STREAM INVENTORY REPORT

SHAW CREEK

## INTRODUCTION

A stream inventory was conducted during the summer of 2000 on Shaw Creek. The survey began at the confluence with Lawrence Creek and extended upstream approximately 1.5 miles.

The Shaw Creek inventory was conducted in two parts: habitat inventory and biological inventory. The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Shaw Creek. The objective of the biological inventory was to document the presence and distribution of juvenile salmonid species.

The objective of this report is to document the current habitat conditions, and recommend options for the potential enhancement of habitat for chinook salmon, coho salmon, and steelhead trout. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's north coast streams.

Adult carcass surveys were conducted in Shaw Creek from 1988 through 2000. The table below describes the results of those surveys:

Shaw Creek Carcass Surveys 1988-2000

| | | Chinook Salmon | | | | Other | | |
|---|---|---|---|---|---|---|---|---|
| Year | # of Surveys | # of Live Chinook | # of Chinook Carcasses | # of Adipose Clip CWT | # of Redds | # of Live Coho | # of Live SH/RT | # of Live unknown |
| 1988-89 | 1 | 3 | 4 | 1 | 3 | 3 | 0 | 1 |
| 1989-90 | 2 | 11 | 10 | 0 | 11 | 0 | 0 | 0 |
| 1990-91 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1991-92 | 2 | 3 | 0 | 0 | 15 | 1 | 3 | 0 |
| 1992-93 | 5 | 83 | 25 | 0 | 112 | 2 | 3 | 8 |
| 1993-94 | 3 | 9 | 0 | 0 | 70 | 1 | 0 | 5 |
| 1994-95 | 4 | 75 | 7 | 0 | 53 | 0 | 0 | 20 |
| 1997-98 | 3 | 11 | 7 | 0 | 17 | 0 | 0 | 64 |
| 1998-99 | 3 | 1 | 1 | 0 | 1 | 0 | 2 | 0 |
| 1999-00 | 4 | 9 | 4 | 0 | 10 | 0 | 0 | 0 |

## WATERSHED OVERVIEW

Shaw Creek is a tributary to Lawrence Creek, tributary to Yager Creek, tributary to the Van Duzen River, located in Humboldt County, California (Map 1). Shaw Creek's legal description at the confluence with Lawrence Creek is T03N R02E S19. Its location is 40°37′51″ north latitude and 123°58′15″ west longitude. Shaw Creek is a second order stream and has approximately 3.2 miles of blue line stream according to the USGS Owl Creek and Iaqua Buttes 7.5 minute quadrangles. Shaw Creek drains a watershed of approximately 5.39 square miles. Elevations range from about 640 feet at the mouth of the creek to 2,400 feet in the headwater areas. Redwood/Douglas fir/mixed hardwood forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production. Vehicle access exists via Pacific Lumber Company's main hauling road and Road #9.

## METHODS

The habitat inventory conducted in Shaw Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The Watershed Stewards Project/AmeriCorps (WSP/AmeriCorps) Members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). This inventory was conducted by a two-person team.

## SAMPLING STRATEGY

The inventory uses a method that samples approximately 10% of the habitat units within the survey reach. All habitat units included in the survey are classified according to habitat type and their lengths are measured. All pool units are measured for maximum depth, depth of pool tail crest (measured in the thalweg), dominant substrate composing the pool tail crest, and embeddedness. Habitat unit types encountered for the first time are measured for all the parameters and characteristics on the field form. Additionally, from the ten habitat units on each field form page, one is randomly selected for complete measurement.

## HABITAT INVENTORY COMPONENTS

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the *California Salmonid Stream Habitat Restoration Manual*. This form was used in Shaw Creek to record measurements and observations. There are nine components to the inventory form.

1. Flow:

Flow is measured in cubic feet per second (cfs) at the bottom of the stream survey reach using a Marsh-McBirney Model 2000 flow meter.

