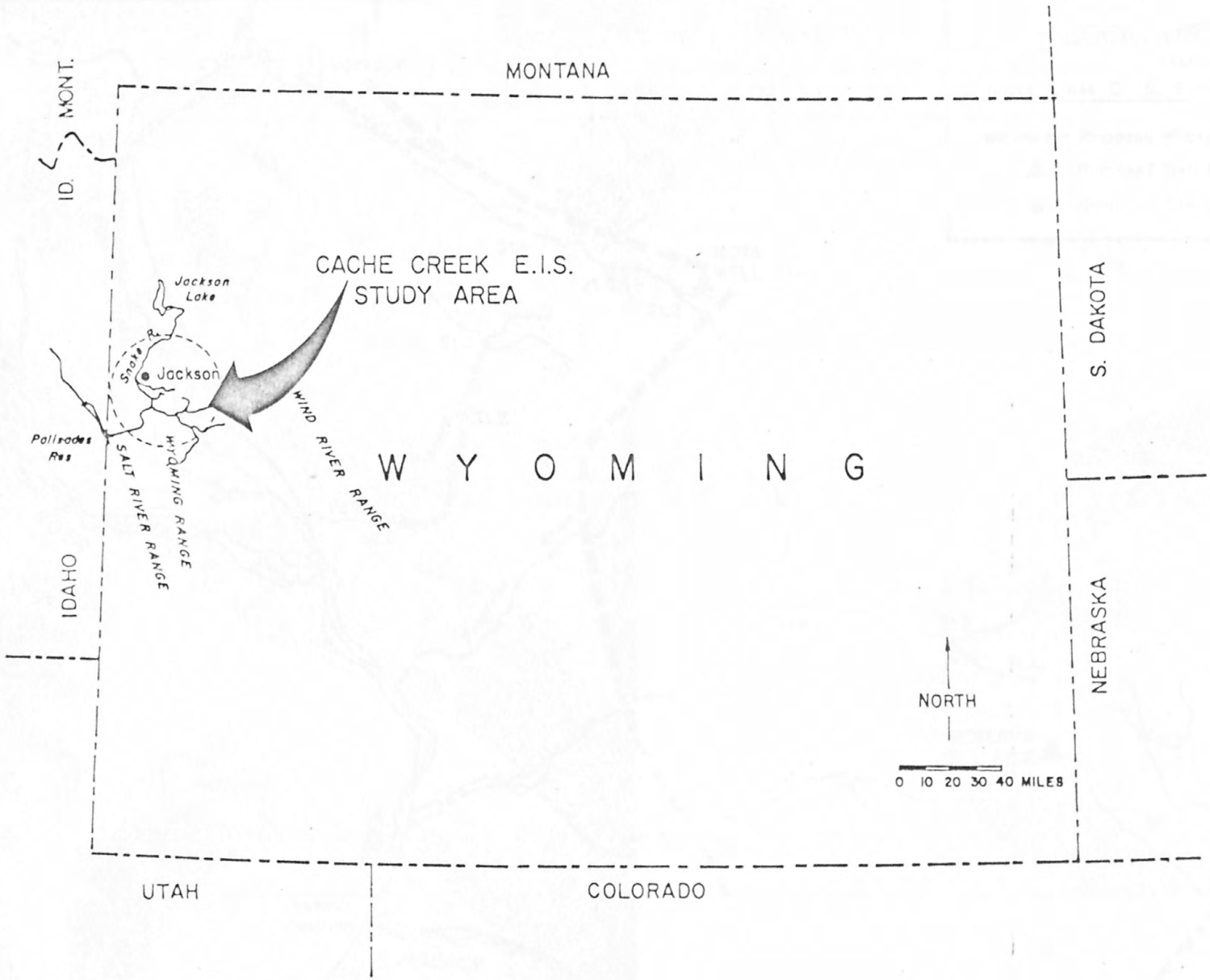
MONTANA
ID.
MONT.
CACHE CREEK E.I.S.
STUDY AREA
Jackson Lake
Snake R.
Jackson
Palisades Res
SALT RIVER RANGE
WYOMING RANGE
WIND RIVER RANGE
W Y O M I N G
S. DAKOTA
NEBRASKA
IDAHO
NORTH
0 10 20 30 40 MILES
UTAH
COLORADO

