SECTION F
SALMONID HABITAT CONDITION

INTRODUCTION

The anadromous fish species inhabiting the Elk WAU are steelhead trout (*Oncorhynchus mykiss)* and coho salmon (*O. kisutch*). Other fish and amphibian species include three-spine stickleback *(Gasterosteus aculeatus),* prickly sculpin *(Cottus asper),* coastrange sculpin *(C. aleuticus),* Pacific lamprey *(Lampetra tridentata),* Pacific giant salamander *(Dicamptodon tenebrosus),* tailed frog *(Ascaphus truei),* red-legged frogs *(Rana aurora),* yellow-legged frogs *(Rana boylii),* southern torrent salamander *(Rhyacotriton variegatus),* and tarichid newts *(Taricha spp)*. A fish habitat assessment was conducted in the Elk WAU to identify the current habitat conditions and areas of special concern regarding spawning, summer rearing, and over-wintering habitat.

Field surveys conducted to evaluate the quality and quantity of fish habitat in the Elk WAU included fish habitat typing and assessment, aquatic species distribution surveys, outmigrant trapping, stream gravel permeability measurements and bulk gravel samples. The fish habitat assessment evaluated spawning, summer rearing, and over-wintering habitats based on targets derived from scientific literature (Bilby and Ward, 1989; Bisson et al., 1987; Bjornn and Reiser, 1991; CDFG, 2002; Montgomery et al., 1995; Swales et al., 1988; Washington Forest Practices Board, 1997) and professional judgment. The habitat data are used to rate the quality of the habitat for the life history stages discussed above.

Aquatic species distribution surveys were conducted by the previous landowners (Louisiana-Pacific Corp.) from 1994-1996, and were repeated by MRC from 2000-2002 (MRC 2002). The study consisted of single pass electrofishing or snorkeling surveys in the summer months to assess aquatic species distribution and composition in the Elk WAU. All organisms observed were identified to the lowest possible taxonomic level.

Permeability and bulk gravel samples were taken in two long term channel monitoring segments in the Elk WAU to determine an index of spawning gravel quality. Permeability and gravel particle size distributions are stream substrate parameters which affect survival of incubating salmonid embryos. Salmonid eggs buried under as much as a foot of gravel depend on sufficient intragravel water flow for their survival and development. Fine sediment within spawning gravel can impede intragravel water flow, reducing the delivery of dissolved oxygen to eggs, which can increase mortality in the egg to emergence stage. Forest management practices may increase the delivery of fine sediment to the stream channel, potentially impacting spawning gravel. The assessment of substrate permeability and composition are useful in monitoring the effects of increased sediment delivery on salmonid spawning and incubation conditions.

METHODS

Salmonid Habitat Assessment

The habitat inventory used to evaluate the habitat condition of the Elk WAU was conducted during low flow conditions using methods modified from the California Salmonid Stream Habitat Restoration Manual (CDFG, 2002). Surveys described 100% of the stream channel's wetted width, including side channel habitats. Stream segments were created based on stream gradient and channel confinement (see section E "Stream Channel Conditon"). Each of the selected stream segments within the planning watershed was fully sampled or until an adult salmonid upstream

migration barrier was reached. Fish habitat conditions were determined by habitat typing the majority of fish bearing stream segments throughout the watershed. High gradient streams are likely to be non-fish bearing, thus survey efforts were concentrated on low gradient reaches of the stream network.

Data collected during the fish habitat and stream channel surveys provided information on habitat type occurrence (Table F-2); pool, riffle, and flatwater frequency; pool spacing; spawning gravel quantity and quality; shelter complexity and availability (shelter rating); residual pool depths; substrate embeddedness; substrate composition; frequency of key and functional large woody debris pieces (see section D "Riparian Function" for definition of 'Key LWD' and 'Functional LWD'); overwintering substrate; side channel frequency (Table F-6) and dominant cover type (Table F-4).

Evaluations on the quality of habitat available for spawning life stages, summer rearing, and over-wintering were made based upon scientific literature and professional judgment. The criteria used to determine whether a specific variable was 'good', 'fair', or 'poor' is defined within Table F-1. Spawning habitat conditions are evaluated on the basis of gravel availability and quality (gravel size and embeddedness), and were evaluated within preferred salmonid spawning areas located at the tail-outs of pools. Summer rearing habitat was evaluated using methods developed by CDFG (2002). Summer rearing habitat conditions for salmonids are evaluated on the size, depth, and availability of pools; and the complexity and quantity of cover (particularly large woody debris). Over-wintering habitat is evaluated on the size, depth and availability of pools, the proportion of habitat units with cobble or boulder-dominated substrate (over-wintering substrate), side channel frequency, and the quantity of cover(particularly large woody debris). The over-wintering scores reflect parameters measured during summer flows and may not be an accurate representation of actual over-wintering habitat conditions.

The habitat data are combined into indices of habitat quality for the different salmonid life stages. Measured fish habitat parameters were weighted and given a numeric scale to develop a quality rating for individual life history stages. Parameters were divided into subsets that correspond with individual life history stages (spawning, summer rearing, and over-wintering habitat). Parameters were scored as follows: 1 (poor), 2 (fair), and 3 (good). Parameter weights were applied to the total score calculated as shown below. The parameter codes (see Table F-1) are in bold and the weights in parentheses.

Spawning Habitat

E (0.31) + **F** (0.33) + **G** (0.36)

Summer Rearing Habitat

A (0.20) + **B** (0.15) + **C** (0.20) + **D** (0.15) + **F** (0.10) + **H** (0.20)

Over-wintering Habitat

A (0.20) + **B** (0.15) + **C** (0.15) + **D** (0.10) + **H** (0.20) + **I** (0.15) + **J** (0.05)

The overall score is rated as follows:
1.00 - 1.66 = Poor
1.67 - 2.33 = Fair
2.34 - 3.00 = Good

Table F-1. Fish Habitat Quality Criteria for Measured Parameters.

Fish Habitat Parameter	Feature	Fish Habitat Quality Poor	Fair	Good
Percent Riffle (By length) **(A)**	Anadromous Salmonid Streams	>50%	25-50%	<25%
Pool Spacing (Reach length/Bankfull/#pools) **(B)**	Anadromous Salmonid Streams	≥6.0	3.0 - 5.9	≤2.9
Shelter Rating (Shelter value x % of habitat covered) **(C)**	Pools	<60	60-120	>120
% Of Pools that are ≥3 ft. residual depth **(D)**	Pools	<25%	25-50%	>50%
Spawning Gravel Quantity (% of Surface area) **(E)**	Pool Tail-outs	<25%	25-50%	>50%
Percent Embeddedness **(F)**	Pool Tail-outs	>50%	25-50%	<25%
Gravel Quality Rating (Substrate composition) **(G)**	Pool Tail-outs	Silt/Clay Sand Boulder Bedrock	Small Gravel Large Cobble	Large Gravel Small Cobble
Key LWD +root wads / 328 ft of stream. **(H)**	Streams < 40 ft. BFW Streams ≥ 40 ft. BFW	<4.0 <3.0	4.0-6.5 3.0-3.8	>6.5 >3.8
Substrate for Over-wintering **(I)**	All Habitat Types	<20% of Units Cobble or Boulder Dominated	20-40% of Units Cobble or Boulder Dominated	>40% of Units Cobble or Boulder Dominated
Percent Side Channel (By length) **(J)**	Anadromous Salmonid Streams	<3%	3-5%	>5%

Table F-2. Habitat types as described in the California Salmonid Stream Habitat Restoration Manual (CDFG, 2002).

HABITAT TYPES	CODES	DESCRIPTIONS
Riffle		
Low Gradient Riffle	LGR	Shallow reach with swift flowing, turbulent water; partially exposed substrate; and <4% gradient.
High Gradient Riffle	HGR	Steep reach with swift flowing, very turbulent water; high exposed substrate; and >4% gradient.
Cascade		
Cascade	CAS	Steepest riffle habitat; consisting of alternating small waterfalls and shallow pools.
Bedrock Sheet	BRS	Thin sheet of water flowing over a smooth bedrock surface.
Flatwater		
Pocket Water	POW	Swift flowing stream around boulders and obstructions creating eddies or scour holes (pockets).
Glide	GLD	Wide uniform channel bottom; low to moderate flow.
Run	RUN	Swift flowing reaches with little surface agitation and no major flow obstructions; flooded riffle.
Step Run	SRN	Sequence of runs seperated by short riffle steps.
Edgewater	EDW	Quiet, shallow area along stream margins, typically associated with riffles; low water velocities
Main Channel Pool		
Trench Pool	TRP	U-shaped cross section typically flanked by bedrock walls; water velocities are swift.
Mid-Channel Pool	MCP	Large pools formed by mid-channel scours; water velocities are slow.
Channel Confluence Pool	CCP	Large pools formed at the confluence of two or more channels; higher water velocities and turbulence.
Step Pool	STP	Series of pools seperated by short riffles or cascades; generally high gradient, confined streams.
Scour Pool		
Corner Pool	CRP	Lateral scour pools formed at a bend in the channel.
Lateral Scour Pool - Log Formed	LSL	Formed by flow impinging against partial channel obstruction consisting of large woody debris.
Lateral Scour Pool - Rootwad Formed	LSR	Formed by flow impinging against partial channel obstruction consisting of a rootwad.
Lateral Scour Pool - Bedrock Formed	LSBk	Formed by flow impinging against a bedrock stream bank.
Lateral Scour Pool - Boulder Formed	LSBo	Formed by flow impinging against a partial channel obstruction consisting of a boulder.
Plunge Pool	PLP	Stream passes over channel obstruction and drops steeply into stream bed below; scouring depression.
Backwater Pools		
Secondary Channel Pool	SCP	Formed outside the average wetted channel width; mainly associated with gravel bars.
Backwater Pool - Boulder Formed	BPB	Shallow pool found along channel margins; caused by eddies around a boulder obstruction.
Backwater Pool - Rootwad Formed	BPR	Shallow pool found along channel margins; caused by eddies around a rootwad obstruction.
Backwater Pool - Log Formed	BPL	Shallow pool found along channel margins; caused by eddies around a woody debris obstruction.
Damned Pool	DPL	Water impounded from complete or nearly complete channel blockage (debris jams & rockslides).
Additional Unit Designations		
Dry	DRY	Dry stream beds.
Culvert	CUL	Culvert.
Not Surveyed	NS	Not surveyed.
Not Surveyed due to marsh	MAR	Not surveyed due to marsh.

Aquatic Species Distribution

A hierarchical framework was used to select the initial locations of survey sites in each stream. Major streams were broken into lower, middle and upper reaches. Smaller streams were divided into lower and upper reaches. One site is surveyed in each reach, resulting in 3 sites in larger streams, and 2 sites in smaller streams. Additional sites are added directly downstream and upstream of potential migration barriers to determine which salmonid species these barriers are impacting.

A survey site contains a minimum of two consecutive habitat sequences (pool-riffle sequences) and has a minimum length of ninety feet. The survey method used to determine the aquatic species present is single pass electrofishing or snorkeling. The effort put forth at each survey site is not sufficient to delineate the absence of a species. If future fishery research develops reasonable methods to determine the probability that a species is absent, these methods will be incorporated into future distribution surveys.

Prior to initiating surveys water quality is measured using a Horiba™ U-10 Water Quality Checker. Measurements taken are water temperature (°C), conductivity (microS/cc), dissolved oxygen (mg/L), and pH. Air temperature is measured with a pocket thermometer and water visibility is estimated. Stream discharge is estimated or measured with a Swoffer™ Model 2100 flow meter. The actual physical parameters measured at each site vary depending on equipment availability. Horiba™ U-10 Water Quality Checkers were not used prior to the surveys in 2000.

Diving (snorkeling) is used to assess species presence when stream conditions are considered adequate or when elevated stream temperatures have the potential to adversely impact the health of the animals being electrofished. The basic survey unit for diving consists of a minimum of two pools, however if riffles are deep enough to allow underwater observation these units are sampled.

Permeability and Stream Bulk Gravel Samples

Stream gravel permeability and bulk gravel samples were collected on two stream monitoring segments in the Elk WAU, one in the Upper Elk planning watershed and one in Lower Elk. The stream gravel permeability was measured using a 1-inch diameter standpipe similar to the standpipe discussed in Terhune (1958) and Barnard and McBain (1994) with the exception that our standpipe is smaller in diameter. We used the smaller diameter standpipe because we hypothesize that it creates fewer disturbances to the stream gravel when inserted. Bulk stream gravel samples were taken with a 12-inch diameter sampler as described in Platts, Megahan and Minshall (1983).

