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Densities and habitat utilization of Wood River sculpin (Cottus leiopomus) on three Nature Conservancy preserves in Idaho

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Introduction

The Wood River sculpin, Cottus leiopomus, has been found only in the Wood River basin and in nearby drainages in Idaho (Simpson and Wallace, 1978). It is listed as a federal candidate for threatened species status, and is ranked as a sensitive species in the state of Idaho (Moseley and Groves, 1992). There is no published information on the Wood River sculpin, although it is believed to be similar to other Cottus species found in the area such as the shorthead sculpin, C. confusus; the Paiute sculpin, C. beldingi; the mottled sculpin, C. bairdi; and the Shoshone sculpin, C. greenei.

Because freshwater sculpin are sensitive to habitat alterations and pollution, they are viewed as indicators of good water quality in streams. The Wood River Valley is presently experiencing a serious threat to its riparian and stream channel communities in the form of intense housing and transportation developments. Individuals of C. leiopomus have been found, or were expected to be found, on three properties, the Hemingway, Soldier Creek Stapp, and Silver Creek Preserves owned by The Nature Conservancy. These sculpin populations have never been systematically surveyed.

This report describes a survey of these three Preserves conducted in June and July 1992. Sampling was done to determine the presence, population density, and habitat utilization of Wood River sculpin in six different habitat types based on differing substrate, vegetation, and water velocity.

Methods

Study Sites

The Hemingway Preserve in Ketchum (Blaine County, Idaho) contains a 1.7 km stretch of the Big Wood River, a fast flowing, cobblestone bottomed river which was shaded by tall riparian vegetation. The channel was approximately 15 to 20 m wide. Average depth during low water was 30 cm. Water velocity ranged from 18 to 71 cm/s, and water temperatures ranged from 10° to 15° C on sampling dates.

The Soldier Creek Stapp Preserve, located 14.5 km above Fairfield (Camas County, Idaho) contains a 1.61 km stretch of a very shaded, small, shallow stream impacted heavily by beaver activity. This portion of Soldier Creek is a series of thirteen dams which formed pools filled with fine sediments. The sections between the dams were mostly cobble and some gravel riffles. The beaver dam pools were about 10 m wide and riffles were around 5 m wide. The average depth of the pools and the riffles was 90 cm and 25 cm, respectively. Water velocity was zero in the pools, and averaged 43 cm/s in the riffles. Between noon and 3 P.M., water temperatures ranged from 15° to 18.5° C. The highest temperatures were found in the pools.

Silver Creek Preserve, located 6.4 km west of Picabo (Blaine County, Idaho) encompasses over 22.5 km of stream length along the tributaries and main stem of Silver Creek. These stream systems are spring creeks. Channel widths varied highly, from 5

m in the smallest creek to over 100 m in the lower part of the Preserve. A majority of the channels were highly sedimented and have dense macrophyte growth. Isolated pockets of boulder and cobble were associated with manmade culverts, bridges and rock weirs. Otherwise, the dominant substrates throughout Silver Creek and its tributaries were fine sediments with some patches of gravel scours between the high sediment and macrophyte growth. Water velocity for the six creeks surveyed on Silver Creek Preserve ranged from 10 to 155 cm/s. Water temperatures ranged from 13° to 20° C.

Sampling Techniques

Framesampling was performed using a framenet to enclose a 1 m^2 area. The frame was 75 cm high with 1 m^2 openings at the top and bottom. It was constructed with 1.9 cm diameter PVC tubing, with 0.3 cm mesh netting attached to the sides of the frame. The framenet was carefully placed over a randomly chosen site, and then dipnets were used to sweep the interior volume. One or two dipnetters continued netting until they made three consecutive sweeps without catching a sculpin.

Kicksampling was done at randomly chosen sites along a 10 m stretch. Starting at the lower end, either one dipnet 42 cm wide was used, or two dipnets were placed side by side equalling 85 cm in width. One person secured the dipnet(s) on the streambottom while the other person, staying within the width of the net(s), dislodged the cobbles about 0.5 m above the net(s). Material was swept by the current into the net(s) and they were checked

frequently. After all rocks were dislodged from one area, the net(s) were moved forward. This was done along the entire length of 10 m.

Electrofishing was done with a Coffelt backpack electroshocking unit, set at 500-550 volts DC on the Hemingway Preserve, 400-600 volts DC on Soldier Creek Stapp Preserve and 300-400 volts DC on Silver Creek Preserve. One person operated the electroshocker while another person with a dipnet stood below them to collect the stunned fish in the current. One or three passes were done by zig-zagging along a stretch of creek to cover the entire channel width. For three pass shocking a blocknet was placed at the lower end of a sample site to prevent fish from escaping. The blocknet design had a net tied to two poles, one at each end. The net was stretched tightly across the stream channel, and the poles were secured on opposite banks. The bottom of the net in the stream was weighted down with rocks and sealed as tightly as possible.

All fish caught were identified in the field and released alive. A plexiglass aquarium-like measuring board was used to facilitate identification and measurement of total length.

On each Preserve, the entire length of creek was walked, and a rough sketch of the creek was drawn in the field. On these sketches, areas of creek were divided into different habitat types according to differing substrate, vegetation and water velocity. Six habitats were described (Table 1). Slow water had low gradient, low velocity, high sediment and dense, bank to bank

macrophyte growth. Gravel scours were higher gradient, medium velocity, with less sediment and macrophytes than the slow water habitat. The scours occurred as patches between the sediment and macrophyte growth. Riffles, occurring over cobble or gravel substrate, were higher gradient and velocity, with low amounts of sediment, and little or no macrophyte growth. Manmade structures such as culverts and bridges, were also higher gradient and velocity, with less sediment and macrophyte growth. Pools occurred as springs, sloughs or beaver dams. The pools had low gradient, low velocity (often zero), high amounts of sediment in the sloughs and beaver dams, or fine substrates like sand in the springs. Depending on the substrate, macrophytes varied. Undercut bank conditions varied and may include any of the habitats described above. Sample sites were chosen randomly by placing a translucent paper grid over the sketches and by using a calculator random number generator to determine the x and y coordinates for each site.