FIGURE 1

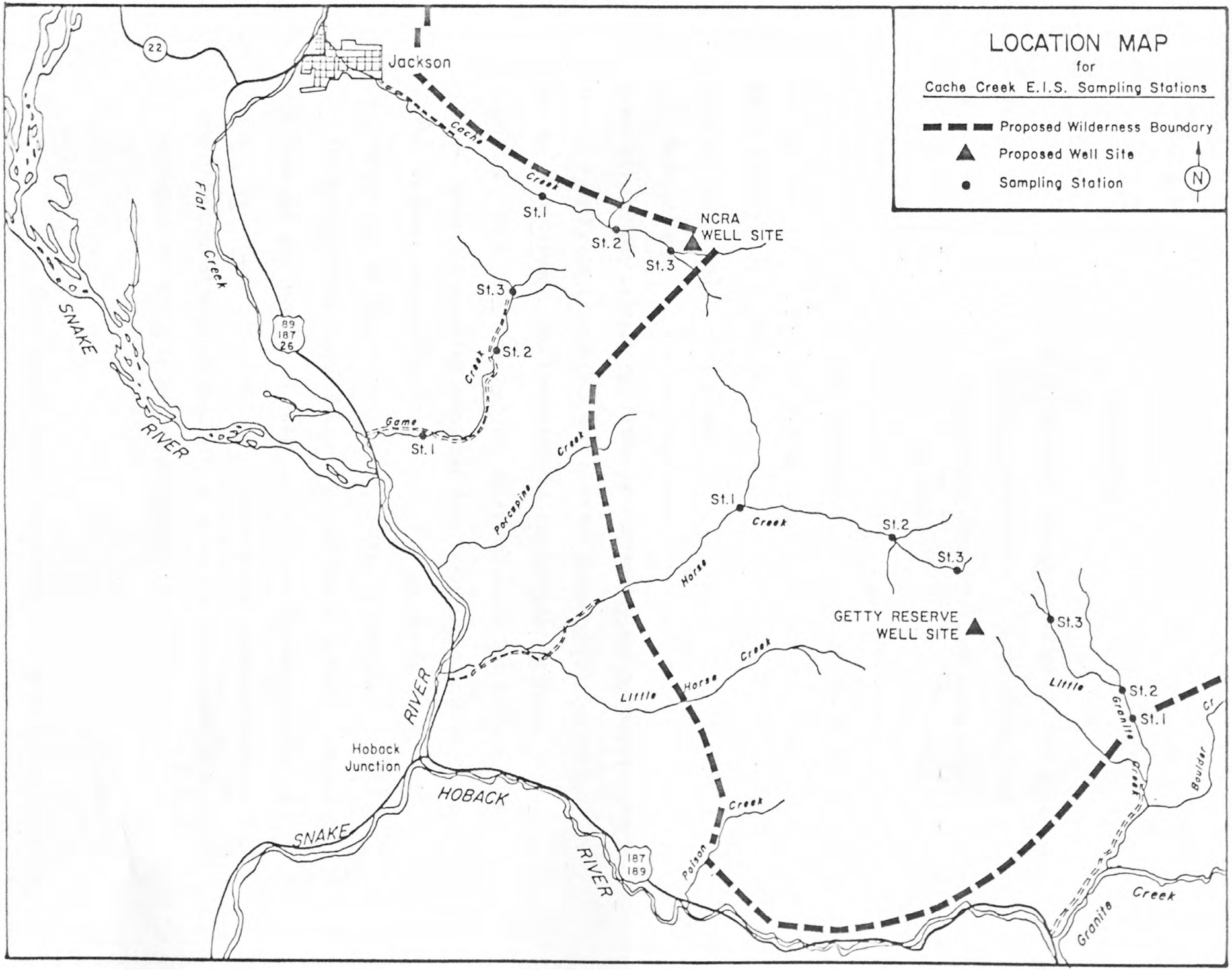
LOCATION MAP
for
Cache Creek E.I.S. Sampling Stations
Proposed Wilderness Boundary
Proposed Well Site
Sampling Station
N
Jackson
22
Cache Creek
St.1
St.2
St.3
NCRA WELL SITE
Flat Creek
SNAKE RIVER
89
187
26
Game Creek
Porcupine Creek
Horse Creek
GETTY RESERVE WELL SITE
Little Horse Creek
Little Granite Creek
Boulder Cr.
Granite Creek
Poison Creek
Hoback Junction
HOBACK RIVER
187
189