2. Channel Type:

Channel typing is conducted according to the classification system developed and revised by

David Rosgen (1985 rev. 1994). This methodology is described in the *California Salmonid Stream Habitat Restoration Manual*. Channel typing is conducted simultaneously with habitat typing and follows a standard form to record measurements and observations. There are five measured parameters used to determine channel type: 1) water slope gradient, 2) entrenchment, 3) width/depth ratio, 4) substrate composition, and 5) sinuosity. Channel characteristics are measured using a clinometer, hand level, hip chain, tape measure, and a stadia rod.

3. Temperatures:

Both water and air temperatures are measured and recorded at every tenth habitat unit. The time of the measurement is also recorded. Both temperatures are taken in degrees Fahrenheit at the middle of the habitat unit and within one foot of the water surface.

4. Habitat Type:

Habitat typing uses the 24 habitat classification types defined by McCain and others (1988). Habitat units are numbered sequentially and assigned a type identification number selected from a standard list of 24 habitat types. Dewatered units are labeled "dry". Shaw Creek habitat typing used standard basin level measurement criteria. These parameters require that the minimum length of a described habitat unit must be equal to or greater than the stream's mean wetted width. All measurements were in feet to the nearest tenth. Habitat characteristics were measured using a clinometer, hip chain, and stadia rod.

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out areas is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Shaw Creek, embeddedness was ocularly estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3) and 76 - 100% (value 4). Additionally, a value of 5 was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate particle size, having a bedrock tail-out, or other considerations.

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide salmonids protection from predation, reduce water velocities so fish can rest and conserve energy, and allow separation of territorial units to reduce density related competition. The shelter rating is calculated for each fully-described habitat unit by multiplying shelter value and percent cover. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All cover is then classified according to a list of nine cover types. In Shaw Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. Thus, shelter ratings can range from 0-300 and are expressed as mean values by habitat types within a stream.

7. Substrate Composition:

Substrate composition ranges from silt/clay sized particles to boulders and bedrock elements. In all fully-described habitat units, dominant and sub-dominant substrate elements were ocularly

estimated using a list of seven size classes and recorded as a one and two, respectively. In addition, the dominant substrate composing the pool tail-outs is recorded for each pool.

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densiometers as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Shaw Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the center of approximately every third unit in addition to every fully-described unit, giving an approximate 30% sub-sample. In addition, the area of canopy was estimated ocularly into percentages of coniferous or deciduous trees.

9. Bank Composition and Vegetation:

Bank composition elements range from bedrock to bare soil. However, the stream banks are usually covered with grass, brush, or trees. These factors influence the ability of stream banks to withstand winter flows. In Shaw Creek, the dominant composition type and the dominant vegetation type of both the right and left banks for each fully-described unit were selected from the habitat inventory form. Additionally, the percent of each bank covered by vegetation (including downed trees, logs, and root wads) was estimated and recorded.

## BIOLOGICAL INVENTORY

Biological sampling during the stream inventory is used to determine fish species and their distribution in the stream. Fish presence was observed from the stream banks in Shaw Creek. In addition, seven sites were electrofished using a Smith-Root Model 12 electrofisher. These sampling techniques are discussed in the *California Salmonid Stream Habitat Restoration Manual*.

## DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat, a dBASE 4.2 data entry program developed by Tim Curtis, Inland Fisheries Division, California Department of Fish and Game. This program processes and summarizes the data, and produces the following six tables:

- Riffle, flatwater, and pool habitat types
- Habitat types and measured parameters
- Pool types
- Maximum pool depths by habitat types
- Dominant substrates by habitat types
- Mean percent shelter by habitat types

Graphics are produced from the tables using Quattro Pro. Graphics developed for Shaw Creek include:

- Riffle, flatwater, pool habitats by percent occurrence

- Riffle, flatwater, pool habitats by total length
- Total habitat types by percent occurrence
- Pool types by percent occurrence
- Total pools by maximum depths
- Embeddedness
- Pool cover by cover type
- Dominant substrate in low gradient riffles
- Mean percent canopy
- Bank composition by composition type
- Bank vegetation by vegetation type

HABITAT INVENTORY RESULTS

* ALL TABLES AND GRAPHS ARE LOCATED AT THE END OF THE REPORT *

The habitat inventory of June 6-8 and July 6-7, 2000, was conducted by Ethan Jankowski, Daria Leibel and Randy Turner (WSP). The total length of the stream surveyed was 7,840 feet with an additional 382 feet of side channel.