The Big Wood River on the Hemingway Preserve was sampled on 15, 27 and 28 July 1992, by two people. On 15 July, six framesamples and two kicksamples were done. Two framesamples were taken in an isolated side channel containing beaver dam pools. All other samples were taken in the cobble/riffles of the main channel. On 27 and 28 July, five randomly chosen sites were three pass electroshocked. After each pass, fish were identified, enumerated and released below the blocknet.

Soldier Creek Stapp Preserve was first sampled 28 June 1992,

by two people. Starting at the lower end of the preserve boundary and heading upstream, sampling areas were broken into reaches using the upper and lower ends of beaver dams as natural barriers. Three reaches were electroshocked using a single pass. On 21-22 July 1992, two people returned to Soldier Creek to complete three more samples. This time the three pass electroshock method was done with a blocknet. Sites were selected having a beaver dam at the upper end as a barrier; a blocknet was placed at the lower end to enclose the area. After each pass, fish were identified, enumerated and released below the blocknet.

From 9 June to 16 July 1992, Silver, Mud, Chaney, Grove, Loving and Stalker Creeks were sampled on Silver Creek Preserve and easement properties. Sampling techniques utilized were framenetting, electroshocking, and one kicksample. The framenet was used in the highly vegetated and sedimented portions of the creeks, in gravel scours, and in the gravel on Grove Creek. One pass electroshocking was done at all bridges, culverts, and undercut bank samples. Stream width was too great to allow the use of blocknets. When the cobble or boulder around bridges and culverts was shocked, one person operated the electroshocker to stun the fish while another person collected the fish with a dipnet as they emerged from the rocks. In that single pass, as many fish as possible were caught. Since sculpin densities were low on most of Silver Creek Preserve, all fish were likely captured. The area of the sample was also determined here.

Undercut banks were shocked in the same manner, heading upstream along either 24 m on one bank, or along 12 m on both banks of the channel. On Grove Creek, sculpin densities were too high in the undercut banks to catch all of the fish in each single pass.

Fish density could not be quantitatively determined from kicksampling or bank electroshocking. Kicksampling was not an effective technique for removing all the fish within the sample area. During this study the area of the field of electricity was never measured when electroshocking. This, in conjunction with the narrow, linear nature of the undercut bank samples, made it impossible to quantify the area of banks shocked.

The Zippin calculation (Platts et al., 1983) was used to acquire population estimates from the three pass electrofishing data. Three pass results were used to calibrate the single passes done on Soldier Creek. For every three pass sample the percentage that the first pass was of the population estimate, N, was calculated. These percentages were averaged over the three samples. This average percentage was then divided into the number of fish caught in each single pass sample to obtain projected totals.

Fish Identification

The Wood River sculpin, C. leiopomus, has an incomplete lateral line. Prickles are absent. The head is moderately large and characteristically oval in shape. This fish is an olive color with dark mottling. The most important characteristic, however, is the absence or underdevelopment of the preopercular

spine (Simpson and Wallace, 1982). Frequently, on one side of the head, a single, poorly developed preopercular spine is present, but no preopercular spine appears on the other side of the head. This asymmetry can be misleading or mistaken for the presence of a preopercular spine. Therefore, it is important to look at both sides of the head on each individual sculpin.

The other sculpin encountered in this study was the Paiute sculpin, Cottus beldingi, on Silver Creek Preserve. This sculpin has a thicker body shape. Prickles are absent, and the head is moderately robust, lacking the oval roundness of C. leiopomus. Usually, the Paiute sculpin has one to two upper, large preopercular spines. The lateral line may be complete or incomplete, but if complete, is a good characteristic for distinguishing it from the Wood River sculpin. Another useful characteristic for identifying this sculpin is the presence of five to seven crossbars or lateral bands on the back which the Wood River sculpin lack (Simpson and Wallace, 1982).

Results and Discussion

Presence

Wood River sculpin, C. leiopomus, were present on all three Preserves in this study. Five Paiute sculpin, C. beldingi, were found in Silver, Grove and Stalker Creeks on Silver Creek Preserve. Francis and Bjornn (1979) claim they found Cottus aleuticus on the Silver Creek Preserve. However, this is highly unlikely and probably a misidentification because C. aleuticus is

a Pacific coastrange sculpin of Canada and the United States whose range does not extend into Idaho (Scott and Crossman, 1973). No sculpin fitting the characteristics of C. aleuticus were found on Silver Creek in this survey.

From 1971 to 1978 Wood River sculpin were collected (R.L. Wallace, University of Idaho, personal communication) on the Big Wood River from Galena Summit to Bellevue, and in tributaries of the Big Wood -- Trail Creek and Warm River, and in Freidman Creek, a tributary of the Little Wood River. Also, Wood River sculpin were collected in two Silver Creek tributaries, Wilson Creek and Loving Creek above Hayspur Fish Hatchery.

Sculpin Densities and Habitat Utilization

The Big Wood River on the Hemingway Preserve yielded the highest catches of Wood River sculpin followed by Soldier Creek. Silver Creek contained substantially fewer sculpin than the first two Preserves. On the Hemingway Preserve a total of 200 Wood River sculpin were caught. On Soldier Creek Stapp Preserve a total of 139 Wood River sculpin were caught. Of these, 113 sculpin were from the riffle samples and 26 sculpin were caught in the beaver dam pools. On Silver Creek Preserve a total of 42 Wood River sculpin and five Paiute sculpin were caught. Almost half of the Wood River sculpin, 22 fish, were from Grove Creek on this Preserve (Fig. 5).

For comparison, average densities of Wood River sculpin were about 73 fish/100 m^2 on the Hemingway Preserve, and 19 fish/100 m^2 on Soldier Creek Preserve. This indicates that a much larger

population exists on the Big Wood River. On the Big Wood River three sampling techniques were used. Sculpin densities were determined on the Hemingway Preserve from three pass electrofishing data only. Here, electrofishing yielded the best quantitative results with a mean of 72.7 fish/m^2. The other two sampling techniques were inferior for determining densities on this river. Kicksampling yielded a mean of 11.8 fish/100 m^2. No sculpin were caught by framenetting (Table 2). Densities on the Soldier Creek Stapp Preserve were determined from one and three pass electrofishing results. Soldier Creek had a mean of 18.8 fish/100 m^2. On Silver Creek Preserve sculpin densities were not determined due to the small size of the population there. Sculpin were caught on Silver Creek Preserve by one pass electrofishing, framesampling and one kicksample.