FIGURE 2

BACKGROUND

The fishery resources of the four streams included in this study are poorly known. All are fairly inaccessible, although Game Creek has a road along most of its length and a road follows Cache Creek for about 2 miles out of the city of Jackson. All of the streams have excellent trails along them. No quantitative fisherman use data are available for the streams, although the lower portions of all four streams are fairly accessible and therefore fished to some degree. Cache Creek probably contains the highest pressure due to its closeness and accessibility from Jackson.

Granite Creek, Flat Creek, the Hoback River, and the main Snake River all sustain significant fisheries—primarily for cutthroat trout. Flat Creek is probably an important spawning-rearing area for the Snake River. The importance of the tributary streams in supplying fish to these larger streams is not known but suspected to be low. Important spawning areas may occur near the mouths of these smaller streams, especially Little Granite Creek, Horse Creek, and Cache Creek, but no studies have verified this assumption.

The Wyoming Department of Game and Fish has as a major management objective the preservation of their native trout fishery—populations in this area. Therefore, the loss of Snake River cutthroat habitat, or the reduction of present populations by habitat alteration or overfishing, could seriously impact this management objective.

METHODS

The streams selected for study were those that would be impacted by proposed oil access roads. Previous data on the streams, both fisheries and habitat, were obtained from the Forest Service and Wyoming Department of Game and Fish. The Forest Service provided Stream Aquatic Habitat Inventory data sheets for stations that had been previously sampled. Our stations were selected to cover areas that may be impacted but which had not been inventoried previously. These were primarily in the upper, inaccessible portions of the streams. Three stations were established on each stream. Each station was sampled to assess the aquatic habitat following the method of Dunham and Collotzi (1975).

Ralph Hudelson of the Wyoming Department of Game and Fish in Jackson provided verbal accounts of the fisheries in the streams. Little, if any, information was available for the upper portions of each stream near the proposed drilling pad sites (Figure 2). Quantitative data was not available for the streams except for an older collection in Cache Creek.

Since fishery data was lacking, we suggested to the Forest Service that we make fish collections at one station in each of the streams of interest. This was beyond the original scope of work and was agreed to.

Once sampling was initiated, it was decided the fishery samples would be taken at all stations to obtain a more complete set of data. Therefore, each station was sampled by electrofishing using a Coffelt Model BP-1c backpack shocker. At least 250 feet of each stream was shocked to determine relative abundance and species composition. The area electrofished was the same area sampled in the habitat inventory. Fish caught were measured for total length and returned alive. Since the streams were small and clear, few fish escaped capture and therefore numbers caught approximated the total population. The exception to this was Station 1 on Little Granite Creek where numerous mottled sculpin were not netted.

The portions of the streams between stations were walked to visually assess habitat and to aid in predicting impacts associated with access road and pad development.

STREAM DESCRIPTIONS

Cache Creek

Cache Creek headwaters are located directly south-southeast of the proposed NCRA pad site. The stream flows northwest to the town of Jackson where it joins Flat Creek, a tributary to the Snake River.