An electric pump was used to create the water suction in the standpipe for the permeability measurements. The permeability measurements were taken at a depth of 25 centimeters, near the maximum depth of coho and steelhead spawning. The permeability measurements were taken in four randomly selected pool tail-out sections along the monitoring segment. At each pool tail-out sampled permeability measurements were taken at three sites; the ¼, ½ and ¾ mark of the wetted channel. This gave a total of 12 permeability sites along each monitoring segment in 1999. A recent analysis of MRC permeability data has shown that more samples should be taken to more accurately predict the survival to emergence percentage calculated from the permeability data. From a power analysis it was determined that 26 measurements per segment was needed to predict within a 20 percent accuracy the survival of emerging fry (Stillwater Science, 2000). Future measurements will be evenly distributed among all pool tail-outs in the segments. Care must be taken in interpreting calculated values from the Elk permeability measurements as the number of samples are lower than desirable.

A bulk gravel sample was taken in each of the 4 randomly selected pool tail-outs in both the Upper and Lower Elk planning watersheds. After the bulk gravel samples were collected the gravel is dried and sieved through 7 different size-class screens (50.8, 25.4, 12.5, 6.3, 4.75, 2.36, 0.85 mm). The weight of each gravel size class was determined for each of the bulk gravel samples using a commercial quality scale.

The median permeability measurement for each permeability site in the monitoring segment was used as representative of the site. To characterize the entire monitoring segment, the natural log of the mean of the median permeability measurements was determined. The natural log of the permeability is used because of a relationship developed from data from Tagart (1976) and McCuddin (1977) (Stillwater Sciences, 2000) to estimate survival to emergence from permeability data. This relationship ($r^2 = 0.85$, $p<10^{-7}$) equates the natural log of permeability to fry survival. This index needs further improvements, but is currently all we have for interpreting permeability information and biological implications. This relationship is:

Survival = -0.82530 + 0.14882 * ln permeability

It is important to understand that the use of this survival relationship is only an index of spawning gravel quality in the segment. The permeability measurements were taken in randomly selected pool tail-outs and are not indicative of where a salmon may select to spawn. Furthermore, spawning salmon have been shown to improve permeability in gravel where a redd was developed (MRC, 2000). Therefore the survival percentage developed is only indicative of the quality of potential spawning habitat and not as an absolute number.

From the sieved bulk gravel samples the percent fine particles less than 0.85 mm sieve size class was determined. The survival index for steelhead trout was calculated from the bulk gravel samples using the method described in Tappel and Bjorn (1983).

RESULTS AND DISCUSSION

Salmonid Habitat Condition

The Elk WAU is comprised of two planning watersheds of which both were surveyed for fish habitat and aquatic species distribution. The results are discussed by segment. Tables F-4 through F-6 summarizes the 2005 fish habitat assessment data. A total of 32 segments were evaluated. The habitat parameters used to evaluate individual stream segments can be found in Table F-6. The 'rating' is the quality value for calculation of weighted habitat indices (see Table F-1). The ratings were used to calculate habitat quality for each life history stage. A summary of the habitat ratings corresponding to each life history stage can be found in Table F-5. Table F-4 summarizes the percent of dominant cover types found in pool, riffle, and flatwater habitats.

Map F-1 was generated using data collected during the aquatic species distribution surveys. If no adult salmonid upstream migration barrier was found, then the upper extent of salmonid (steelhead and coho) distribution is mapped as far upstream as juveniles have been found. In most circumstances this is close to the actual extent of salmonid distribution. However, in some streams salmonid distribution may extend further upstream.

There is a taxonomic uncertainty that is important to note. Juvenile steelhead and resident rainbow trout cannot be distinguished between in the field. For the purpose of this report, *Oncorhynchus mykiss* juveniles are referred to as "steelhead" if there is not a known migration barrier downstream. If there is a migration barrier downstream the juveniles are referred to as "rainbow trout". Some streams lack aquatic species distribution information. Data from six years

of aquatic species distribution surveys (MRC 2002) are located in Appendix F. The Site ID's presented in Appendix F are also depicted on Map F-1.

Table F-3 presents data collected by MRC while operating an out-migrant trap in Elk Creek between 2001 and 2003 (See Map F-1). Population estimates are presented for age 1+ steelhead based upon a mark recapture program that accounted for the capture efficiency of the trap. During the 2003 trapping season there were extremely large amounts of precipitation, which resulted in numerous trap failures. Therefore, steelhead population estimates from 2003 should be disregarded. Only one young of year coho salmon was captured during out-migrant trapping in 2002, so population estimates were unable to be generated for this species. The complete report (MRC 2003) should be consulted regarding additional data and the data limitations.

Table F-3. Summary of juvenile out-migrant population estimates in Elk Creek, 2000-2002.

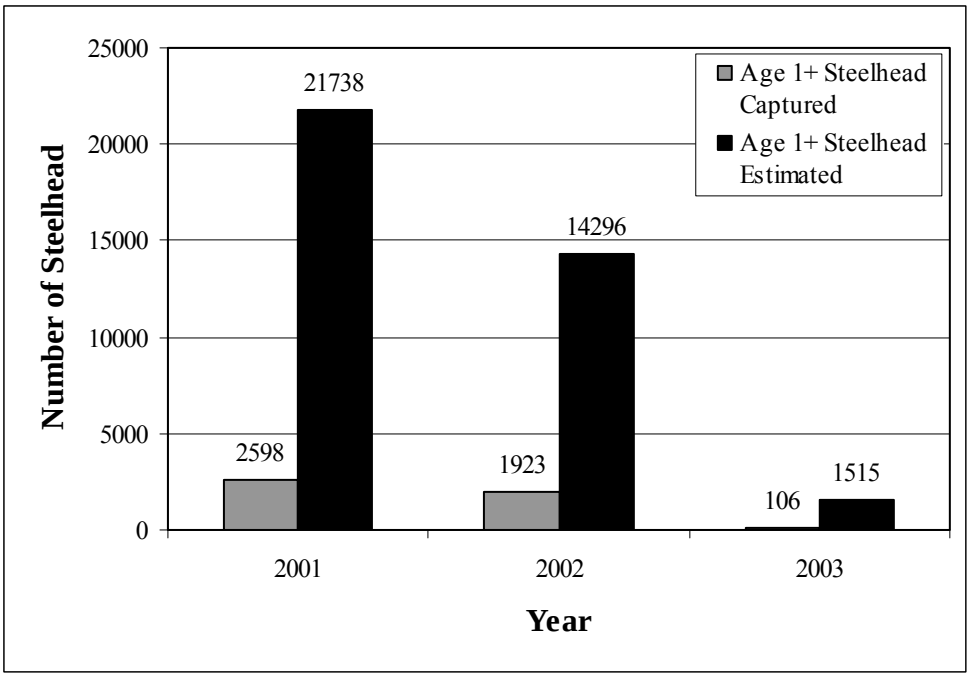

Table F-4. Percent of dominant cover types found in pool, riffle, and flatwater habitats of the Elk WAU, 2005.

Segment	Pool		Riffle		Flatwater	
	Dom. Cover	Percent	Dom. Cover	Percent	Dom. Cover	Percent
CL01	LWD	44	Bubble Curtain	62	Terrestrial Vegetation	25
CL02	Boulders	42	Boulders	41	SWD	38
CL03	Boulders	61	Boulders	48	Boulders	100
CL05	Bedrock Ledges	46	Boulders	88	Boulders	92
CL06	LWD	59	LWD	35	LWD	40
CL07	Boulders	100	Boulders	50	Undercut Banks	100
CL12	LWD	31	SWD	26	LWD	67
CL16	Bubble Curtain	60	Bubble Curtain	60		0
CL24	LWD	56	LWD	74		0
CE01	Boulders	47	Boulders	89	Boulders	100
CE02	LWD	38	Boulders	64	Boulders	92
CE04	Bedrock Ledges	33	Boulders	93	Boulders	50
CE05	Boulders	44	Boulders	69	Boulders	38
CE06	Bedrock Ledges	20	Terrestrial Vegetation	40	Terrestrial Vegetation	50
CE08	Bedrock Ledges	27	SWD	50	Rootwads	50
CE09	LWD	58	SWD	50	SWD	50
CE10	LWD	50	Boulders	31	LWD	100
CE11	LWD	44	SWD	28	Bedrock Ledges	40
CE12	LWD	47	LWD	44	Rootwads	50
CE13	Boulders	50	Boulders	83		0
CE30	Bedrock Ledges	47	Boulders	68	Boulders	50
CE31	LWD	43	Boulders	75	Boulders	43
CE32	Boulders	47	Boulders	71	Boulders	50
CE33	Boulders	71	Boulders	88	Boulders	100
CE39	Bedrock Ledges	25	Boulders	53	Boulders	43
CE40	Boulders	50	Boulders	86	Boulders	100
CE41	Bedrock Ledges	40	Boulders	100	Boulders	100
CE44	Bedrock Ledges	33	Boulders	68	Undercut Banks	33
CE45	Bedrock Ledges	67	Boulders	83	Bedrock Ledges	67
CE46	Boulders	50	Boulders	87	Boulders	100
CE47	Boulders	100	Boulders	100	Boulders	100
CE51	LWD	62	Boulders	31	Undercut Banks	50

Table F-5. Summary of Fish Habitat Ratings for Three Life History Stages of the Elk WAU, 2005.

Segment	Spawning Habitat Score	Spawning Habitat Rating	Summer Rearing Habitat Score	Summer Rearing Habitat Rating	Over-wintering Habitat Score	Over-wintering Habitat Rating
CL01	2.31	Fair	2.30	Fair	2.00	Fair
CL02	2.03	Fair	1.70	Fair	1.60	Poor
CL03	1.67	Fair	1.85	Fair	1.90	Fair
CL05	2.00	Fair	2.10	Fair	2.00	Fair
CL06	1.67	Fair	1.35	Poor	1.35	Poor
CL07	1.36	Poor	1.35	Poor	1.30	Poor
CL12	1.36	Poor	1.20	Poor	1.15	Poor
CL16	1.69	Fair	1.80	Fair	1.60	Poor
CL24	1.36	Poor	1.80	Fair	1.70	Fair
CE01	1.67	Fair	1.85	Fair	1.75	Fair
CE02	1.67	Fair	1.70	Fair	1.70	Fair
CE04	1.67	Fair	1.85	Fair	2.05	Fair
CE05	2.67	Good	1.80	Fair	1.60	Poor
CE06	2.67	Good	1.95	Fair	1.75	Fair
CE08	1.36	Poor	1.20	Poor	1.15	Poor
CE09	1.67	Fair	1.55	Poor	1.45	Poor
CE10	2.00	Fair	1.80	Fair	1.60	Poor
CE11	1.67	Fair	1.35	Poor	1.30	Poor
CE12	1.36	Poor	1.35	Poor	1.30	Poor
CE13	1.36	Poor	1.35	Poor	1.45	Poor
CE30	1.67	Fair	1.55	Poor	1.50	Poor
CE31	1.67	Fair	1.55	Poor	1.50	Poor
CE32	1.36	Poor	1.35	Poor	1.60	Poor
CE33	1.36	Poor	1.55	Poor	1.75	Fair
CE39	1.67	Fair	1.35	Poor	1.45	Poor
CE40	1.36	Poor	1.35	Poor	1.45	Poor
CE41	1.00	Poor	1.40	Poor	1.60	Poor
CE44	2.03	Fair	1.35	Poor	1.60	Poor
CE45	2.05	Fair	1.45	Poor	1.30	Poor
CE46	1.36	Poor	1.50	Poor	1.45	Poor
CE47	1.36	Poor	1.55	Poor	1.75	Fair
CE51	1.36	Poor	1.55	Poor	1.45	Poor

Table F-6. Summary of Fish Habitat Parameters of the Elk WAU, 2005.