The Big Wood River of the Hemingway Preserve contained the highest densities of sculpin. This river consisted mostly of the cobble/riffle habitat type. No sculpin were found in the two pool samples on the Big Wood River (Table 2). The highest density of Wood River sculpin was found in a sample from a relatively high velocity riffle. These sculpin are probably utilizing the broken surface of the riffles as cover and the spaces inbetween the rocks for cover, food and spawning.

Initially, on 1 June 1992 when the river water was high, sculpin were seen in a small side channel in front of the Hemingway house. A month later, when actual sampling was done, flow had decreased and the side channel was dry except for a few

beaver dam pools where no sculpin were seen or found. Therefore, the sculpin must have migrated back into the main channel or died. During high water the side channel appears to be suitable habitat for the Wood River sculpin.

With the exception of a few deep pools, the habitat of the Big Wood River in the study site consists of fairly uniform cobble riffles. Wood River sculpin densities are probably highest in this study site because almost all of the habitat can be utilized by the sculpin. There are few obstructions preventing the sculpin from using the entire channel on the Big Wood River. However, on Soldier Creek Preserve beaver dams comprise at least half of the stream and interrupt the cobble riffle habitat.

Bruns and Minshall (1979) reported Wood River sculpin densities on the Big Wood River. Seven study sites were established along the river beginning with headwaters near Galena Summit and extending downstream to Hailey. The sites were sampled in August and October 1977. The two sites with the highest densities of sculpin were located on Coyote and Cherry creeks that enter the Big Wood River approximately 2.5 km below Galena. Sculpin densities (species not identified, but were presumably C. leiopomus) there ranged from 16-18 fish/100 m^2 on Coyote Creek and 58-120 fish/100 m^2 on Cherry Creek. The two sites nearest to the Hemingway Preserve were immediately below the confluence of the North Fork, with 2-6 fish/100, and immediately above the city of Ketchum sewage treatment facility,

with 5-9 fish/100 m^2.

Soldier Creek Stapp Preserve contained far fewer C. leiopomus than the Hemingway Preserve. Sample densities showed that sculpin were more abundant in riffles than in pools (Table 3). The sculpin caught in beaver pools appeared to have lower body condition and may have been trapped there. The pools had low velocity, were silted, and macrophytes were generally absent. Sculpin probably do not select this habitat because it lacks proper substrate, i.e. cobble or gravel needed for cover, food and spawning. Of the 2231 m^2 sampled on Soldier Creek Stapp Preserve, 1677 m^2 of that area was beaver pools. Since 75% of Soldier Creek on the Preserve is interrupted by beaver dam pools, less usable habitat is available for the Wood River sculpin in comparison to habitat on the Big Wood River.

Silver Creek Preserve samples taken in the main stem of Silver Creek and in five tributaries contained very few sculpin. On Silver Creek Preserve C. leiopomus densities were highest in Grove Creek followed in decreasing order by Stalker Creek, Mud Creek, Silver Creek and Chaney Creek. No sculpin were found in the study sites in Loving Creek (Table 4). Overall, Silver Creek system is lacking the cobble/riffles characteristic of the Big Wood River and Soldier Creek. In the Silver Creek system no sculpin were caught in the habitat with the slowest velocity and the highest amounts of sediment and macrophytes. Also, none were found in the still waters, pool/sloughs (Table 4). The slowest velocity water with heavy sedimentation and dense macrophyte

growth is subject to high temperature fluctuations, 13-20° C on hot days. Apparently, this habitat type is not favorable for the Wood River sculpin. The constant temperatures of Sullivan spring and Stalker spring, as well as the heavily sedimented and vegetated portions of Sullivan spring and Lower Silver Slough, contained no sculpin.

The habitat types harboring the highest densities of Wood River sculpin on Silver Creek Preserve were gravel riffles, manmade structures containing cobble and boulder such as, bridges and culverts, and undercut banks. Riffles occurred in Silver and Grove Creeks. Small sculpin were found in the riffles in Grove Creek, but no sculpin were found in the riffles on Silver Creek. Manmade structures occurred in all creeks. This rocky habitat was in isolated pockets throughout the Preserve and is artificial to the system. Ironically, it provides some of the best habitat for C. leiopomus. Undercut banks are really a mesohabitat because they occur within other habitat types. Of all habitats checked on Silver Creek Preserve, Wood River sculpin tended to select undercut banks the most. Only one Wood River sculpin was caught in the gravel scours, which is intermediate between the slowest velocity waters and the riffles and appears to offer inadequate cover for sculpin (Table 4).

Grunder (1982) dredged sample sites on Mud Creek of Silver Creek Preserve. During his study he caught incidental species of fish including Wood River sculpin and reported their numbers. For comparison, one of his sites (12 m long) was resampled in

this survey. In June 1982 he caught 6 sculpin. In June 1992, only 2 Wood River sculpin were caught at this same site.

From 3 October through 14 November 1992, during a brown trout study on Silver Creek Preserve, incidental catches of sculpin were reported (R. Wilkison, Idaho State University, personal communication) for day and night boat electroshocking samples. Stalker Creek was shocked primarily in the day and five sculpin were caught. The main stem of Silver Creek was sampled primarily at night and twelve sculpin were caught. A site above Kilpatrick bridge, located at the lower end of the Preserve, was also shocked primarily at night and four sculpin were caught.

An interesting general observation was made comparing trout and sculpin in the three Preserves. When trout seemed less abundant, sculpin densities were high, as seen on the Big Wood River where 200 sculpin and 51 trout were caught during this study. On Soldier Creek Preserve 139 Wood River sculpin and 78 trout were caught. Where trout were very abundant, sculpin densities were quite low, as seen on Silver Creek Preserve. Trout do prey on sculpin (Simpson and Wallace, 1982). This could be a significant relationship. This observation is highly speculative, though. It is unknown whether trout and sculpin are competing for similar resources, or if trout are a significant predator on sculpin. This observation could merit further study, especially on Silver Creek Preserve where the habitat for sculpin is marginal and brown trout are abundant. If trout are preying upon and/or competing with Wood River sculpin for resources, the

sculpin could be negatively affected.