A road provides vehicular access along Cache Creek about 2 miles upstream from the city of Jackson. A trail, suitable for horse or foot travel, then follows the stream to its headwaters.

Station 1

Station 1 was located at the intersection of Cache Creek and Gin Pole Draw (T40N, R115W, Sec. 7) (Figure 2). Riparian vegetation consisted of willows and sedge/grass mixture with some coniferous trees present.

The aquatic habitat at this station included a number of pools with good depth and cover (i.e., log jams, undercut banks). Flow was about 7.9 cubic feet/second (cfs) and the water temperature was 6°C at 1630 hrs. on September 24, 1980.

Electrofishing 250 feet of the stream at this station produced 13 Snake River cutthroat trout (Table 1). Every obvious fish holding structure contained at least one fish, but the population was not dense.

Table 1. Number of fish captured at the various stations by electrofishing.

	Mottled Sculpin	Snake River Cutthroat	Brook Trout
Little Granite Creek			
Station 1	22	7	0
Station 2	0	15	0
Station 3	0	17	0
Horse Creek			
Station 1	1	6	0
Station 2	0	22	0
Station 3	0	0	0
Game Creek			
Station 1	0	0	0
Station 2	0	3	37
Station 3	0	0	0
Cache Creek			
Station 1	0	13	0
Station 2	0	1	0
Station 3	0	0	0

Station 2

Station 2 was located directly downstream from the intersection of Cache Creek and the Game Creek trail (T40N, R115W, Sec. 8). Riparian vegetation consisted of willows and grass/sedge mixture.

The aquatic habitat at this station included shallow runs and riffles with few pools. The pools that were present were exposed and offered little shelter for fish. However, there were a few suitable undercut banks which could have sheltered fish. The water temperature at this station was 50°C at 1300 hrs. on September 24, 1980, and flows were 5.4 cfs.

Only one Snake River cutthroat was collected in 250 feet of stream sampled. Areas that should have contained fish did not, even though an abundant food supply was present in the form of aquatic macroinvertebrates.

Station 3

Station 3 on Cache Creek was located directly below the proposed NCRA pad site at the junction of the creek and a side canyon (T40N, R115W, Sec. 16). Riparian vegetation included coniferious trees and willows interspersed with grass/sedge mixture. Old beaver activity was present above and below the station.

The aquatic habitat at this station included numerous plunge pool type habitats because of the abundance of log jams. There was adequate cover and a good supply of aquatic macroinvertebrates to support a

population of fish. The water temperature at this station was 5°C at 1300 hrs. on September 23, 1980, and flow was 4.3 cfs.

No fish were electrofished or observed in 250 feet of stream sampled.

Game Creek

The headwaters of Game Creek are located 2.5 miles west of the proposed NCRA pad site. It then flows south-southeast where it joins Flat Creek. Access to Game Creek is gained from Highway 89/187 approximately 6.5 miles south of Jackson. A primitive dirt road, suitable for pickup travel, follows the stream for 5.5 miles to the trailhead for upper Game Creek and Cache Creek.

Station 1

Station 1 was located at the intersection of the Squaw Creek jeep trail and Game Creek (T40N, R116W, Sec. 26). Streamside vegetation included sagebrush mixed with sedge/grass mixtures.

The aquatic habitat at this station was very uniform, consisting of only shallow runs with no pools and few riffles. This could be attributed to the low flow present at this station. Water temperature at this station was 8.5°C at 1630 hrs. on September 25, 1980, and flow was measured at 0.1 cfs.

No fish were electrofished at this station, which was understandable as there was not enough water to support a fish population.

Station 2

Station 2 was located 3 miles from Highway 89/187, directly above the road crossing on Game Creek (T40N, R116W, Sec. 24). The stream at this station flowed through a wide sagebrush covered valley with sedge/grass communities bordering the stream. The aquatic habitat at this station included numerous runs with abundant submerged aquatic vegetation and grassy overhanging banks. There was also several log jam structures creating pools below them. The water temperature was 6°C at 1045 hrs. on September 25, 1980, and flow was 1.4 cfs.