Segment	Length of surveyed habitat (ft.)	**A.** Percent Pool:Riffle: Flatwater by segment length	**B.** Pool Spacing	**C.** Mean Pool Shelter Rating	**D.** Percent of all pools with residual depth >3 ft.	**E.** Percent Spawnable	**F.** Percent Embeddedness	**G.** Dominant Tailout Substrate	**H.** Key LWD + Rootwads / 328ft.	**I.** Percent Over-wintering Substrate	**J.** Percent Side Channel by segment length	Mean Residual Pool Depth (ft.)	Functional LWD / 328ft.
CL01	2791	63:26:11	1.8	124	63	59	25-50	Sm. Gravel	0.1	3	2	3.7	9.8
CL02	5250	49:38:13	3.0	98	50	50	>50	Lg. Gravel	0.1	4	0	3.3	9.4
CL03	5061	33:48:19	2.3	117	50	40	>50	Sm. Gravel	0.3	33	0	3.1	5.4
CL05	6208	37:48:15	2.0	93	54	41	25-50	Sm. Gravel	0.2	30	3	2.9	7.6
CL06	3642	29:66:5	5.9	113	9	28	>50	Sm. Gravel	2.7	9	3	1.7	25.0
CL07	703	25:67:8	3.1	113	0	7	>50	Sm. Gravel	0.3	13	0	1.0	10.7
CL12	3423	17:79:4	6.0	96	0	18	>50	Sm. Gravel	1.0	1	0	1.0	12.7
CL16	241	40:60:0	2.8	146	0	10	25-50	Sm. Gravel	0.3	5	0	1.1	29.1
CL24	822	30:70:0	6.3	126	0	14	>50	Sm. Gravel	6.9	6	3	1.1	27.4
CE01	4222	37:41:22	2.8	78	37	40	>50	Sm. Gravel	0.3	7	0	2.7	8.9
CE02	4183	25:49:26	3.5	91	25	44	>50	Sm. Gravel	0.1	9	5	2.4	6.6
CE04	2731	32:36:32	2.5	83	25	36	>50	Sm. Gravel	0.1	41	0	2.5	5.3
CE05	6179	43:40:17	3.5	116	37	52	25-50	Lg. Gravel	0.4	2	0	2.6	6.0
CE06	4073	44:38:18	2.0	113	26	55	25-50	Lg. Gravel	0.2	0	1	2.4	13.1
CE08	1550	32:63:5	9.6	105	0	14	>50	Sm. Gravel	0.8	17	0	1.4	10.7
CE09	1864	16:62:22	5.5	173	0	26	>50	Sm. Gravel	0.6	0	0	1.5	19.0
CE10	1569	31:67:2	2.6	130	0	34	25-50	Sm. Gravel	0.1	19	0	1.5	25.7
CE11	2074	24:67:9	4.6	85	6	25	>50	Sm. Gravel	0.4	8	1	1.5	17.7
CE12	2001	16:75:8	5.0	94	0	17	>50	Sm. Gravel	1.1	9	2	1.1	21.8
CE13	451	12:88:0	3.9	90	0	23	>50	Sm. Gravel	0.0	40	0	1.4	12.4
CE30	2196	36:49:15	4.3	86	11	27	>50	Sm. Gravel	0.0	14	0	2.1	6
CE31	1858	29:49:22	4.8	96	21	34	>50	Sm. Gravel	0.3	5	0	2.2	13.4
CE32	2223	28:56:16	4.0	65	12	14	>50	Sm. Gravel	0.3	68	0	2.1	9.3
CE33	747	25:57:18	3.6	121	0	23	>50	Sm. Gravel	0.1	71	0	1.6	18.4
CE39	2678	18:62:20	5.5	88	0	37	>50	Sm. Gravel	0.7	22	0	1.8	13.5
CE40	1922	29:51:20	5.4	93	13	24	>50	Sm. Gravel	0.3	30	0	1.7	10.1
CE41	876	14:72:14	6.7	138	0	10	>50	Boulder	0.2	45	0	2.1	6.7
CE44	4249	23:61:16	4.2	85	13	42	>50	Lg. Gravel	0.5	42	0	2.0	5.7
CE45	861	22:52:26	3.5	68	0	16	25-50	Sm. Cobble	0.1	13	0	1.4	3.4
CE46	1472	32:61:7	2.7	89	0	18	>50	Sm. Gravel	0.0	13	0	2.7	4.7
CE47	411	20:67:13	3.5	133	0	11	>50	Sm. Gravel	0.0	50	0	2.2	5.6
CE51	1322	20:69:11	4.3	142	0	20	>50	Sm. Gravel	0.8	0	0	1.3	23.8

Lower Elk Creek Planning Watershed

Elk Creek (Segment CL01)

The segment surveyed consisted of 63% pool, 26% riffle, and 11% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered high with a moderate frequency of riffle habitat. The majority of pools were lateral scour pools formed by logs (31%, Figure F-1). The dominant cover available to fish in pools in the segment was LWD (44%, Table F-4). The mean residual pool depth was 3.7 feet, with 63% of pools having residual depths ≥3 feet. The shelter rating was high (124), mainly due to good cover complexity and availability. There were minimal amounts of key LWD (0.1 pieces per 328 feet) observed in the segment. However, 31% of pools were formed by LWD and there were 9.8 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was moderate (25-50%).

Spawning Habitat

Spawning habitat in the segment was fair due to a high percentage of spawnable gravels available to fish in tailouts (59% of tailout area) and the spawning gravels were slightly embedded. However, the dominant tailout substrate size (small gravel) was slightly smaller than the preferred range of salmonids.

Summer Rearing Habitat

Summer rearing habitat in the segment was fair due to a high shelter rating, high frequency of pools, high occurrence of pools with residual depths ≥3 feet. However, there were minimal amounts of key LWD.

Over-wintering Habitat

Over-wintering habitat in the segment was fair due to a high shelter rating, high frequency of pools, high occurrence of pools with residual depths ≥3 feet. However, there were minimal amounts of key LWD, over-wintering substrate, and side channels.

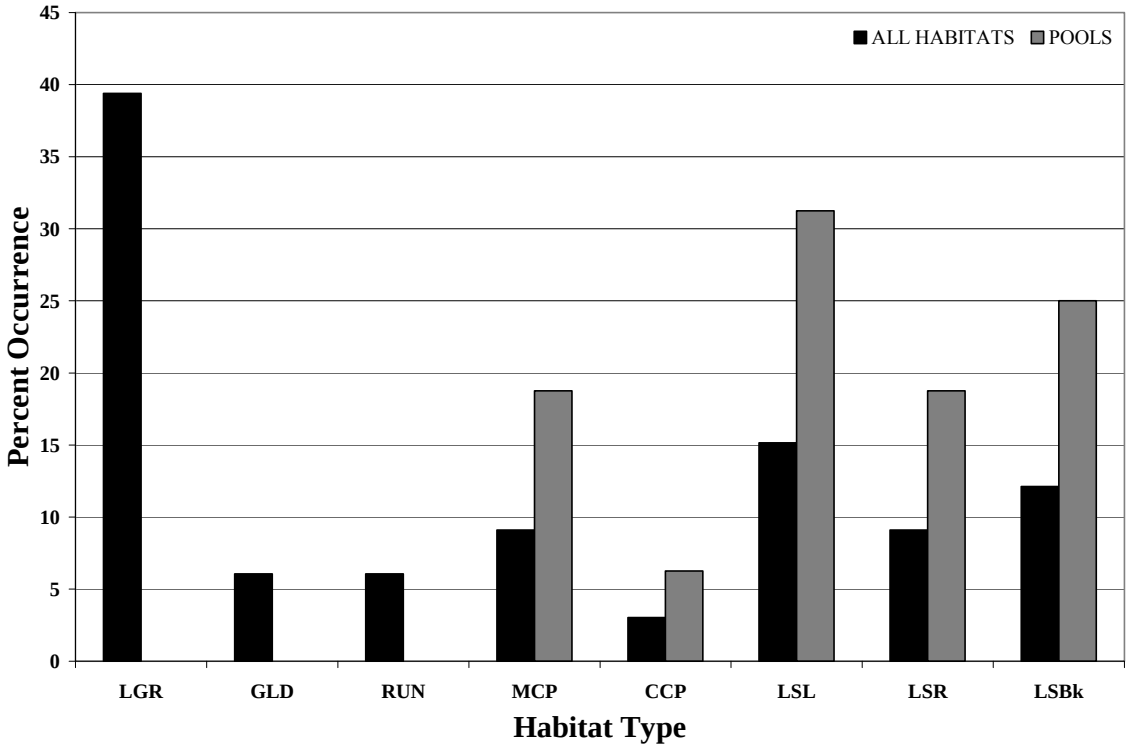

Figure F-1. Percent occurrence of habitat types surveyed in segment CL01 within the Elk WAU, 2005.

Elk Creek (Segment CL02)

The segment surveyed consisted of 49% pool, 38% riffle, and 13% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered moderate with a moderate frequency of riffle habitat. The majority of pools were mid-channel pools (42%, Figure F-2). The dominant cover available to fish in pools in the segment was boulders (42%, Table F-4). The mean residual pool depth was 3.3 feet, with 50% of pools having residual depths ≥3 feet. The shelter rating was moderate (98), mainly due to an availability of cover. There were minimal amounts of key LWD (0.1 pieces per 328 feet) observed in the segment with 4% of pools being formed by LWD. However, there were 9.4 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was large gravel and the embeddedness rating was high (>50%).

Spawning Habitat

Spawning habitat in the segment appeared to be fair due to a moderate percentage of spawnable gravels available to fish in tailouts (50% of tailout area) and the dominant tailout substrate size (large gravel) was within the preferred range of salmonids. However, the spawning gravels were embedded.

Summer Rearing Habitat

Summer rearing habitat in the segment was fair due to a moderate occurrence of pools with residual depths ≥3 feet, a moderate frequency of pools, and a moderate shelter rating. However, there were minimal amounts of key LWD.

Over-wintering Habitat

Over-wintering habitat in the segment was poor due to a moderate occurrence of pools with residual depths ≥3 feet, a moderate frequency of pools, and a moderate shelter rating. However, there were minimal amounts of key LWD, minimal over-wintering substrate and an absence of side channels.

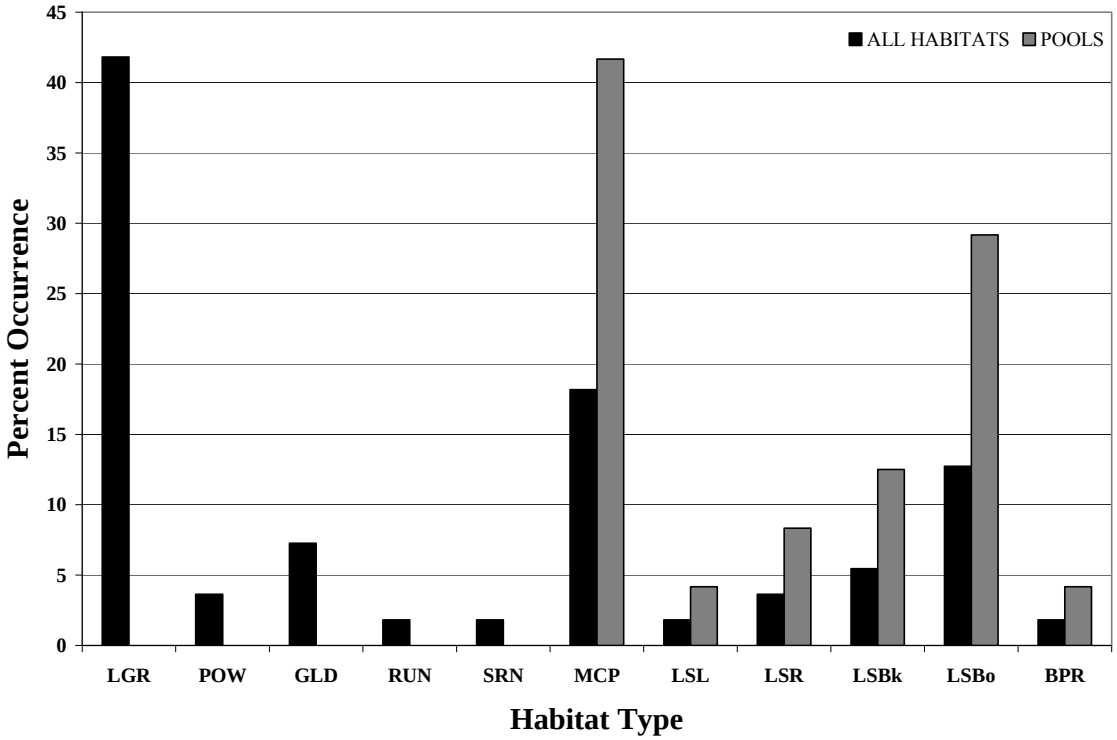

Figure F-2. Percent occurrence of habitat types surveyed in segment CL02 within the Elk WAU, 2005.

Elk Creek (Segment CL03)

The segment surveyed consisted of 33% pool, 48% riffle, and 19% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered moderate with a moderate frequency of riffle habitat. The majority of pools were mid-channel pools (33%, Figure F-3). The dominant cover available to fish in pools in the segment was boulders (61%, Table F-4). The mean residual pool depth was 3.1 feet, with 50% of pools having residual depths ≥3 feet. The shelter rating was moderate (117), mainly due to an availability of cover. There were minimal amounts of key LWD (0.3 pieces per 328 feet) observed in the segment. However, 22% of pools were formed by LWD and there were 5.4 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was high (>50%).

Spawning Habitat

Spawning habitat in the segment was fair due to a moderate percentage of spawnable gravels available to fish in tailouts (40% of tailout area). However, the dominant tailout substrate size (small gravel) was slightly smaller than the preferred range of salmonids, and the spawning gravels were embedded.

Summer Rearing Habitat

Summer rearing habitat in the segment was fair due to a moderate occurrence of pools with residual depths ≥3 feet, a moderate frequency of pools, and a moderate shelter rating. However, there were minimal amounts of key LWD.