Evaluation of Sampling Techniques

The three sampling techniques used on the Hemingway and Silver Creek Preserves yielded different results. This calls for an evaluation of each sampling method used. On the Big Wood River electroshocking worked best. Kicksampling and framenetting did not give good quantitative results. Only one sampling method, electroshocking, was used on Soldier Creek Stapp Preserve. On Silver Creek Preserve mostly framenetting and electroshocking were done. Silver Creek undercut bank, manmade structure and pool samples were single pass electroshocked because the channels were too wide for blocknets. This made it difficult to obtain quantitative population densities, especially at undercut banks where the linear nature of the sample made it hard to measure the area being shocked.

Framenetting works well in areas where the vegetation and substrate within the frame can be dislodged with a dipnet. Fine sediments, gravel and dense macrophytes such as those on Silver Creek Preserve are easily sampled with the framenet. However, cobble and boulder are too difficult to dislodge. Framenetting is ineffective if fish can hide between or under rocks as they did on the Hemingway Preserve.

Kicksampling is done ideally in swift water so material can be swept quickly into nets below. It yielded better results than framenetting but still grossly underestimated population numbers on the Big Wood River. Kicksampling is useful in determining the

presence, but not quantitative densities of sculpin. All fish may not be dislodged, and those that do may be carried around the net instead of into it.

Electroshocking appears to be the most effective method for catching and locating large numbers of fish. It is not as easy to quantify a sample area as it is with the framenet. Also, it is difficult to catch all of the stunned fish. Some sculpin go into the rocks or vegetation or are lost in the current. Because of these complications, blocknets and multiple passes are required which make this sampling technique more labor intensive and time consuming than framenetting.

Size of Sculpin

Small sculpins that were apparently young-of-the-year were found on all three Preserves in this study. On 2 July 1992, one 15 mm sculpin was caught in the gravel on Grove Creek. On 28 July 1992, about ten, 10 mm or smaller sculpin fry were seen in the shallow water near the bank on the Big Wood River. On 22 July 1992, while electroshocking Soldier Creek, hundreds of 10 mm and under sculpin were found in the mud in a shallow pool. These fry burrowed into the silt when shocked. Throughout this study, sculpins of all sizes were observed to burrow into the mud or let disturbed, loose sediment settle over them for concealment.

On the Big Wood River on the Hemingway Preserve, the majority of Wood River sculpin caught were 41-60 mm. No sculpin were caught in size ranges 111-130 or 0-30 mm, although sculpin <

10mm were seen and not captured (Fig. 1). Most Wood River sculpin on Soldier Creek Stapp Preserve were 51-70 mm. No sculpin 31-40 or 121-130 mm were caught (Fig. 2). Silver Creek Preserve, which is quite different habitat from the other two Preserves, mostly had Wood River sculpin 31-40 mm and 81-90 mm. No sculpin < 15 mm were caught (Figs. 3-5).

Maximum sizes, 120-130 mm on Soldier and Silver creeks and 110 mm on the Hemingway, were similar for the three preserves. Size class peaks on the Big Wood River and Soldier Creek were 41-60 mm and 51-70 mm, respectively (Figs. 1-3). If these size classes of sculpin on these two Preserves represent fish of the same age, then the slightly smaller fish on the Big Wood River are growing slower than sculpin on Soldier Creek. Factors contributing to growth rates in fish are stream fertility, water temperature, and inter- or intra-specific resource competition.

On Grove Creek of Silver Creek Preserve, fish < 35 mm were among the gravel and fish 35-105 mm were caught from under the banks (Fig. 4). This division is probably a result of cover requirements of different sized fish. The small sculpin can utilize gravel well, but larger fish need better cover.

Life History and Niche of Wood River Sculpin

The Wood River sculpin is believed to be similar to other sculpin species found in Idaho such as the shorthead, Paiute, mottled and Shoshone. Taxonomically, the Wood River sculpin is related to the shorthead, Paiute and mottled sculpins; they are all in the Bairdi species group. Shoshone sculpin is in the

Asper species group (Bailey and Bond, 1963). The shorthead sculpin occurs in the Columbia River system and Puget Sound freshwater streams. In Idaho it has mostly been taken from Snake River tributaries below Shoshone Falls and the Big Lost River. The natural range of the Piute sculpin is the Lahonton and Bonneville basins and the Columbia River drainage, including the upper Snake River. The mottled sculpin has a wide, but disjunct, range throughout North America and is located both east and west of the Continental Divide. In Idaho it has been collected from Snake River and tributaries above Shoshone Falls, Bear River basin, and the Salmon and Clearwater Rivers and some of their tributaries. The Shoshone sculpin is restricted to the Thousand Springs area of the Snake River and tributary streams in Hagerman Valley (Simpson and Wallace, 1982).

The shorthead sculpin, like most cottids, spawns in the early spring, laying eggs on the underside of rocks in cobble, boulder areas. It feeds primarily on benthic insect larvae and shows seasonal variation in diet and feeding intensity. The Wood River sculpin might be expected to have similar spawning and feeding behaviors as the shorthead sculpin. The Paiute sculpin selects swift riffles with cobble or gravel substrate. It spawns in the spring, laying eggs on the underside of rocks. In Sagehen Creek, California, the Paiute sculpin is preyed upon primarily by brown trout (Jones, 1972). The Wood River sculpin, like the Paiute, (which were found together on Silver Creek Preserve), seems to select fast water or riffles, boulder, cobble and

gravel. Mottled sculpin select cobble bottomed streams. They also spawn in the spring, laying eggs in rock crevices which are guarded by the male. Mottled sculpin are also preyed upon by trout (Simpson and Wallace, 1982). Interestingly, no mottled sculpin were found on the Hemingway, Soldier Creek or Silver Creek Preserves, or in the Wood River basin. They have been used as fishing bait and should have been able to establish despite any migration barriers below.