Electrofishing 250 feet of the station produced 37 brook trout (Salvelinus fontinalis) and three Snake River cutthroats.

Station 3

Station 3 was located on the Right Hand Fork of Game Creek and adjacent to the Cache Creek trail (T40N, R116W, Sec. 13). Streamside vegetation consisted of sedge/grass communities.

The aquatic habitat at this station consisted of a series of shallow runs separated by small plunge pools formed by log barriers. The substrate was very uniform being made up of only gravel and sand/silt. Water temperature at this station was 6°C at 1400 hrs. on September 25, 1980, and flow was 0.5 cfs.

No fish were present at this station in the 250 feet electrofished which could be expected due to the minimal flow that was present.

Horse Creek

The headwaters of Horse Creek are located north by northwest of the proposed Getty Reserve pad site. It then flows west and southwest where it enters the Snake River 1.2 miles north of Hoback Junction. Access to Horse Creek is gained from Highway 187/89, 1.2 miles north of Hoback Junction. A primitive dirt road, through a private ranch, follows the stream for 2.3 miles. A horse/foot trail then follows the stream to its headwaters area.

Station 1

Station 1 was located directly below the confluence of Horse Creek and North Fork Horse Creek (T39N, R116W, Sec. 3). No riparian zone was present at this station as the coniferous forest extended to the streamside. The aquatic habitat at this station was somewhat uniform in that it was mostly constant depth runs with few to no pools present. The only breaks in continuity were achieved by boulders in the substrate. Water temperature at this station was 7°C at 1600 hrs. on September 26, 1980, and flow was 12.8 cfs.

Six Snake River cutthroats and one mottled sculpin (*Cottus bairdi*) were caught by electrofishing 250 feet of stream at this station.

Station 2

Station 2 was located 1.75 miles northwest of the proposed drill site directly below the confluence of two side drainages. The stream

was bordered on one side by exposed bedrock and on the other by coniferous forest growth.

The aquatic habitat at this station included several pools with good depth. The left bank was somewhat steep with exposed bedrock extending out into the stream. There was an abundance of large boulders throughout the station providing good holding areas for fish. This station had an extreme silt load that covered the entire substrate. The silt was apparently coming from the side canyon above the station, draining from the south. The water temperature was 5°C at 1250 hrs. on September 26, 1980, and flow was 3.8 cfs.

Twenty-two Snake River cutthroats were electrofished in 300 feet of stream at this station. Additional electrofishing above the station in an area of better pools, produced more cutthroats. Over 10 fish were found in one deep pool below a log jam.

Station 3

Station 3 was located 1.0 mile north by northwest of the proposed drill site (T39N, R115W, Sec. 1). There was little riparian vegetation other than grasses as the coniferous forest extended down to the streamside.

The aquatic habitat at this station was reflective of the scouring action of spring runoffs. Substrate particle size was mainly confined to the large size particles with very little sand/silt present. The habitat appeared to be acceptable to fish populations with pools and

undercut banks present. There was also adequate populations of aquatic macroinvertebrates inhabiting the substrate of the stream. The water temperature was 3.5°C at 0930 hrs. on September 26, 1980, and flow was 2.5 cfs.

No fish were observed or electrofished in the entire length of the station.

Little Granite Creek

The headwaters of Little Granite Creek are located east by northeast of the proposed Getty Reserve pad site. The stream then flows southward where it joins Boulder Creek before entering Granite Creek, a tributary of the Hoback River. Access to Little Granite Creek is gained from Highway 187/189. A dirt road, 11.5 miles east of Hoback Junction, extends northward from the highway for 3.5 miles to the mouth of Rough Draw and an old mine site on Little Granite Creek. A horse/foot trail then follows the stream to its headwaters area.