Over-wintering Habitat

Over-wintering habitat in the segment was fair due to a moderate occurrence of pools with residual depths ≥3 feet, a moderate frequency of pools, a moderate shelter rating, and a moderate amount of over-wintering substrate. However, there were minimal amounts of key LWD and an absence of side channels.

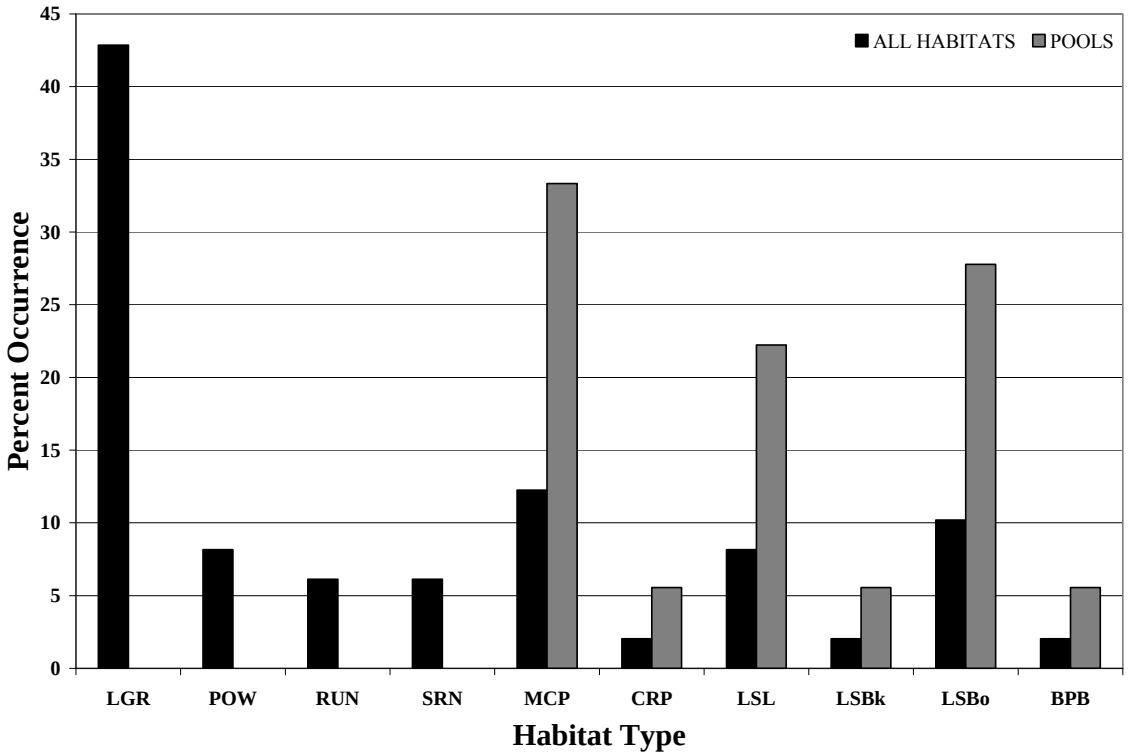

Figure F-3. Percent occurrence of habitat types surveyed in segment CL03 within the Elk WAU, 2005.

Elk Creek (Segment CL05)

The segment surveyed consisted of 37% pool, 48% riffle, and 15% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered moderate with a moderate frequency of riffle habitat. The majority of pools were lateral scour pools formed by bedrock (42%, Figure F-4). The dominant cover available to fish in pools in the segment was bedrock ledges (46%, Table F-4). The mean residual pool depth was 2.9 feet, with 54% of pools having residual depths ≥3 feet. The shelter rating was moderate (93), mainly due to an availability of cover. There were minimal amounts of key LWD (0.2 pieces per 328 feet) observed in the segment with 4% of pools being formed by LWD. However, there were 9.4 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was moderate (25-50%).

Spawning Habitat

Spawning habitat in the segment was fair due to a moderate percentage of spawnable gravels available to fish in tailouts (41% of tailout area) and the spawning gravels were slightly embedded. However, the dominant tailout substrate size (small gravel) is slightly smaller than the preferred range of salmonids.

Summer Rearing Habitat

Summer rearing habitat in the segment was fair due to a high occurrence of pools with residual depths ≥3 feet, a moderate frequency of pools, and a moderate shelter rating. However, there were minimal amounts of key LWD.

Over-wintering Habitat

Over-wintering habitat in the segment was fair due to a high occurrence of pools with residual depths ≥3 feet, a moderate frequency of pools, a moderate shelter rating, and a moderate amount of over-wintering substrate. However, there were minimal amounts of key LWD and a moderate frequency of side channels.

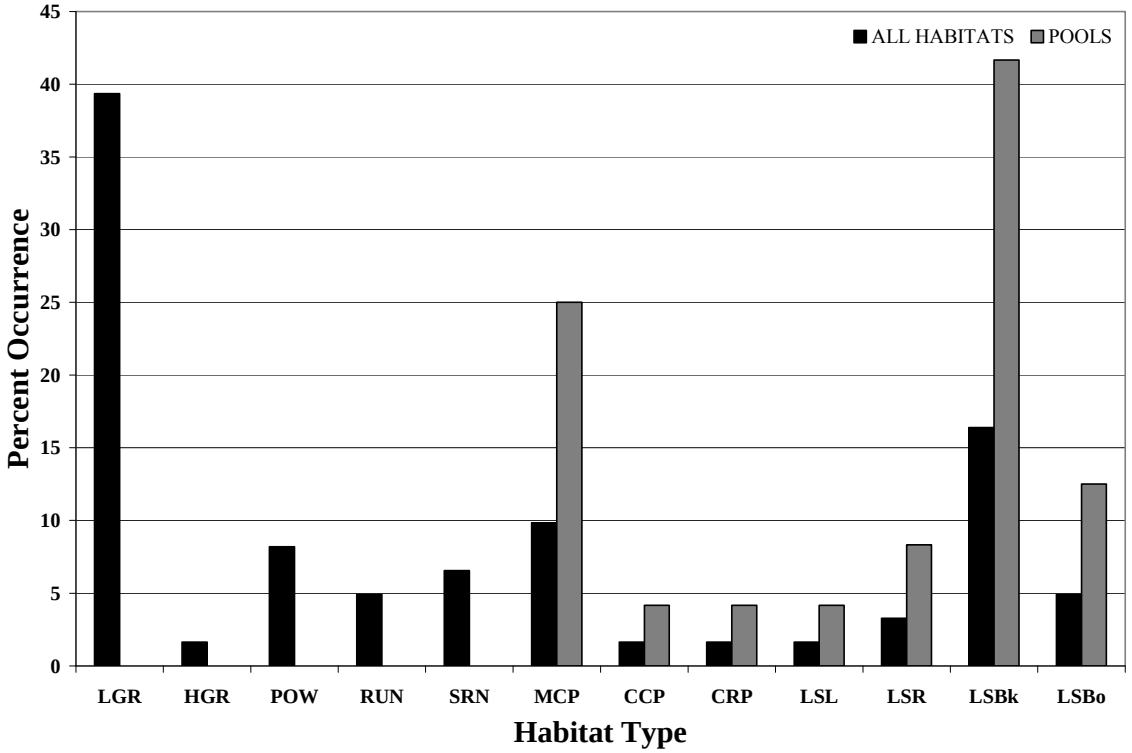

Figure F-4. Percent occurrence of habitat types surveyed in segment CL05 within the Elk WAU, 2005.

South Fork Elk Creek (Segment CL06)

The segment surveyed consisted of 29% pool, 66% riffle, and 5% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered moderate with a high frequency of riffle habitat. The majority of pools were lateral scour pools formed by logs (34%, Figure F-5). The dominant cover available to fish in pools in the segment was LWD (59%, Table F-4). The mean residual pool depths was 1.7 feet, with 9% of pools having residual depths ≥3 feet. The shelter rating was moderate (113), mainly due to an availability of cover. There were minimal amounts of key LWD (2.7 pieces per 328 feet) observed in the segment. However, 34% of pools were formed by LWD and there were 25.0 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was high (>50%).

Spawning Habitat

Spawning habitat in the segment was fair due to a moderate percentage of spawnable gravels available to fish in tailouts (28% of tailout area). However, the dominant tailout substrate size (small gravel) was slightly smaller than the preferred range of salmonids, and the spawning gravels were embedded.

Summer Rearing Habitat

Summer rearing habitat in the segment was poor due to minimal amounts of key LWD and a low occurrence of pools with residual depths ≥3 feet. However, there was a moderate shelter rating and a moderate frequency of pools.

Over-wintering Habitat

Over-wintering habitat in the segment was poor due to minimal amounts of key LWD, a minimal amount of over-wintering substrate, and a low occurrence of pools with residual depths ≥3 feet. However, there was a moderate frequency of side channels, a moderate frequency of pools, and a moderate shelter rating.

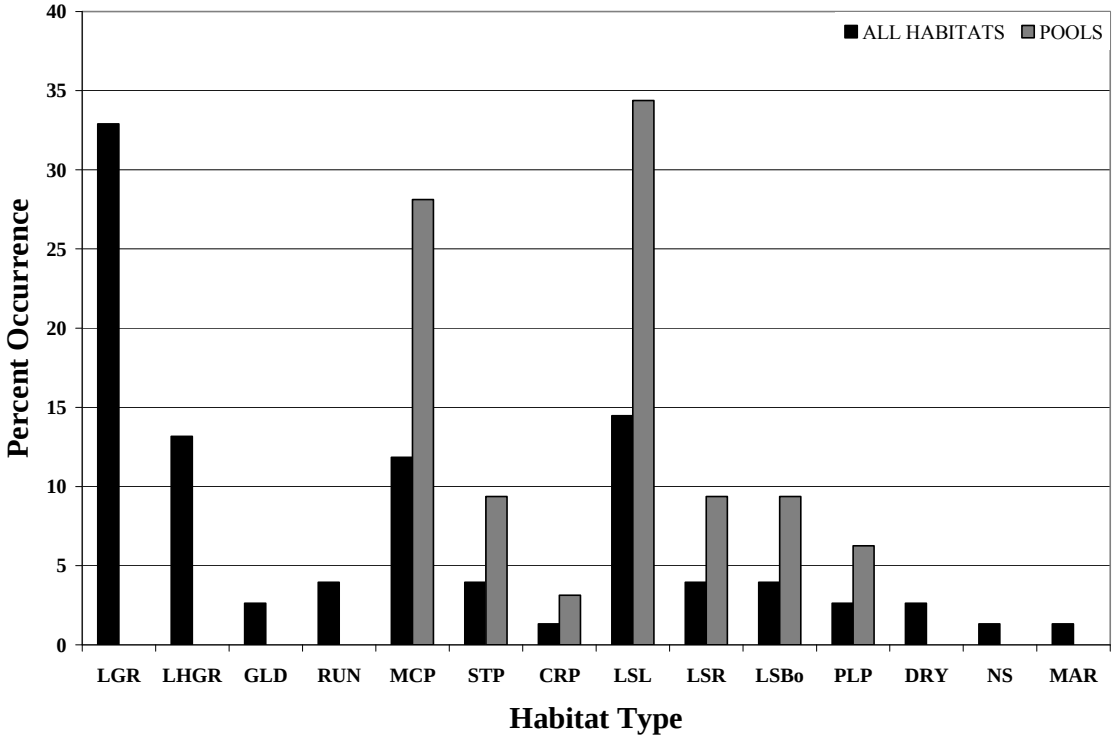

Figure F-5. Percent occurrence of habitat types surveyed in segment CL06 within the Elk WAU, 2005.

South Fork Elk Creek (Segment CL07)

The segment surveyed consisted of 25% pool, 67% riffle, and 8% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered moderate with a high frequency of riffle habitat. The majority of pools were mid-channel pools (67%, Figure F-6). The only cover available to fish in pools in the segment was boulder (100%, Table F-4). The mean residual pool depth was 1.0 feet, with 0% of pools having residual depths ≥3 feet. The shelter rating was moderate (113), mainly due to an availability of cover. There were minimal amounts of key LWD (0.3 pieces per 328 feet) observed in the segment with none of the pools formed by LWD. However, there were 10.7 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was high (>50%).

Spawning Habitat

Spawning habitat in the segment was poor due to a low percentage of spawnable gravels available to fish in tailouts (7% of tailout area), the dominant tailout substrate size (small gravel) is slightly smaller than the preferred range of salmonids, and the spawning gravels were embedded.

Summer Rearing Habitat

Summer rearing habitat in the segment was poor due to a minimal amount of key LWD and an absence of pools with residual depths ≥3 feet. However, there was a moderate shelter rating and a moderate frequency of pools.