Lastly, Shoshone sculpin inhabit a very limited range in the Hagerman Valley. They occurred in springs bordered by boulder sized talus. The spring bottoms consisted of medium and fine substrates covered by thick macrophyte growth. Shoshone sculpin utilized the dense vegetation beds of an aquatic vascular plant, Veronica, more than any other type of substrate (Kuda et al. 1992). This is different from other species of sculpin mentioned above. For comparison, Wood River sculpin clearly did not select the heavily vegetated portions of creeks on Silver Creek Preserve, which were generally the habitat types with slow or medium velocity.

Summary

Wood River sculpin, C. leiopomus, were surveyed on three Nature Conservancy properties in Idaho: The Hemingway, Soldier Creek Stapp, and Silver Creek Preserves in summer 1992. This study was done to determine the presence, population density, and habitat utilization of Wood River sculpin in six different

habitat types based on differing substrate, vegetation, and water velocity.

Fish were captured by framesampling, kicksampling and electroshocking. Wood River sculpin were present on all three Preserves. In addition, a few Paiute sculpin were found on Silver Creek Preserve. The Big Wood River on the Hemingway Preserve yielded the highest numbers of Wood River sculpin followed by Soldier Creek. Silver Creek Preserve contained substantially fewer sculpin than the first two Preserves. The habitat on the Hemingway Preserve was mostly cobble/riffle. The habitat on Soldier Creek Stapp Preserve was an equal mixture of cobble/riffle and beaver dam pools. On this Preserve sculpin were more abundant in the cobble/riffles than in the beaver pools. Overall, Silver Creek Preserve is lacking the cobble/riffle habitat type characteristic of the Big Wood River and Soldier Creek. On Silver Creek Preserve no sculpin were caught in the slowest velocity water with the greatest amounts of sediment and macrophytes, and no sculpin were captured in the pools/sloughs. On this Preserve the habitat types harboring the highest densities of Wood River sculpin were gravel riffles, manmade structures containing cobble and boulder such as bridges and culverts, and undercut banks.

Literature Cited

Bailey, R.M. and C.E. Bond. 1963. Four new species of freshwater sculpins, genus Cottus, from western North America. Occasional Papers of the Museum of Zoology University of Michigan. 634: 1-27.

Bruns, D.A. and G.W. Minshall. 1979. Effects of drought on the Big Wood River, Idaho. A report for the Department of Army, Walla Walla District, Corps of Engineers.

Francis, L.J. and T.C. Bjornn. 1979. A study of the aquatic resources in The Nature Conservancy portion of Silver Creek. University of Idaho, Moscow, Idaho, for The Nature Conservancy. 75 pp.

Grunder, S.A. 1985. Biotic responses to sediment removal in a tributary to Silver Creek, Idaho. M.S. Thesis. Idaho State University. 79 pp.

Jones, A.C. 1972. Contributions to the life history of the Piute sculpin in Sagehen Creek, California. California Fish and Game 58(4). 285-290.

Kuda, D., J.S. Griffith, K.K. Merkley. 1992. Habitat selection by Shoshone sculpin, Cottus greenei, in three springs on the Thousand Springs Preserve, Idaho. A report to The Nature Conservancy and Idaho Power Company. 13 pp.

Moseley R. and C. Groves. 1992. Rare, threatened and endangered plants and animals of Idaho. Nongame and Endangered Wildlife Program, Idaho Department of Fish and Game. 38 pp.

Platts, W.S., W.F. Megahan, G.W. Minshall. 1983. Methods for evaluating stream, riparian, and biotic conditions. Gen. Tech. Rep. INT-138. USDA Forest Service. 70 pp.

Scott, W.B. and E.J. Crossman. 1973. Freshwater Fishes of Canada. Dept. of Icthyology and Herpetology, Royal Ontario Museum, Toronto.

Simpson, J.C. and R.L. Wallace. 1978. Fishes of Idaho. Univ. Press of Idaho. 237 pp.

_____. 1982. Fishes of Idaho. Univ. Press of Idaho. 238 pp.

Wallace, R.L. 1982. University of Idaho Collection Records of the Wood River sculpin Cottus leiopomus.

Wilkison, R. Idaho State University graduate student.

Table 1. Samples on the Hemingway, Soldier Creek Stapp and Silver Creek Preserve were divided into different habitat "types" based on differing substrate, vegetation and water velocity.

Habitat type	Gradient	Velocity cm/s	Sediment depth,cm	Macrophyte height,cm	Preserve
slow water	low	0-38	4-69	6-67	Silver
gravel scours	higher	40-63	<69	<67	Silver
riffle	higher	30-80	<4	<5	Silver Soldier Hemingway
manmade	higher	12-155	low	low	Silver
pool	low	0	high	vary	Silver Soldier Hemingway
undercut banks	vary	vary	vary	vary	Silver

Table 2. On the Hemingway Preserve Wood River sculpin sample sites, habitats, fish caught per sample or pass by framenetting, electroshocking or kicksampling. Estimates, (N), 95% confidence intervals, (CI) calculated by the Zippin method for three pass electrofishing.

Technique	Site	Pass	Number Caught	Habitat	Area (m^2)	N	95% CI±	Density (fish/100m^2)
electro	A	1	40	riffle	108	93	5.1	85.7
		2	29					
		3	19					
		total	88					
electro	B	1	35	riffle	140	60	2.5	42.9
		2	17					
		3	7					
		total	59					
electro	C	1	23	riffle	60	54	3.7	89.5
		2	20					
		3	8					
		total	51					
frame	D	-	0	riffle	1	-	-	-
	E	-	0	riffle	1	-	-	-
	F	-	0	riffle	1	-	-	-
	G	-	0	riffle	1	-	-	-
	J	-	0	pool	1	-	-	-
	K	-	0	pool	1	-	-	-
kick	H	-	1	riffle	8.5	-	-	11.76
	I	-	1	riffle	8.5	-	-	11.76

Table 3. On Soldier Creek Stapp Preserve Wood River sculpin sample sites, habitats, fish caught per sample or pass by framenetting, electroshocking or kicksampling. Estimates, (N), 95% confidence intervals, (CI), calculated by the Zippin method for three pass electrofishing.