Station 1

Station 1 on Little Granite Creek was located approximately 1.3 miles upstream from the confluence with Boulder Creek where the trail crosses the stream (T39N, R114W, Sec. 22). The station began directly above this stream crossing. The stream sides were steep along this station with vegetative growth restricted to coniferous trees and grasses.

The aquatic habitat was reflective of a somewhat steep gradient and swift current. The majority of the substrate size was confined to large rubble which was unimbedded. Very few pools were present at the station. Water temperature was 9°C at 1530 on September 27, 1980, and flow was 7.2 cfs.

Seven Snake River cutthroat trout and 22 mottled sculpin were electrofished in 250 feet of stream.

Station 2

Station 2 was located 1.0 miles above Station 1 on the right hand fork of Little Granite Creek (T39N, R114W, Sec. 15). The station began just above its confluence with Little Granite Creek. Riparian vegetation included willows and grasses as the station was located in a meadow type environment.

The aquatic habitat included several log jam structures which created plunge pools and shelter. There was also an abundance of rubble to provide good substrate for invertebrate populations. The water temperature was 7.0°C at 1215 hrs. on September 27, 1980, and flow was 2.3 cfs.

A total of 15 Snake River cutthroats were collected at this station by electrofishing 250 feet of stream.

Station 3

Station 3 was located two miles above Station 2 at the point where the trail crosses the stream (T39N, R114W, Sec. 9). Vegetation

adjacent to the station consisted of coniferous forest growth with no riparian zone present.

The most significant feature of the aquatic habitat appeared to be the large amount of undercut banks and debris cover along the stream banks. This provided good shelter for the fish population occupying this section of the stream. Flow in this section of the stream was 3.7 cfs.

There was a total of 17 Snake River cutthroats captured from this section of stream.

DISCUSSION OF FIELD SURVEY RESULTS

The four streams considered can be placed into two groups, one containing native fish species only, the other containing primarily introduced fishes. Game Creek is the only stream which contained non-native species, the brook trout. Brook trout are stocked in the beaver ponds between Stations 2 and 3 on a fairly regular basis according to the Wyoming Department of Game and Fish. The ponds apparently winter kill on a regular basis also. The other three streams all contain populations of the native Snake River cutthroat trout.

Excellent cutthroat populations were noted at Station 2 on Horse Creek and Stations 2 and 3 on Little Granite Creek. Good populations were found at Station 1 on Cache Creek, and low populations at Station 1 on Horse and Little Granite creeks and Stations 2 of Cache and Game creeks. No fish were found at the other stations except Station 2 on Game Creek where an excellent brook trout population was found.

The areas that did not contain fish either had too low a flow level (Stations 1 and 3 on Game Creek), or were headwater areas where winter conditions are probably too harsh for survival of fish (Stations 3 on Cache and Horse creeks).

Low populations of trout were found in areas of poor habitat, primarily meaning few pools with adequate cover (Station 1 on Horse

Creek) or in areas of medium quality habitat that were fished (Station 1, Little Granite Creek and Station 2, Cache Creek). Low cutthroat populations in Game Creek were probably a combination of poor overwintering habitat, competition with brook trout, and fishing pressure.

Good populations of cutthroat trout were found in lower Cache Creek where habitat was excellent, but fishing pressure probably held the population down.

The excellent cutthroat populations were in inaccessible areas of excellent habitat that were not fished. The excellent brook trout population was due to excellent habitat and stocking.

Therefore the primary factors limiting cutthroat trout populations in portions of the study area are poor habitat, meaning few high quality pools, extreme winter conditions, and fishing pressure.

The cutthroat trout collected during this study were found almost exclusively in pools with overhead cover. Log jams were the primary source of such pools. The downstream portions of Little Granite and Horse creeks apparently contained sufficient flow during spring breakup to flush logs and other debris from the stream channel. Hence, habitat was considerably poorer than headwater areas that did not flush out in-stream debris totally. Lower Cache Creek, on the other hand, did contain excellent pools and apparently does not have the severe flushing spring flows suggested in the other two streams.