Over-wintering Habitat

Over-wintering habitat in the segment was poor due to a minimal amount of key LWD, minimal over-wintering substrate, and an absence of pools with residual depths ≥3 feet and side channels. However, there was a moderate shelter rating and a moderate frequency of pools.

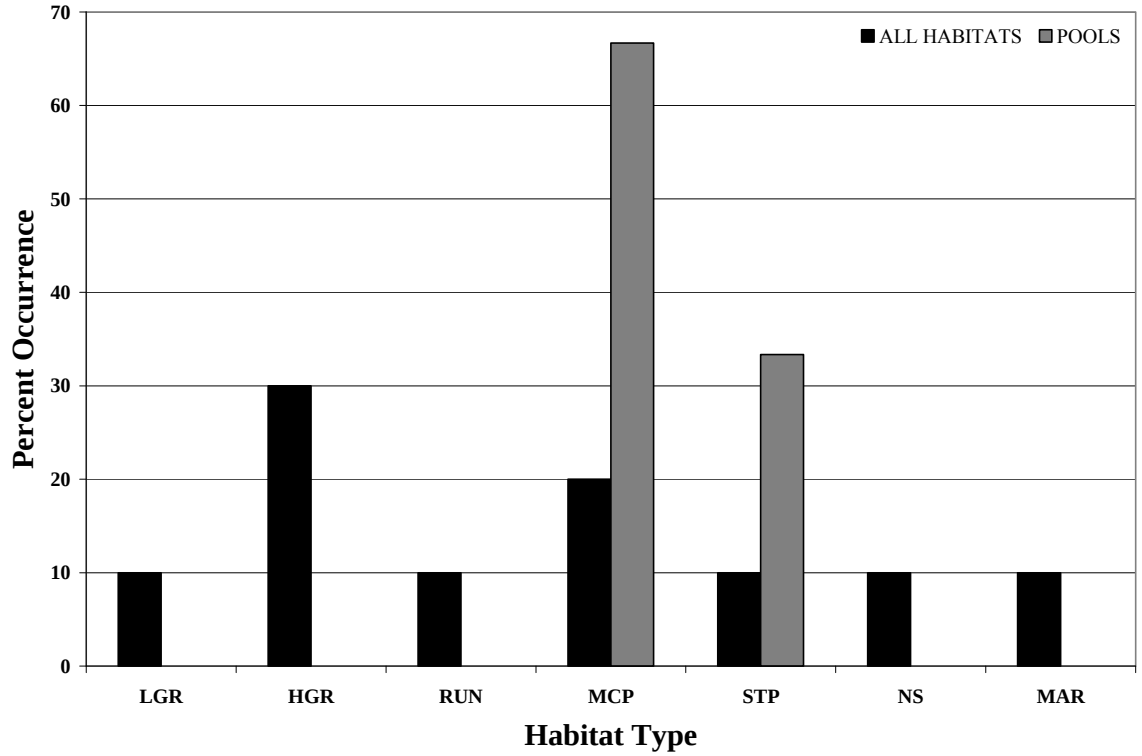

Figure F-6. Percent occurrence of habitat types surveyed in segment CL07 within the Elk WAU, 2005.

Little South Fork Elk Creek (Segment CL12)

The segment surveyed consisted of 17% pool, 79% riffle, and 4% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered low with a high frequency of riffle habitat. The majority of pools were mid-channel pools (26%, Figure F-7). The dominant cover available to fish in pools in the segment was LWD (31%, Table F-4). The mean residual pool depth was 1.0 feet, with 0% of pools having residual depths ≥3 feet. The shelter rating was moderate (96), mainly due to an availability of cover. There were minimal amounts of key LWD (1.0 pieces per 328 feet) observed in the segment. However, 17% of pools were formed by LWD and there were 12.7 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was high (>50%).

Spawning Habitat

Spawning habitat in the segment was poor due to a low percentage of spawnable gravels available to fish in tailouts (18% of tailout area), the dominant tailout substrate size (small gravel) is slightly smaller than the preferred range of salmonids, and the spawning gravels were embedded.

Summer Rearing Habitat

Summer rearing habitat in the segment was poor due to a minimal amount of key LWD, a low frequency of pools, and an absence of pools with residual depths ≥3 feet. However, there was a moderate shelter rating.

Over-wintering Habitat

Over-wintering habitat in the segment was poor due to a minimal amount of key LWD, minimal over-wintering substrate, a low frequency of pools, and an absence of pools with residual depths ≥3 feet and side channels. However, there was a moderate shelter rating.

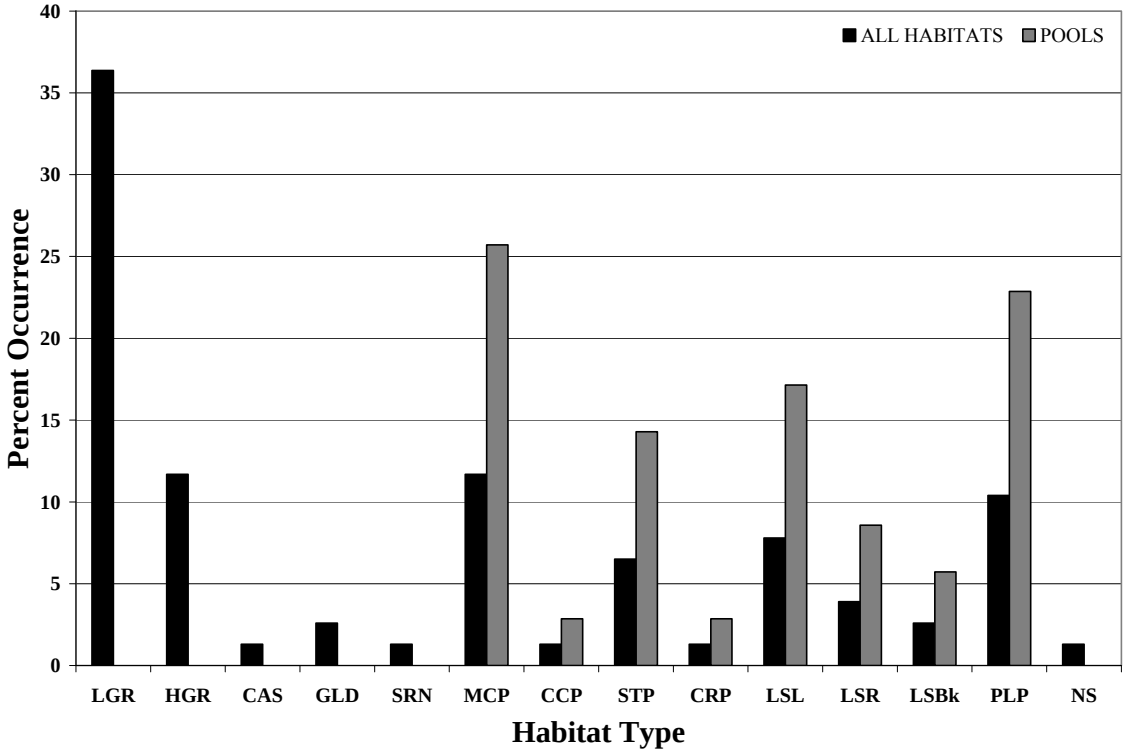

Figure F-7. Percent occurrence of habitat types surveyed in segment CL12 within the Elk WAU, 2005.

Unnamed Left Bank Tributary to Elk Creek (Segment CL16)

The segment surveyed consisted of 40% pool, 60% riffle, and 0% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered low with a high frequency of riffle habitat. There was an equal proportion of mid channel pools to plunge pools (40%, Figure F-8). The dominant cover available to fish in pools in the segment was bubble curtain (60%, Table F-4). The mean residual pool depth was 1.1 feet, with 0% of pools having residual depths ≥3 feet. The shelter rating was high (146), mainly due to good cover complexity and availability. There were minimal amounts of key LWD (0.3 pieces per 328 feet) observed in the segment with none of the pools formed by LWD. However, there were 29.1 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was moderate (25-50%).

Spawning Habitat

Spawning habitat in the segment was fair due to the spawning gravels being slightly embedded. However, there was a low percentage of spawnable gravels available to fish in tailouts (10% of tailout area) and the dominant tailout substrate size (small gravel) is slightly smaller than the preferred range of salmonids.

Summer Rearing Habitat

Summer rearing habitat in the segment was fair due to a high shelter rating and a moderate frequency of pools. However, there was an absence of pools with residual depths ≥3 feet and a minimal amount of key LWD.

Over-wintering Habitat

Over-wintering habitat in the segment was poor due to an absence of side channels and pools with residual depths ≥3 feet, a minimal amount of over-wintering substrate, and a minimal amount of key LWD. However, there was a high shelter rating and a moderate frequency of pools.

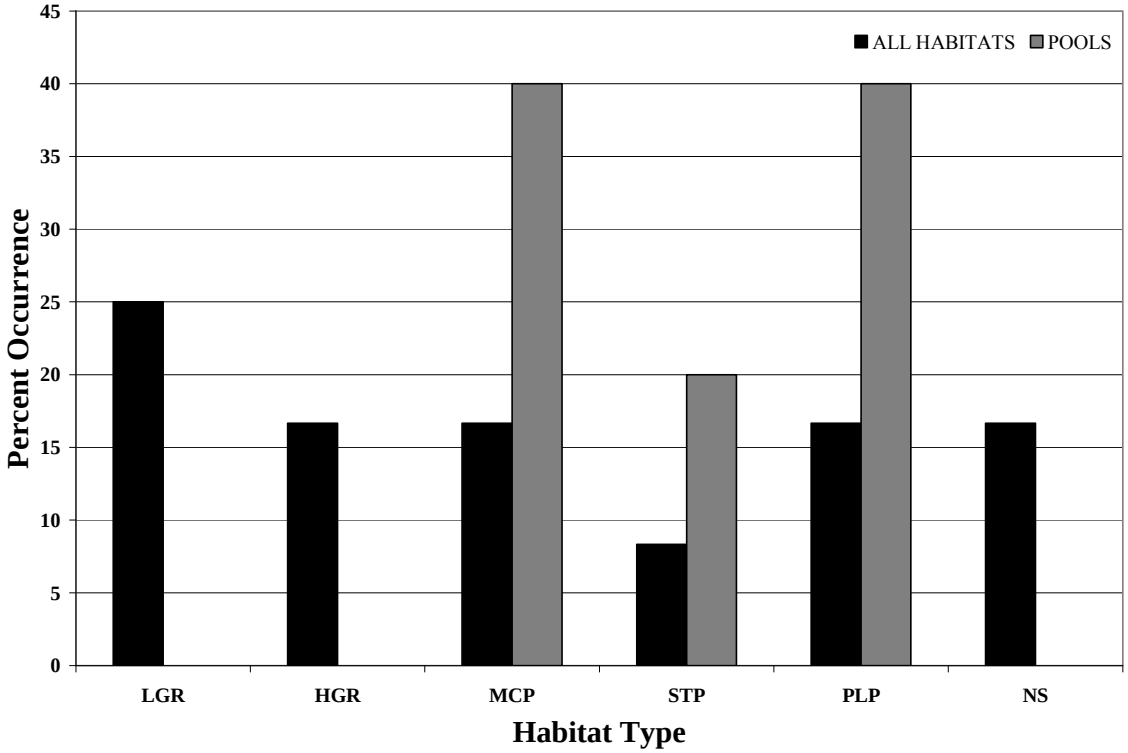

Figure F-8. Percent occurrence of habitat types surveyed in segment CL16 within the Elk WAU, 2005.

Unnamed Right Bank Tributary to Elk Creek (Segment CL24)

The segment surveyed consisted of 30% pool, 70% riffle, and 0% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered moderate with a high frequency of riffle habitat. There was an equal proportion of mid channel pools to plunge pools (25%, Figure F-9). The dominant cover available to fish in pools in the segment was LWD (56%, Table F-4). The mean residual pool depth was 1.1 feet, with 0% of pools having residual depths ≥3 feet. The shelter rating was high (126), mainly due to good cover complexity and availability. There were high amounts of key LWD (6.9 pieces per 328 feet) observed in the segment due to a collapsing railroad trestle. There were 27.4 pieces of functional LWD per 328 feet surveyed, however only 6% of pools in this segment were formed by LWD. The dominant tailout substrate was small gravel and the embeddedness rating was high (>50%).

Spawning Habitat

Spawning habitat in the segment was poor due to a low percentage of spawnable gravels available to fish in tailouts (10% of tailout area), the dominant tailout substrate size (small gravel) is slightly smaller than the preferred range of salmonids, and the spawning gravels were embedded.

Summer Rearing Habitat

Summer rearing habitat in the segment was fair due to a high amount of key LWD, a high shelter rating, and a moderate frequency of pools. However, there was absence of pools with residual depths ≥3 feet.