Technique	Site	Pass	Number Caught	Habitat	Area (m^2)	N	95% CI±	Density (fish/100m^2)
electro	A	1	29	riffle	161	57	2.5	52.5
		2	16					
		3	10					
		total	55					
electro	B	1	11	pool	207	28	12.3	13.5
		2	5					
		3	7					
		total	23					
electro	C	1	20	riffle	175	50	4.7	31.6
		2	12					
		3	12					
		total	44					
electro	D	1	14	riffle	219	33	-	12.7
	E	1	0	pool	717	0	-	0
	F	1	3	pool	753	7	-	2.51

Table 4. Sampling techniques, habitat types and numbers of Wood River sculpin caught on Silver Creek Preserve by framesampling, elecroshocking and one kicksample. Framesamples equalled 1 m^2, undercut bank samples were 24 m in length, areas of manmade structures varied, and the kicksample was 4.2 m^2.

Creek	Technique	Habitat	No. Samples	No. Caught
Silver	framenetting	low velocity	2	0
		gravel scour	4	1
		riffle	4	0
		pool	3	0
	electro	bank	3	1
		bridge	2	0
		total	18	2
Mud	framenetting	low velocity	4	0
		gravel scour	6	0
	electro	bank	2	3
		bridge culvert	2	4
		total	14	7

Table 4. Silver Creek Preserve continued

Creek	Technique	Habitat	No. Samples	No. Caught
Grove	framenetting	gravel scour	1	0
		riffle	2	2
	electro	bank	2	18
	kick	riffle	1	2
		total	7	22
Stalker	framenetting	low velocity	4	0
	electro	bank	3	1
		bridge culvert	2	8
		pool	1	0
		total	10	9
Chaney	framenetting	low velocity	2	0
	electro	bank	2	0
		culvert	1	2
		total	5	2
Loving	framenetting	low velocity	2	0
	electro	bank	1	0
		bridge	1	0
		total	4	0

Figure 1. On the Hemingway Preserve 200 Wood River sculpin were caught during June and July, 1992. Length frequencies are shown here as the number of fish occurring in each size class in mm TL.

BIG WOOD RIVER

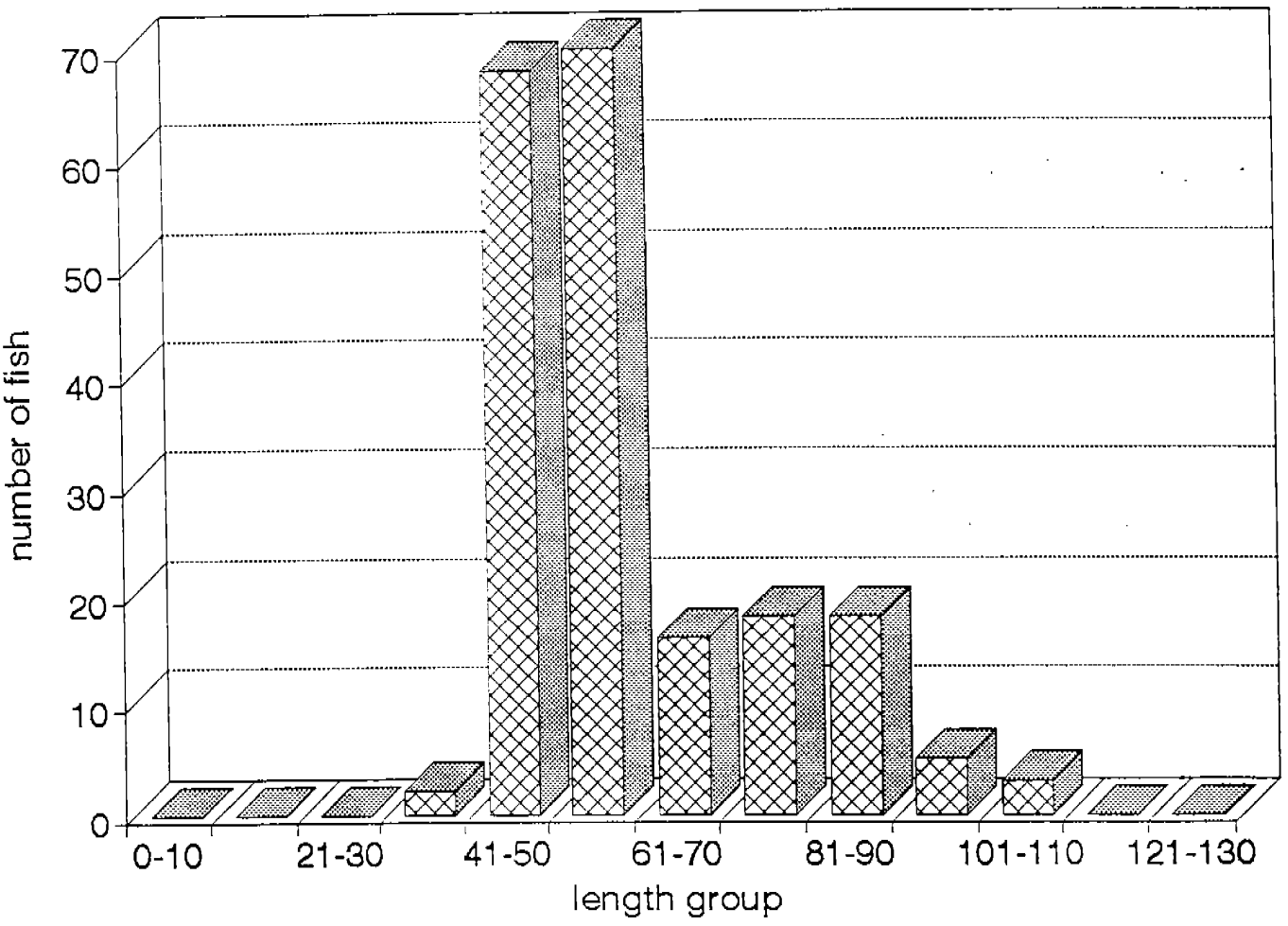

Figure 2. On the Soldier Creek Stapp Preserve 139 Wood River sculpin were caught during June and July, 1992. Length frequencies are shown here as the number of fish occurring in each size class in mm TL.