Stream flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flow meter at 1.1 cfs on June 28, 2000.

Shaw Creek is an F4 channel type for the entire 7,840 feet of the stream surveyed. F4 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 53 to 56 degrees Fahrenheit. Air temperatures ranged from 52 to 67 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 44% pool units, 30% riffle units, 24% flatwater units, and 1% dry unit (Graph 1). Based on total length of Level II habitat types there were 37% flatwater units, 33% riffle units, and 29% pool units (Graph 2).
Nine Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffles, 30%; mid-channel pools, 20%; and runs, 20% (Graph 3). Based on percent total length, low gradient riffles made up 33%, runs made up 26%, and mid-channel pools 14%.

A total of seventy-six pools were identified (Table 3). Scour pools were the most frequently encountered, at 54%, and comprised 50% of the total length of all pools (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. Sixty of the seventy-six pools (79%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the seventy-six pool tail-outs measured, 5 had a value of 1 (7%); 28 had a value of 2 (37%); 25 had a value of 3 (33%); 1 had a value of 4 (1%); and 17 had a value of 5 (22%) (Graph 6). On this scale, a value of 1

indicates the highest quality of spawning substrate. The breakdown of dominant substrate composition for the 17 pool tail-outs that had a embeddedness value of 5 were as follows: 59% silt/clay/sand or small gravel, 24% bedrock, 12% boulder, and 6% small cobble.

A shelter rating was calculated for each habitat unit and expressed as a mean value for each habitat type within the survey using a scale of 0-300. Riffle habitat types had a mean shelter rating of 4, flatwater habitat types had a mean shelter rating of 25, and pool habitats had a mean shelter rating of 82 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 114. Main channel pools had a mean shelter rating of 30 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large and small woody debris are the dominant cover types in Shaw Creek. Graph 7 describes the pool cover in Shaw Creek. Large woody debris is the dominant pool cover type followed by root mass.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 72% of pool tail-outs while small cobble was the next most frequently observed substrate type, at 12%.

The mean percent canopy density for the surveyed length of Shaw Creek was 92%. The mean percentages of deciduous and coniferous trees were 79% and 13%, respectively. Graph 9 describes the mean percent canopy in Shaw Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 66.3%. The mean percent left bank vegetated was 65.2%. The dominant elements composing the structure of the stream banks consisted of 64.6% cobble/gravel, 29.2% sand/silt/clay and 6.3% bedrock (Graph 10). Deciduous trees were the dominant vegetation type observed in 70.8% of the units surveyed. Additionally, 27.1% of the units surveyed had coniferous trees as the dominant vegetation type. (Graph 11).

## BIOLOGICAL INVENTORY RESULTS

Electrofishing was conducted at three sites within the surveyed reach of Shaw Creek and 4 sites upstream of the end of the 2000 stream habitat inventory. The first three sites sampled are annual monitoring sites that have been sampled since 1991 as part of a long term monitoring study.

### July 19, 2000

The first monitoring site is located approximately 750 feet upstream of Shaw Creek's confluence with Lawrence Creek. During the sample period of 10:30am and 1:30pm, the water temperature increased from 56°F to 57°F and the air temperature increased from 57°F to 66°F. Stream flow was measured to be 0.66 cfs at the site. Water clarity was fair. A total distance of 98 feet was sampled and consisted of one plunge pool, one riffle, and one run. Three electrofishing passes resulted in a total catch of ninety-two young-of-the-year steelhead, two one-plus age class steelhead, four ammocetes, and five salamanders.

### July 26, 2000

The second monitoring site is located approximately 5,300 feet upstream of Shaw Creek's confluence with Lawrence Creek. During the sample period of 9:20am and 11:57am, the water temperature was 57°F and the air temperature increased from 59°F to 62°F. Water clarity was fair. A total distance of 76.3 feet was sampled and consisted of two riffles, one run, and one mid-channel pool. Three electrofishing passes resulted in a total catch of forty-two young-of-the-year steelhead, four one-plus age class steelhead, two ammocetes, thirteen salamanders, one crayfish, and one tailed frog.