Over-wintering Habitat

Over-wintering habitat in the segment was fair due to a high amount of key LWD, a high shelter rating, a moderate frequency of side channels, a moderate frequency of pools. However, there was minimal over-wintering substrate, and an absence of pools with residual depths ≥3 feet.

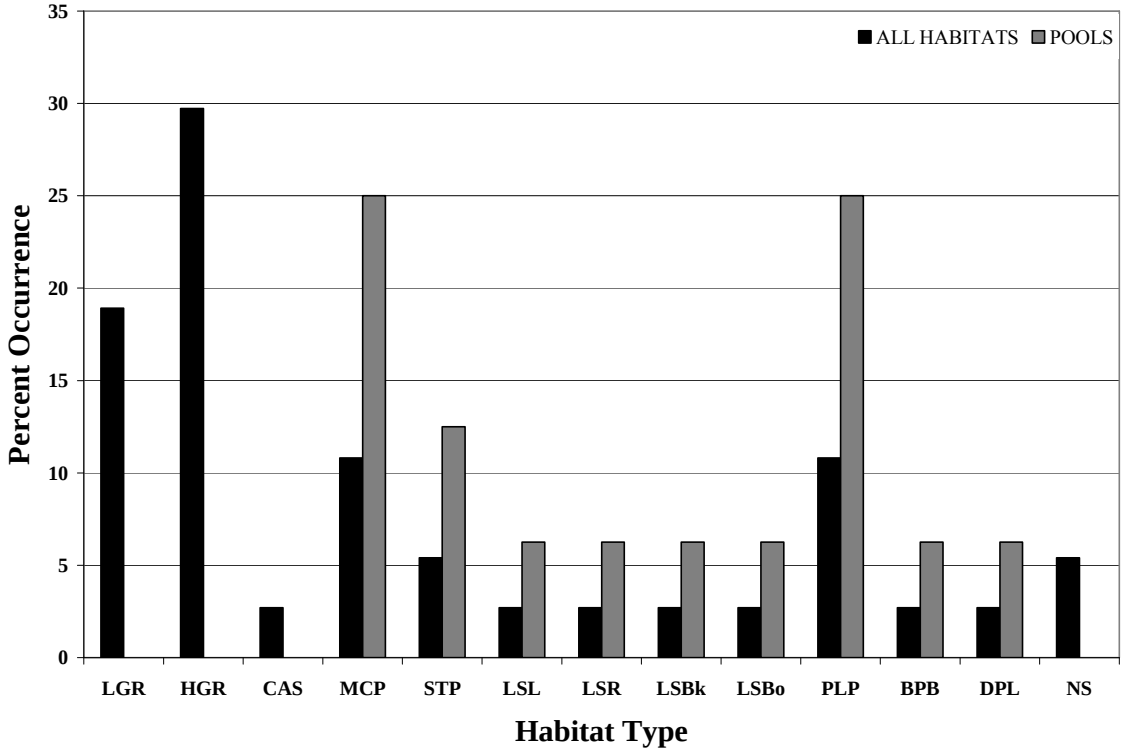

Figure F-9. Percent occurrence of habitat types surveyed in segment CL24 within the Elk WAU, 2005.

Upper Elk Creek Planning Watershed

Elk Creek (Segment CE01)

The segment surveyed consisted of 37% pool, 41% riffle, and 22% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered moderate with a high frequency of riffle habitat. The majority of pools were lateral scour pools formed by bedrock (47%, Figure F-10). The dominant cover available to fish in pools in the segment was boulder (47%, Table F-4). The mean residual pool depth was 2.7 feet, with 37% of pools having residual depths ≥3 feet. The shelter rating was moderate (78), mainly due to an availability of cover. There were minimal amounts of key LWD (0.3 pieces per 328 feet) observed in the segment. However, 11% of pools were formed by LWD and there were 8.9 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was high (>50%).

Spawning Habitat

Spawning habitat in the segment was fair due to the moderate percentage of spawnable gravels available to fish in tailouts (40% of tailout area). However, the dominant tailout substrate size (small gravel) is slightly smaller than the preferred range of salmonids and the spawning gravels were embedded.

Summer Rearing Habitat

Summer rearing habitat in the segment was fair due to a moderate occurrence of pools with residual depths ≥3 feet, a moderate frequency of pools, and a moderate shelter rating. However, there was a minimal amount of key LWD.

Over-wintering Habitat

Over-wintering habitat in the segment was fair due to a moderate occurrence of pools with residual depths ≥3 feet, a moderate frequency of pools, and a moderate shelter rating. However, there was a minimal amount of over-wintering substrate, a minimal amount of key LWD, and an absence of side channels.

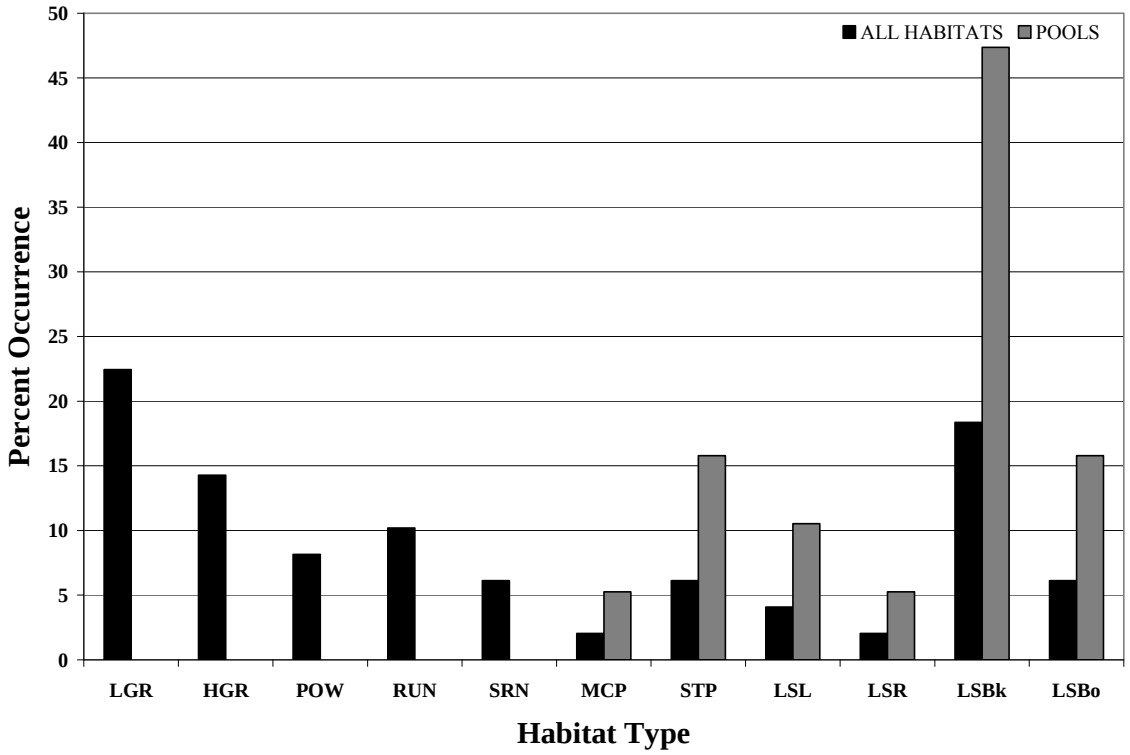

Figure F-10. Percent occurrence of habitat types surveyed in segment CE01 within the Elk WAU, 2005.

Elk Creek (Segment CE02)

The segment surveyed consisted of 25% pool, 49% riffle, and 26% flatwater by stream length (Table F-6). The frequency of pools, riffles, and flatwater in the segment are all considered moderate. The majority of pools were lateral scour pools formed by boulders (38%, Figure F-11). The dominant cover available to fish in pools in the segment was LWD (38%, Table F-4). The mean residual pool depth was 2.4 feet, with 25% of pools having residual depths ≥3 feet. The shelter rating was moderate (91), mainly due to an availability of cover. There were minimal amounts of key LWD (0.1 pieces per 328 feet) observed in the segment. However, 6% of pools were formed by LWD and there were 6.6 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was high (>50%).

Spawning Habitat

Spawning habitat in the segment was fair due to the moderate percentage of spawnable gravels available to fish in tailouts (44% of tailout area). However, the dominant tailout substrate size (small gravel) is slightly smaller than the preferred range of salmonids and the spawning gravels were embedded.

Summer Rearing Habitat

Summer rearing habitat in the segment was fair due to a moderate occurrence of pools with residual depths ≥3 feet, a moderate frequency of pools, and a moderate shelter rating. However, there was a minimal amount of key LWD.

Over-wintering Habitat

Over-wintering habitat in the segment was fair due to a moderate occurrence of pools with residual depths ≥3 feet, a moderate frequency of pools, a moderate shelter rating, and a moderate frequency of side channels. However, there was a minimal amount of over-wintering substrate and key LWD.

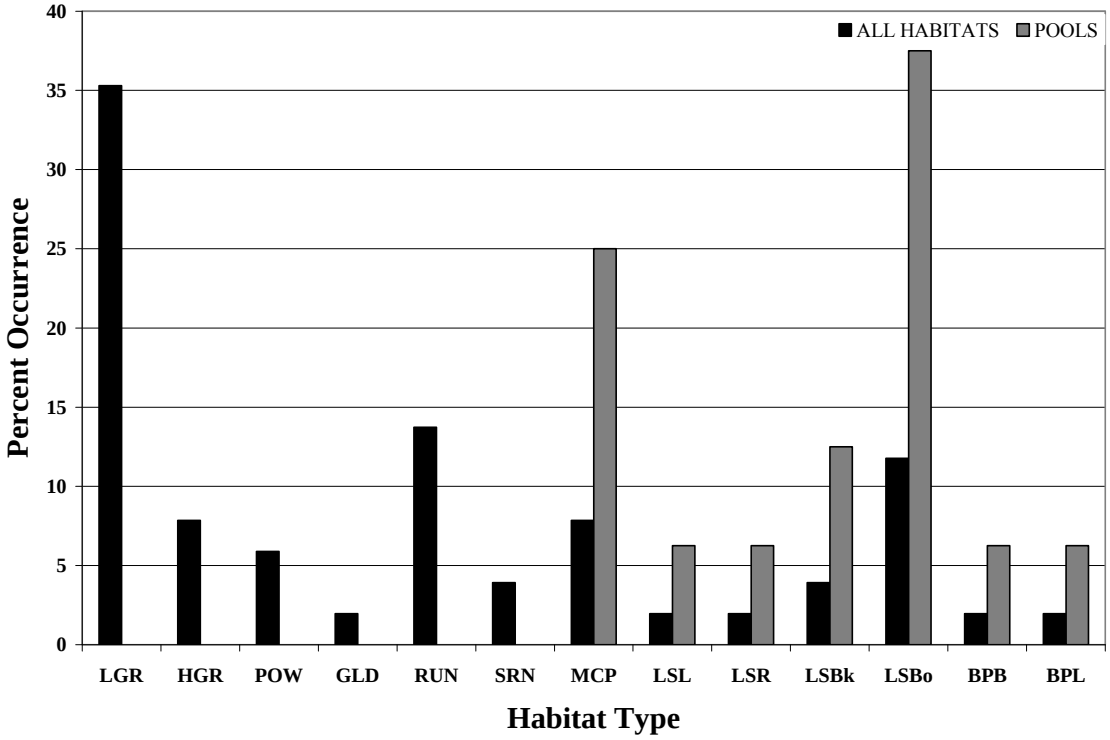

Figure F-11. Percent occurrence of habitat types surveyed in segment CL02 within the Elk WAU, 2005.

Elk Creek (Segment CE04)

The segment surveyed consisted of 32% pool, 36% riffle, and 32% flatwater by stream length (Table F-6). The frequency of pools, riffles, and flatwater in the segment are all considered moderate. The majority of pools were lateral scour pools formed by boulders (33%, Figure F-12). The dominant cover available to fish in pools in the segment was bedrock ledges (33%, Table F-4). The mean residual pool depth was 2.5 feet, with 25% of pools having residual depths ≥3 feet. The shelter rating was moderate (83), mainly due to an availability of cover. There were minimal amounts of key LWD (0.1 pieces per 328 feet) observed in the segment. However, 17% of pools in this segment were formed by LWD and there were also 5.3 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was high (>50%).

Spawning Habitat

Spawning habitat in the segment was fair due to the moderate percentage of spawnable gravels available to fish in tailouts (36% of tailout area). However, the dominant tailout substrate size (small gravel) is slightly smaller than the preferred range of salmonids and the spawning gravels were embedded.

Summer Rearing Habitat
Summer rearing habitat in the segment was fair due to a moderate occurrence of pools with residual depths ≥3 feet, a moderate frequency of pools, and a moderate shelter rating. However, there was a minimal amount of key LWD.
Over-wintering Habitat
Over-wintering habitat in the segment was fair due to a high amount of over-wintering substrate, a moderate occurrence of pools with residual depths ≥3 feet, a moderate frequency of pools, and a moderate shelter rating. However, there was a minimal amount of and key LWD and an absence of side channels.