SOLDIER CREEK

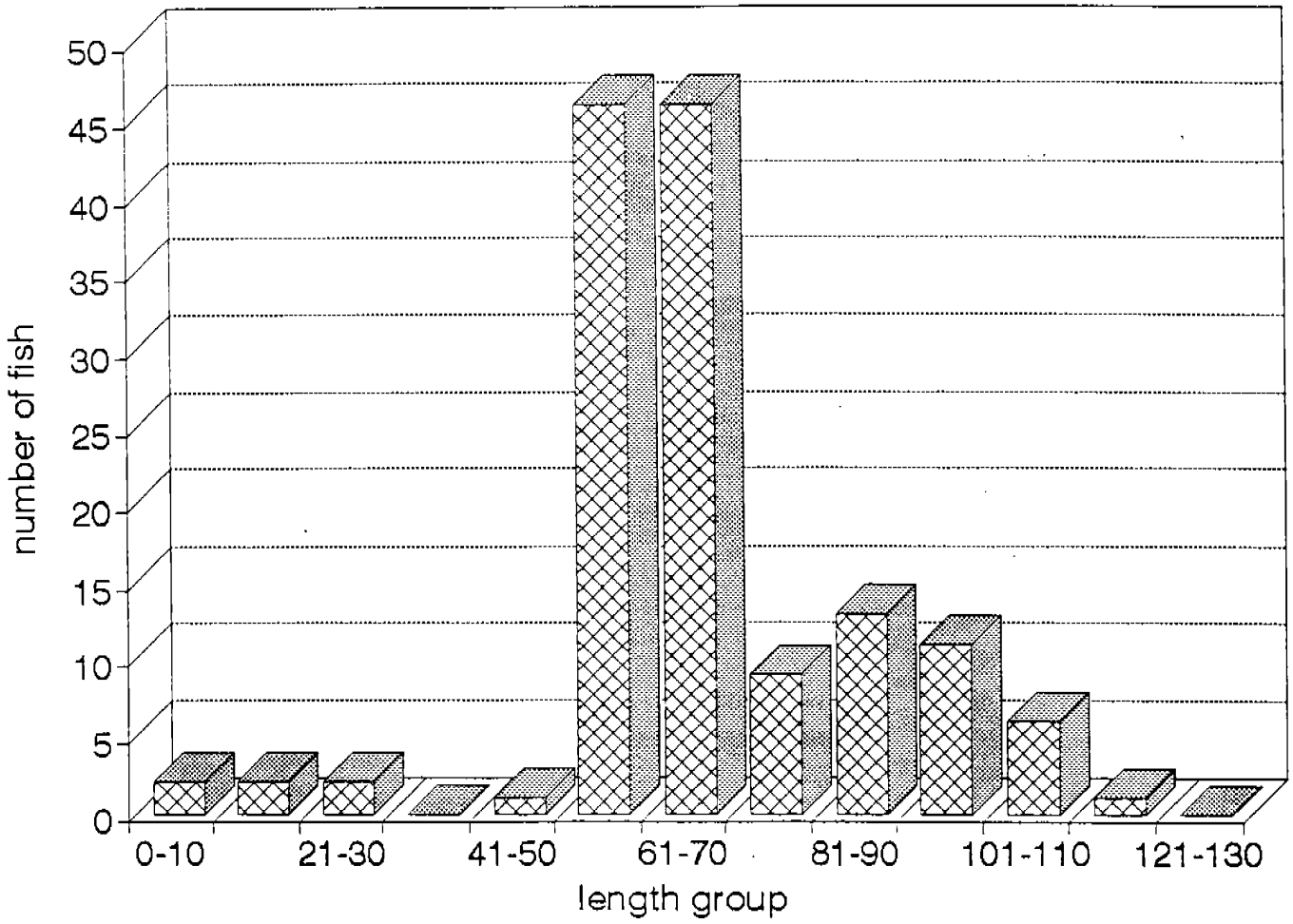

Figure 3. On the Silver Creek Preserve 42 Wood River sculpin were caught during June and July, 1992. Length frequencies are shown here as the number of fish occurring in each size class in mm TL.