The third monitoring site is located approximately 6,000 feet upstream of Shaw Creek's confluence with Lawrence Creek. During the sample period of 2:10pm and 4:33pm, the water temperature was 58°F and the air temperature ranged from 62°F to 66°F. Water clarity was fair. One hundred forty-four feet was sampled and consisted of two mid-channel pools, one lateral scour pool-bedrock formed, one secondary channel pool, three runs, and one riffle. Three electrofishing passes resulted in a total catch of twenty-four young-of-the-year steelhead, eleven one-plus age class steelhead, one ammocetes, and three Pacific giant salamanders.

September 19, 2000

The electrofishing conducted on September 19, 2000 was a presence/absence survey consisting of one electrofishing pass at each of the four sites described below.

During the electrofishing sample period of 12:09pm and 2:00pm on September 19, 2000, the water temperature increased from 57°F to 62°F and the air temperature increased from 65°F to 76°F. The water clarity was fair. The stream flow was measured to be 0.147 cfs and was measured September 22, 2000 (three days after the electrofishing survey) approximately 400 feet upstream of Shaw Creek's confluence with Lawrence Creek.

A total of four sites were sampled for approximately 300 feet upstream of the end of the 2000 stream habitat inventory (approximately 8,100 feet upstream of confluence with Lawrence Creek). The stream habitat inventory ended at a log debris accumulation that was approximately 300 feet long, 70 feet wide, and 15 feet high. The habitat types sampled above this point included three mid-channel pools (two with woody debris cover/scour structures), one corner pool, and one lateral scour pool-log formed. Electrofishing resulted in a total catch of nineteen young-of-the-year steelhead, eight one-plus age class steelhead, one two-plus age class steelhead, and two salamanders.

The following chart displays the information yielded from these sites:

| Date | Site # | Approx. Dist. from mouth (ft.) | Hab. Unit # | Hab. Type | Reach # | Channel type | Steelhead YOY | 1+ | 2+ |
|---|---|---|---|---|---|---|---|---|---|
| 7/19/2000 | 1 | 750 | 13-15 | 5.6, 1.1, | 1 | F4 | 92 | 2 | 0 |

| Date | Site # | Approx. Dist. from mouth (ft.) | Hab. Unit # | Hab. Type | Reach # | Channel type | Steelhead YOY | 1+ | 2+ |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 3.3 | | | | | |
| 7/26/2000 | 2 | 5,300 | 118-119 | 3.4, 4.2 | 1 | F4 | 42 | 4 | 0 |
| 7/26/2000 | 3 | 6,000 | 130-132 | 1.1, 4.2, 1.1 | 1 | F4 | 24 | 11 | 0 |
| 9/19/2000 | 4-7 | 8,100 | NA | NA | * | * | 19 | 8 | 1 |

*Sites 4-7 were not within the surveyed section of Shaw Creek. These sites were located approximately 300 feet upstream of the end of the stream habitat inventory.

DISCUSSION

Shaw Creek is an F4 channel type for the entire 7,840 feet of stream surveyed. The suitability of F4 channel types for fish habitat improvement structures is as follows: good for bank-placed boulders; fair for plunge weirs; single and opposing wing deflectors; channel constrictors; log cover; and poor for boulder clusters.

The water temperatures recorded on the survey days June 6-8 and July 6-7, ranged from 53 to 56 degrees Fahrenheit. Air temperatures ranged from 52 to 67 degrees Fahrenheit. This is a good water temperature range for salmonids. To make any further conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling would need to be conducted.

Flatwater habitat types comprised 37% of the total length of this survey, riffles 33%, pools 29%, and dry 1%. The pools are relatively deep, with 60 of the 76 (79%) pools having a maximum depth greater than 2 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In first and second order streams, a primary pool is defined to have a maximum depth of at least two feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width.