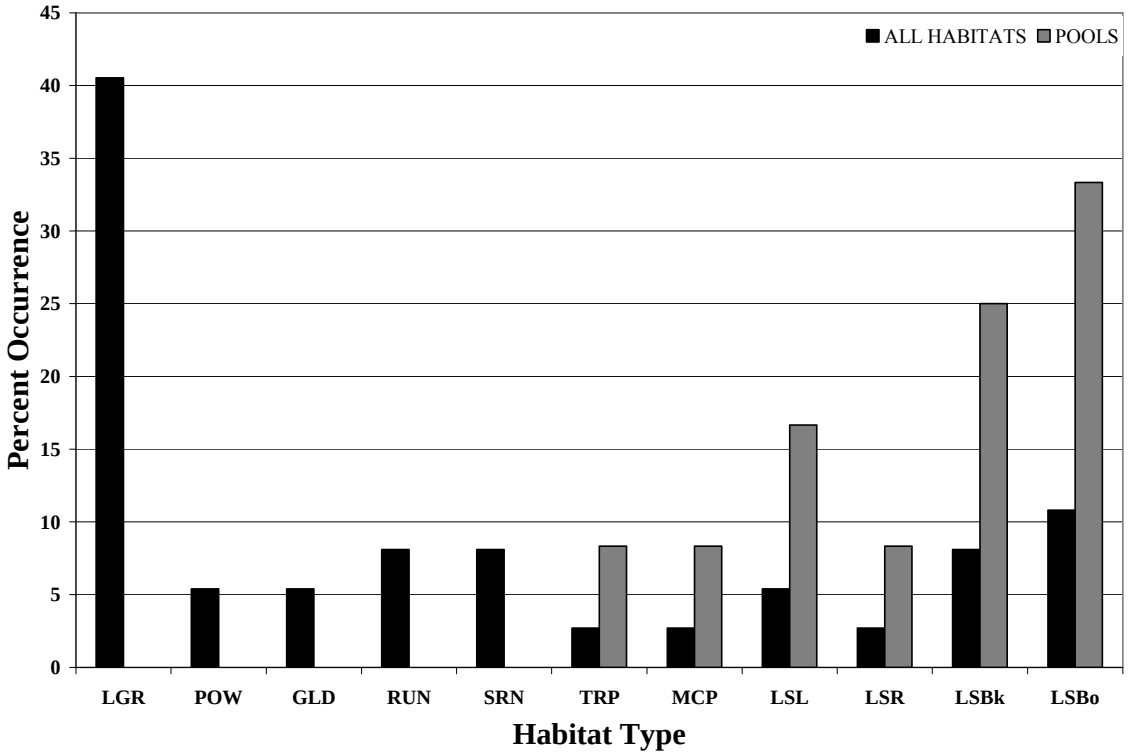

Figure F-12. Percent occurrence of habitat types surveyed in segment CE04 within the Elk WAU, 2005.

Elk Creek (Segment CE05)
The segment surveyed consisted of 43% pool, 40% riffle, and 17% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered moderate with a moderate frequency of riffle habitat. The majority of pools were lateral scour pools formed by bedrock (39%, Figure F-13). The dominant cover available to fish in pools in the segment was boulder (44%, Table F-4). The mean residual pool depth was 2.6 feet, with 37% of pools having residual depths ≥3 feet. The shelter rating was moderate (116), mainly due to an availability of cover. There were minimal amounts of key LWD (0.4 pieces per 328 feet) observed in the segment. However, 10% of pools in this segment were formed by LWD and there were also 6.0 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was large gravel and the embeddedness rating was moderate (25-50%).
Spawning Habitat
Spawning habitat in the segment appeared to be good due to a high percentage of spawnable gravels available to fish in tailouts (52% of tailout area), the dominant tailout substrate size (large gravel) was within the preferred range of salmonids, and the spawning gravels were slightly embedded.

Summer Rearing Habitat
Summer rearing habitat in the segment was fair due to a moderate occurrence of pools with residual depths ≥3 feet, a moderate frequency of pools, and a moderate shelter rating. However, there was a minimal amount of key LWD.
Over-wintering Habitat
Over-wintering habitat in the segment was poor due to a minimal amount of key LWD, minimal over-wintering substrate, and an absence of side channels. However, there was a moderate occurrence of pools with residual depths ≥3 feet, a moderate frequency of pools, and a moderate shelter rating.

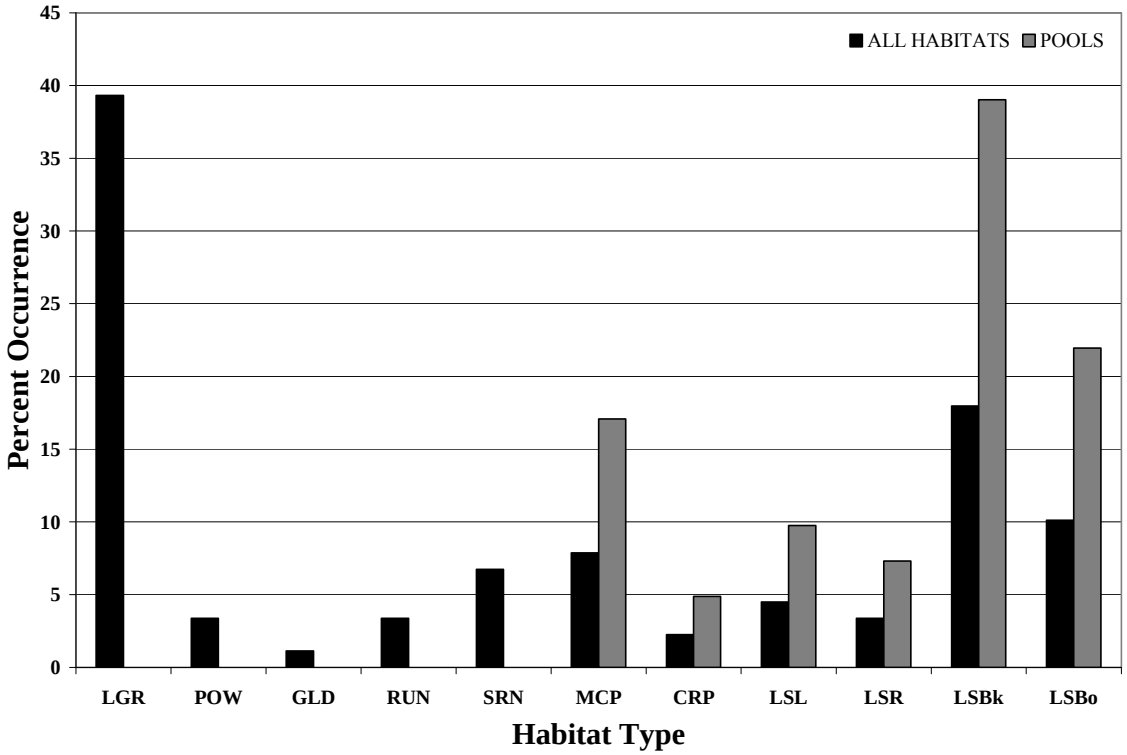

Figure F-13. Percent occurrence of habitat types surveyed in segment CE05 within the Elk WAU, 2005.

Elk Creek (Segment CE06)
The segment surveyed consisted of 44% pool, 38% riffle, and 18% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered moderate with a moderate frequency of riffle habitat. The majority of pools were lateral scour pools formed by bedrock (26%, Figure F-14). The dominant cover available to fish in pools in the segment was bedrock ledges (20%, Table F-4). The mean residual pool depth was 2.4 feet, with 26% of pools having residual depths ≥3 feet. The shelter rating was moderate (113), mainly due to an availability of cover. There were minimal amounts of key LWD (0.2 pieces per 328 feet) observed in the segment. However, 20% of pools in this segment were formed by LWD and there were 13.1 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was large gravel and the embeddedness rating was moderate (25-50%).
Spawning Habitat
Spawning habitat in the segment appeared to be good due to a high percentage of spawnable gravels available to fish in tailouts (55% of tailout area), the dominant tailout substrate size (large gravel) was within the preferred range of salmonids, and the spawning gravels were slightly embedded.

Summer Rearing Habitat
Summer rearing habitat in the segment was fair due to a moderate occurrence of pools with residual depths ≥3 feet, a moderate frequency of pools, and a moderate shelter rating. However, there was a minimal amount of key LWD
Over-wintering Habitat
Over-wintering habitat in the segment was fair due to a moderate occurrence of pools with residual depths ≥3 feet, a moderate frequency of pools, and a moderate shelter rating. However, there was a minimal amount of over-wintering substrate, a minimal amount of key LWD, and an absence of side channels.

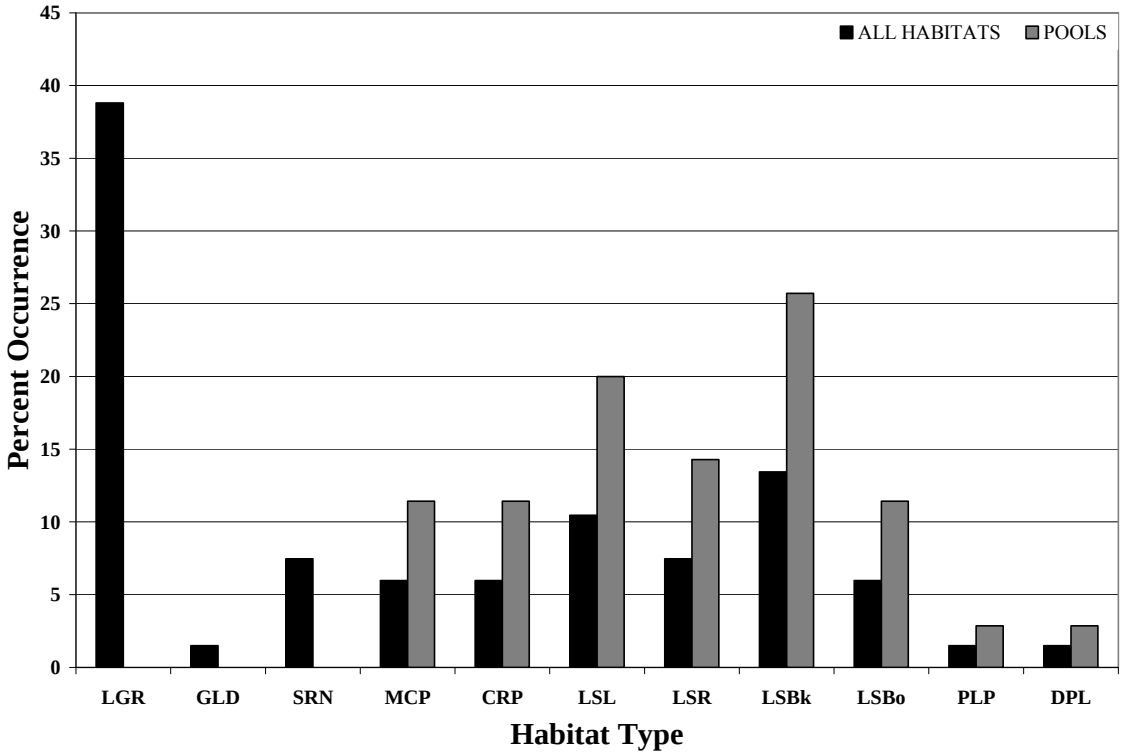

Figure F-14. Percent occurrence of habitat types surveyed in segment CE06 within the Elk WAU, 2005.

Elk Creek (Segment CE08)
The segment surveyed consisted of 32% pool, 63% riffle, and 5% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered moderate with a high frequency of riffle habitat. The majority of pools were mid channels pools (33%, Figure F-15). The dominant cover available to fish in pools in the segment was bedrock ledges (27%, Table F-4).The mean residual pool depth was 1.4 feet, with 0% of pools having residual depths ≥3 feet. The shelter rating was moderate (105), mainly due to an availability of cover. There were minimal amounts of key LWD (0.8 pieces per 328 feet) observed in the segment. However, 7% of pools were formed by LWD and there were 10.7 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was high (>50%).
Spawning Habitat
Spawning habitat in the segment was poor due to a low percentage of spawnable gravels available to fish in tailouts (7% of tailout area), the dominant tailout substrate size (small gravel) is slightly smaller than the preferred range of salmonids, and the spawning gravels were embedded.

Summer Rearing Habitat
Summer rearing habitat in the segment was poor due to a minimal amount of key LWD and an absence of pools with residual depths ≥3 feet. However, there was a moderate shelter rating a moderate frequency of pools.
Over-wintering Habitat
Over-wintering habitat in the segment was poor due to a minimal amount of key LWD, minimal over-wintering substrate, and an absence of side channels and pools with residual depths ≥3 feet. However, there was a moderate shelter rating a moderate frequency of pools.