SILVER CREEK
AND TRIBUTARIES

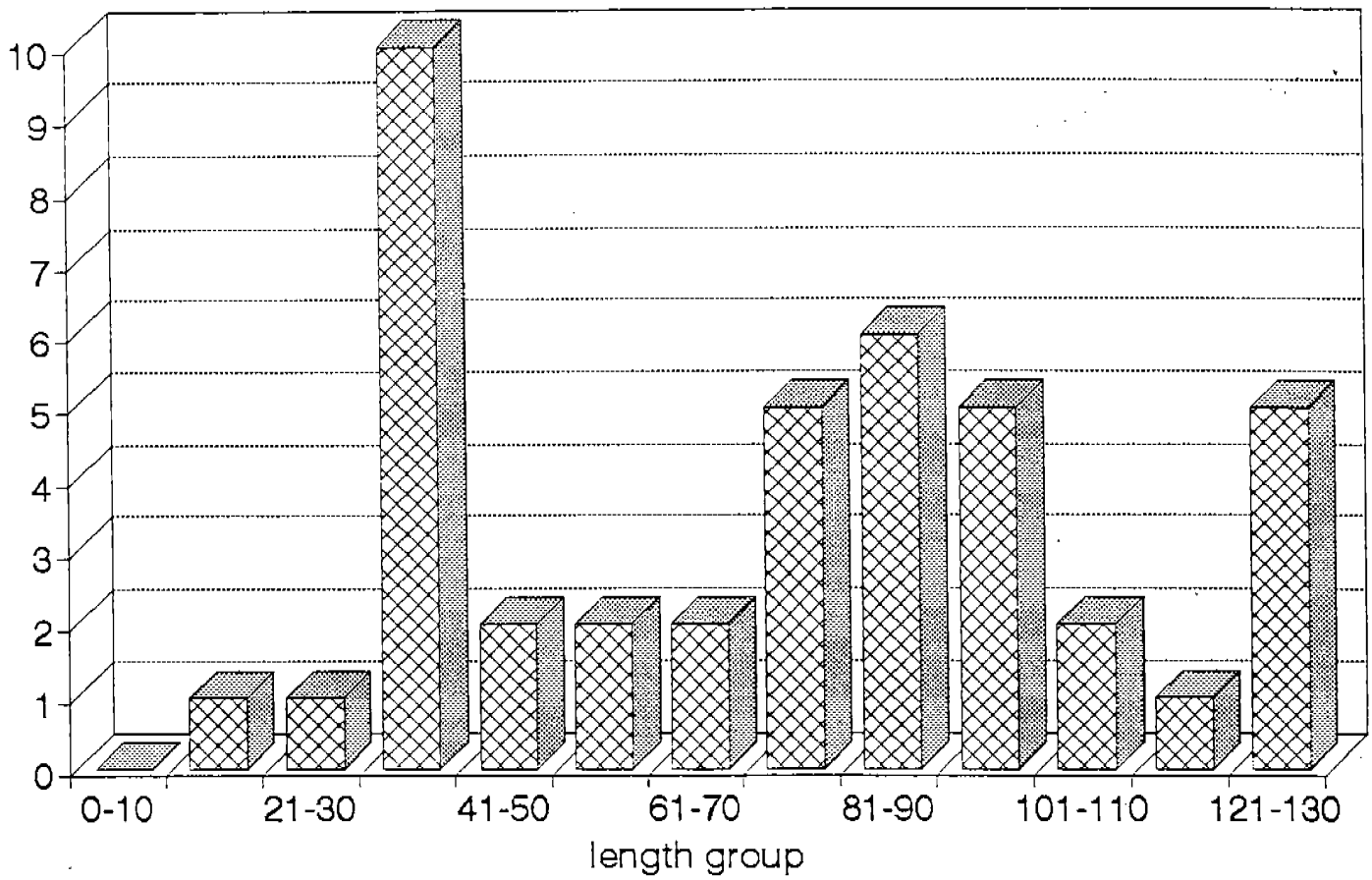

Figure 4. On Grove Creek of Silver Creek Preserve 22 Wood River sculpin were caught in June and July, 1992. Length frequencies are shown here as the number of fish occurring in each size class in mm TL.

GROVE CREEK

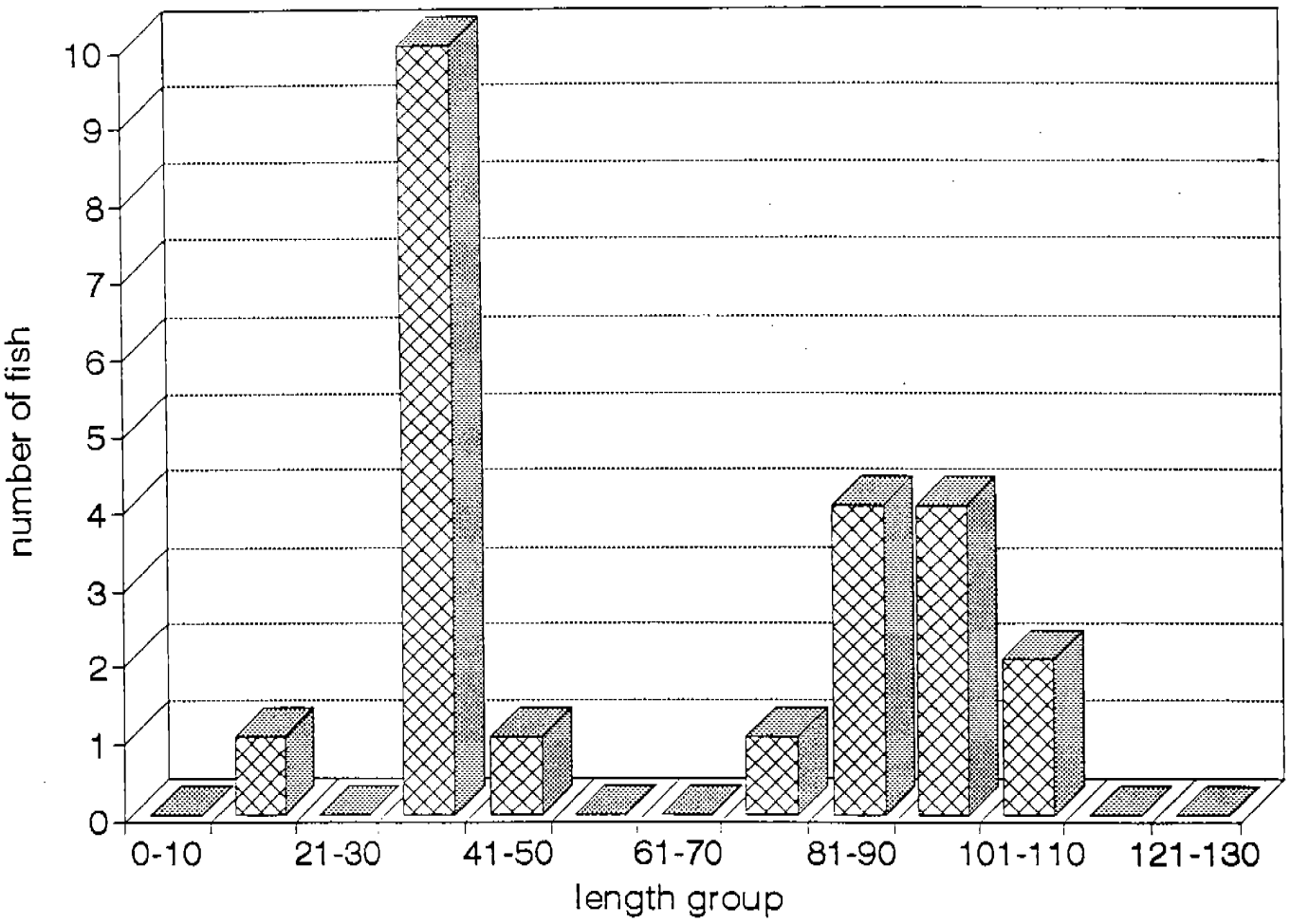
number of fish
10
9
8
7
6
5
4
3
2
1
0
0-10
21-30
41-50
61-70
81-90
101-110
121-130
length group

Figure 5. Of the 42 Wood River sculpin caught on Silver Creek Preserve during June and July, 1992, 22 of these sculpin were caught in Grove Creek. Length frequencies are shown for Grove Creek in comparison to Silver Creek and three other tributaries.

SILVER CREEK
AND TRIBUTARIES