Thirty-three of the seventy-six pool tail-outs measured had embeddedness ratings of 1 or 2. Twenty-six of the pool tail-outs had embeddedness ratings of 3 or 4. Seventeen of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning. Ten of the seventeen (59%) were unsuitable for spawning due to the dominant substrate being silt/sand/clay or small gravel. The remainder of pool tails valued at 5 were dominated by bedrock, boulders, or small cobble. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. Sediment sources in Shaw Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Sixty-four of the seventy-six pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter rating for pools was high with a rating of 82. The shelter rating in the flatwater habitats was lower at 25. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by large woody debris in all habitat types. Additionally, root mass contributes a small amount. Log and root wad cover structure in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structure provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

The mean percent canopy density for the stream was 92%. This is a relatively high percentage of canopy. In general, re-vegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was moderate at 66.3% and 65.2%, respectively. In areas of stream bank erosion or where bank vegetation is not at acceptable levels, planting endemic species of coniferous and deciduous trees, in conjunction with bank stabilization, is recommended.

## RECOMMENDATIONS

1) Shaw Creek should be managed as an anadromous, natural production stream.

2) The structures constructed by the Pacific Lumber Company and the California Conservation Corps need to be evaluated periodically to insure they continue to perform as designed.

3) Coho salmon have not been observed in the last two years of electrofishing index reaches in Shaw Creek. If an appropriate genetic strain of coho can be found, coho should be re-introduced in Shaw Creek.

## COMMENTS AND LANDMARKS

The following landmarks and possible problem sites were noted. All distances are approximate and taken from the beginning of the survey reach.

0' Begin survey at confluence with Lawrence Creek. Channel type is F4.

119' CCC structure site 100, 5/13/98.

200' Plunge pool with 1' plunge; right bank trail entrance from road.

513' CCC structure site 500.

588' Road #9 bridge, 27' long x 15' wide x 40' high. Rip rap, 45' long on left bank and 30'

long on right bank.

653' Hobo temp location.

742' Log debris accumulation on left bank, 12' long x 5' wide x 5' high, retaining gravel 4' long x 2' wide x 2' high.

750' First electrofishing index reach.

945' CCC structure site 950, 1/10/97.

1,030' CCC structure site 1,050, 1/10/97.

1,222' CCC structure site 1,170, PALCO site 1,100.

1,326' CCC structure site 1,290.

1,533' CCC structure site 1,510.

1,636' CCC structure site 1,550, 1998.

1,726' PALCO structure site 1,710, 1993.

1,839' PALCO structure site 1,820, 1993.

1,941' CCC structure site 1,900, 1998.

1,994' CCC structure site 2,050, 1998.

2,171' CCC structure site 2,110, 1998. Also, plunge pool with less than 1' plunge.

2,323' CCC structure site 2,300, 1998.

2,397' CCC structure site 2,355, 1998.

2,479' CCC structure site 2,460, 1998.

2,575' Log debris accumulation, 30' long x 40' wide x 7' high, with no sediment retention.

2,742' CCC structure site 2,710, 1998.

2,793' CCC structure site 2,780, 1998.

2,885' Log debris accumulation, 5' long x 10' wide x 2' high, with no sediment retention.

2,899' CCC structure site 2,850, 1998.

3,002' CCC structure site 2,970, 1998.

3,189' CCC structure site 3,145', 1998.

3,493' Log debris accumulation, 12' long x 18' wide x 4' high, with no sediment retention.

3,670' Tributary enters on left bank. Creek was dry at time of survey.

3,946' CCC structure site 3,885, 1998.

4,060' CCC structure site 3,935, 1998, retaining gravel, 2' long x 30' wide x 2' high.

4,215' Log debris accumulation on left bank, 10' long x 10' wide x 4' high, with no sediment retention.

4,329' CCC structure sites 4,160, 1994; 4,200, 1997; 4,200, 1998.

4,446' Log debris accumulation, 19' long x 20' wide x 7' high, retaining gravel, 14' long x 6' wide x 2' high.

4,589' CCC structure site 4,410, 1998. Log debris accumulation, 12' long x 30' wide x 3' high, no sediment retention.

4,667' CCC structure site 4,480, 1998.

4,803' CCC structure site 4,620, 1998.