The fishery data collected in this study is in general agreement with that obtained from the Wyoming Department of Game and Fish. Their observations had only included the lower portions of the streams, and therefore only low fish populations were known. This study points out heretofore unknown excellent cutthroat populations in the upper reaches of Horse and Little Granite creeks. It also clarifies considerably the limiting factors working on the small streams of the study area.

ENVIRONMENTAL CONSEQUENCES

Direct Impacts

Several major impacts will be associated with road construction and maintenance in the Cache Creek E.I.S. study area. First, the road construction would expose areas of erodable soils which would increase erosion. The finer particles would lodge in the interstices of the streambed, reducing its potential for aquatic insect production and spawning habitat. Heavy rains during or soon after construction could cause siltation in all stream sections below the problem area, including the larger streams such as Flat Creek. Since all four streams have portions in narrow canyons, siltation caused by road construction in such areas would be the most likely problem areas.

Mitigative measures to reduce siltation include revegetation of disturbed areas, construction of dikes, berms and settling ponds to catch soil before it enters streams, minimize construction on steep areas or in highly erodable soils. These measures never completely mitigate the impact but can reduce it.

Road construction in close proximity to streams removes vegetative cover near and/or over the stream. The loss of overhead cover reduces fishery habitat quality as cover is an important part of trout habitat. Since log jams create many of the pools in the study streams, loss of trees along the stream, especially in the upper areas, would cause a long-term reduction in habitat quality by reducing the

number of pools that would be created. This impact can be mitigated by not allowing construction within 100 feet of a stream channel. Also, vegetation clearing should only be allowed to the toe of the road fill material.

Another impact involves the increased accessibility a road provides, therefore increased fishing pressure would occur in the study streams. Increased fishing pressure has the potential of reducing the cutthroat trout population below the levels where natural maintenance could occur. This impact is difficult to mitigate because roads, once built, are difficult to close unless they are not used by anyone. Therefore an increase in fishing pressure, and a consequent decrease in the populations, is unavoidable.

Road crossings of small streams are another serious impact. Road crossings usually require instream activity and straightening of the channel. Both activities reduce fish habitat quality by destroying natural pools and cover. The impact of road crossings can be alleviated by avoiding crossings where possible. When crossings are necessary, impacts can be mitigated by not allowing vegetation clearing within 100 feet of the stream except at the crossing proper, and then only for the crossing width. Natural meanders should be left intact, and no channel straightening should be allowed. Bridges rather than culverts should be used for all crossings. Special precaution should be taken to prevent sedimentation of streams while the crossing is being constructed.

Since the exact alignment and other engineering details of the alternative routes are not known, a quantitative impact comparison is not possible. Therefore, the potential for impact of each alternative will be evaluated.

NCRA Well Site

Cache Creek, with its Snake River cutthroat populations would be more sensitive than Game Creek. But since both routes include a section on upper Cache Creek, both would potentially impact that stream. Increased access along both streams would increase fishing pressure, again this would affect Cache Creek the most. Cache Creek would probably be reduced to a non-viable fishery with the construction of either alternative due primarily to increased fishing pressure but also to habitat degradation. Game Creek would be less effected because shorter portions of it are presently valuable and the fishery is presently stocked. Flat Creek would receive some siltation from either alternatives, which could have rather significant results.

Getty Reserve Well Site

Construction of access roads up either Horse or Little Granite creeks would cause a dramatic decline in these two excellent Snake River cutthroat populations. The most serious problem would probably be fishing pressure, but habitat degradation could also be serious.

This latter factor would be most serious in Horse Creek where steep canyon sides and erodable soils are plentiful and some natural siltation is already occurring.

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Dunham, D. K. and A. Collotzi. 1975. The transect method of stream habitat inventory. U.S. Forest Service, Ogden, Utah. 98 pp.

BIO/WEST, Inc.

P.O. Box 3226
Logan, Utah 84321

Art
by
Scott Greenwood