5,110' CCC structure site 4,850, 1998.

5,228' CCC structure site 4,915, 1998.

5,294' Log debris accumulation, 15' long x 15' wide x 6' high, no gravel retention.

5,300' Second electrofishing index reach.

5,659' Log debris accumulation, 35' long x 25' wide x 13' high, no gravel retention.

5,735' Plunge pool with a 2' plunge.

5,832' Log debris accumulation, 16' long x 22' wide x 5' high, no gravel retention.

5,845' Plunge pool with a 2' plunge. Also a rip-rap section 217' long by 10' high.

5,971' Log debris accumulation, 6' long x 14' wide x 5' high, holding gravel 10' long x 2' wide x 1' high.

6,000' Third electrofishing index reach.

6,421' Plunge pool with a 1' plunge.

7,298' Plunge pool with a 2' plunge.

7,491' Left bank tributary enters creek; high gradient stream, dry at time of the survey.

7,568' Recruitment of several pieces of large woody debris from the right bank.

7,683' Right bank erosion, 37' long x 50' high.

7,734' Plunge pool with a plunge less than 2'.

7,840' End of survey at log debris accumulation, 300' long x 70' wide x 15' high, retaining gravel. There is an active slide on the left bank along the accumulation, contributing large volumes of sediment and woody debris. The approximate size of the slide escarpment is 300' long x 70' high. There were several salmonid fry observed above the potential barrier.

REFERENCES

Flosi, G., Downie, S., Hopelain, J., Bird, M., Coey, R., and Collins, B. 1998. *California Salmonid Stream Habitat Restoration Manual*, 3rd edition. California Department of Fish and Game, Sacramento, California.

# LEVEL III and LEVEL IV HABITAT TYPES

| | | | |
|---|---|---|---|
| RIFFLE | | | |
| Low Gradient Riffle | (LGR) | [1.1] | { 1} |
| High Gradient Riffle | (HGR) | [1.2] | { 2} |
| | | | |
| CASCADE | | | |
| Cascade | (CAS) | [2.1] | { 3} |
| Bedrock Sheet | (BRS) | [2.2] | {24} |
| | | | |
| FLATWATER | | | |
| Pocket Water | (POW) | [3.1] | {21} |
| Glide | (GLD) | [3.2] | {14} |
| Run | (RUN) | [3.3] | {15} |
| Step Run | (SRN) | [3.4] | {16} |
| Edgewater | (EDW) | [3.5] | {18} |
| | | | |
| MAIN CHANNEL POOLS | | | |
| Trench Pool | (TRP) | [4.1] | { 8} |
| Mid-Channel Pool | (MCP) | [4.2] | {17} |
| Channel Confluence Pool | (CCP) | [4.3] | {19} |
| Step Pool | (STP) | [4.4] | {23} |
| | | | |
| SCOUR POOLS | | | |
| Corner Pool | (CRP) | [5.1] | {22} |
| Lateral Scour Pool - Log Enhanced | (LSL) | [5.2] | {10} |
| Lateral Scour Pool - Root Wad Enhanced | (LSR) | [5.3] | {11} |
| Lateral Scour Pool - Bedrock Formed | (LSBk) | [5.4] | {12} |
| Lateral Scour Pool - Boulder Formed | (LSBo) | [5.5] | {20} |
| Plunge Pool | (PLP) | [5.6] | { 9} |
| | | | |
| BACKWATER POOLS | | | |
| Secondary Channel Pool | (SCP) | [6.1] | { 4} |
| Backwater Pool - Boulder Formed | (BPB) | [6.2] | { 5} |
| Backwater Pool - Root Wad Formed | (BPR) | [6.3] | { 6} |
| Backwater Pool - Log Formed | (BPL) | [6.4] | { 7} |
| Dammed Pool | (DPL) | [6.5] | {13} |
| | | | |
| ADDITIONAL UNIT DESIGNATIONS | | | |
| Dry | (DRY) | [7.0] | |
| Culvert | (CUL) | [8.0] | |
| Not Surveyed | (NS) | [9.0] | |
| Not Surveyed due to a marsh | (MAR) | [9.1] | |