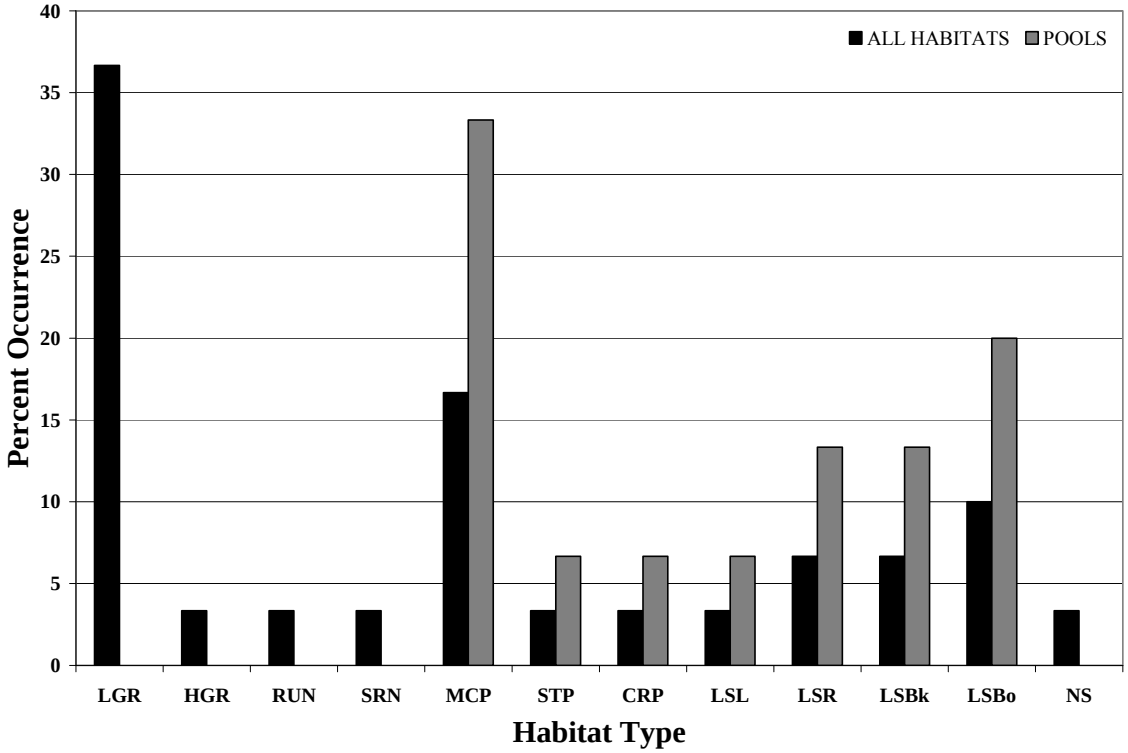

Figure F-15. Percent occurrence of habitat types surveyed in segment CE08 within the Elk WAU, 2005.

Elk Creek (Segment CE09)
The segment surveyed consisted of 16% pool, 62% riffle, and 22% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered low and there was a high frequency of riffle habitat. The majority of pools were lateral scour pools formed by logs (42%, Figure F-16). The dominant cover available to fish in pools in the segment was LWD (58%, Table F-4).The mean residual pool depth was 1.5 feet, with 0% of pools having residual depths ≥3 feet. The shelter rating was high (173), mainly due to good cover complexity and availability. There were minimal amounts of key LWD (0.6 pieces per 328 feet) observed in the segment. However, the majority of pools in this segment were formed by LWD (42%) and there were also 19.0 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was high (>50%).
Spawning Habitat

Spawning habitat in the segment was fair due to the moderate percentage of spawnable gravels available to fish in tailouts (26% of tailout area). However, the dominant tailout substrate size (small gravel) is slightly smaller than the preferred range of salmonids and the spawning gravels were embedded.

Summer Rearing Habitat

Summer rearing habitat in the segment was poor due to a low frequency of pools, a minimal amount of key LWD , and an absence of pools with residual depths ≥3 feet. However, there was a high shelter rating.

Over-wintering Habitat

Over-wintering habitat in the segment was poor due to a minimal amount of key LWD, a low frequency of pools, and an absence of side channels, over-wintering substrate, and pools with residual depths ≥3 feet. However, there was a moderate shelter rating.

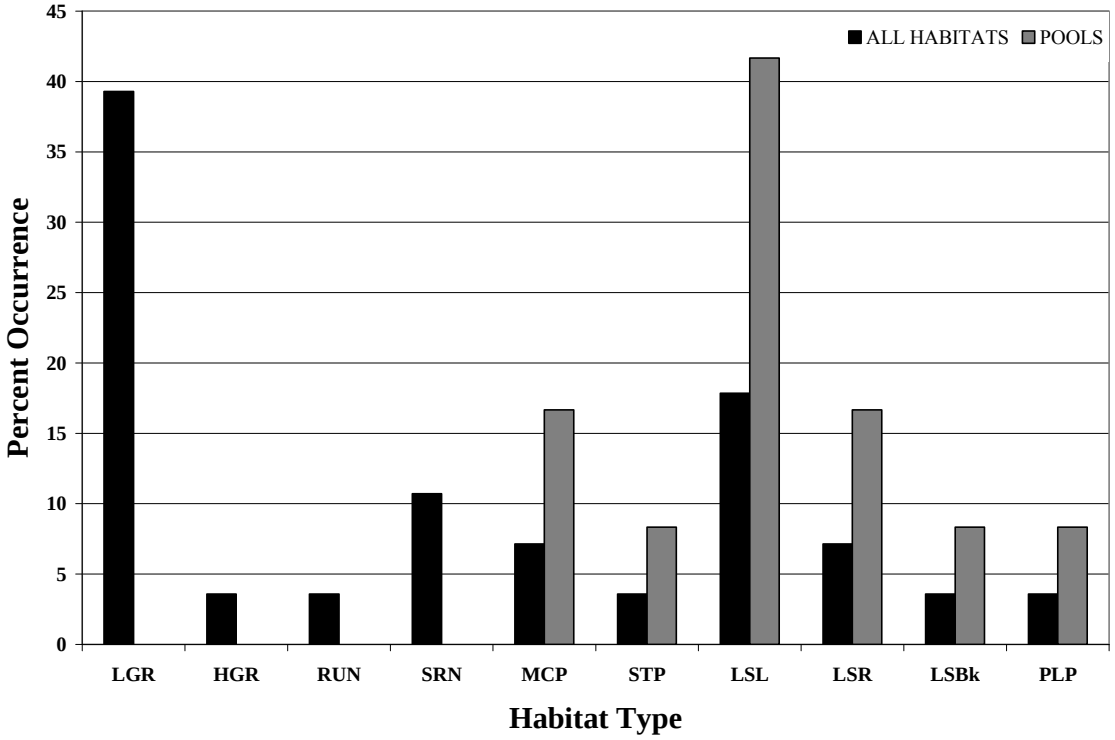

Figure F-16. Percent occurrence of habitat types surveyed in segment CE09 within the Elk WAU, 2005.

Unnamed Left Bank Tributary to Elk Creek (Segment CE10)

The segment surveyed consisted of 31% pool, 67% riffle, and 2% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered moderate with a high frequency of riffle habitat. The majority of pools were lateral scour pools formed by logs (36%, Figure F-17). LWD was the dominant cover available to fish in pools in the segment (50%, Table F-4). The mean residual pool depth was 1.5 feet, with 0% of pools having residual depths ≥3 feet. The shelter rating was high (130), mainly due to good cover complexity and availability. There were minimal amounts of key LWD (0.1 pieces per 328 feet) observed in the segment. However, the majority of pools in this segment were formed by LWD (36%) and there were also 25.7 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was moderate (25-50%).

Spawning Habitat
Spawning habitat in the segment appeared to be fair due to a moderate percentage of spawnable gravels available to fish in tailouts (34% of tailout area) and the spawning gravels were slightly embedded. However, the dominant tailout substrate size (small gravel) is slightly smaller than the preferred range of salmonids.
Summer Rearing Habitat
Summer rearing habitat in the segment was fair due to a moderate frequency of pools and a moderate shelter rating. However, there was a minimal amount of key LWD and an absence of pools with residual depths ≥3 feet.
Over-wintering Habitat
Over-wintering habitat in the segment was poor due to a minimal amount of key LWD, minimal over-wintering substrate, and an absence of side channels and pools with residual depths ≥3 feet. However, there was a moderate shelter rating a moderate frequency of pools.

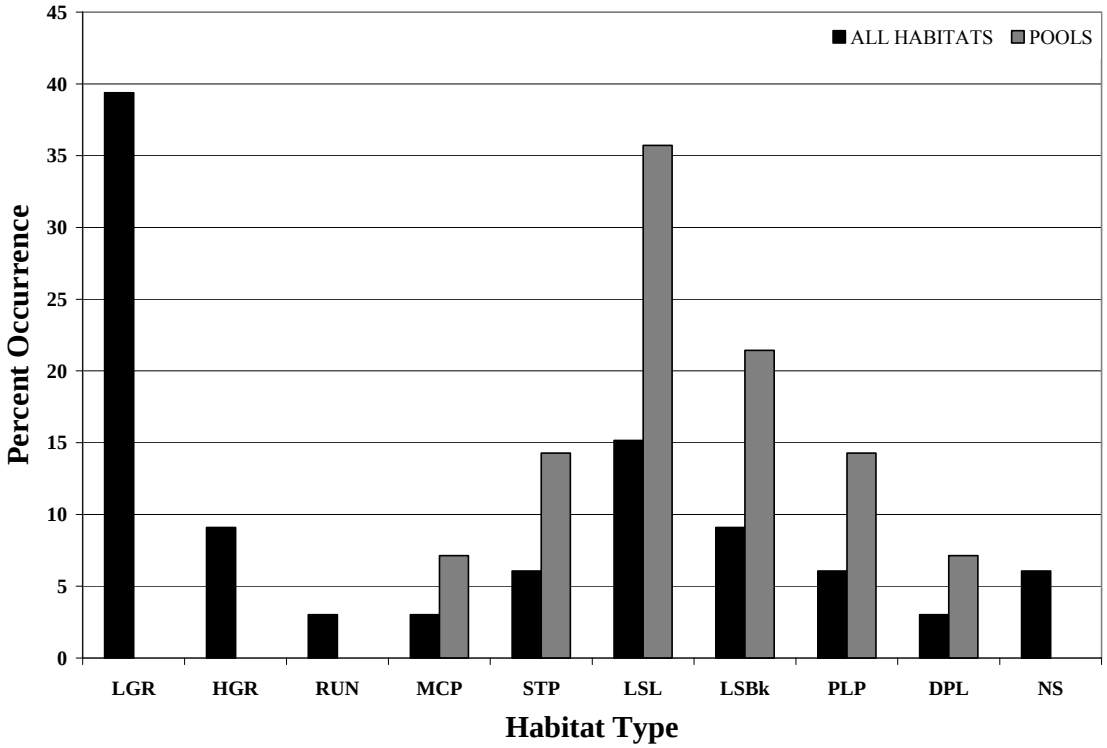

Figure F-17. Percent occurrence of habitat types surveyed in segment CE10 within the Elk WAU, 2005.

Unnamed Left Bank Tributary to Elk Creek (Segment CE11)
The segment surveyed consisted of 24% pool, 67% riffle, and 9% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered low and there was a high frequency of riffle habitat. The majority of pools were mid channel pools (25%, Figure F-18). The dominant cover available to fish in pools in the segment was LWD (44%, Table F-4). The mean residual pool depth was 1.5 feet, with 6% of pools having residual depths ≥3 feet. The shelter rating was moderate (85), mainly due to an availability of cover. There were minimal amounts of key LWD (0.4 pieces per 328 feet) observed in the segment. However, 19% of pools in this segment were formed by LWD and there were also 17.7 pieces

of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was high (>50%).

Spawning Habitat

Spawning habitat in the segment was fair due to the moderate percentage of spawnable gravels available to fish in tailouts (25% of tailout area) However, the dominant tailout substrate size (small gravel) is slightly smaller than the preferred range of salmonids and the spawning gravels were embedded.

Summer Rearing Habitat

Summer rearing habitat in the segment was poor due to a low frequency of pools, a minimal amount of key LWD, and a low occurrence of pools with residual depths ≥3 feet. However, there was a moderate shelter rating.

Over-wintering Habitat

Over-wintering habitat in the segment was poor due to a low frequency of pools, a minimal amount of key LWD, a low occurrence of pools with residual depths ≥3 feet, and minimal over-wintering substrate and side channels. However, there was a moderate shelter rating.

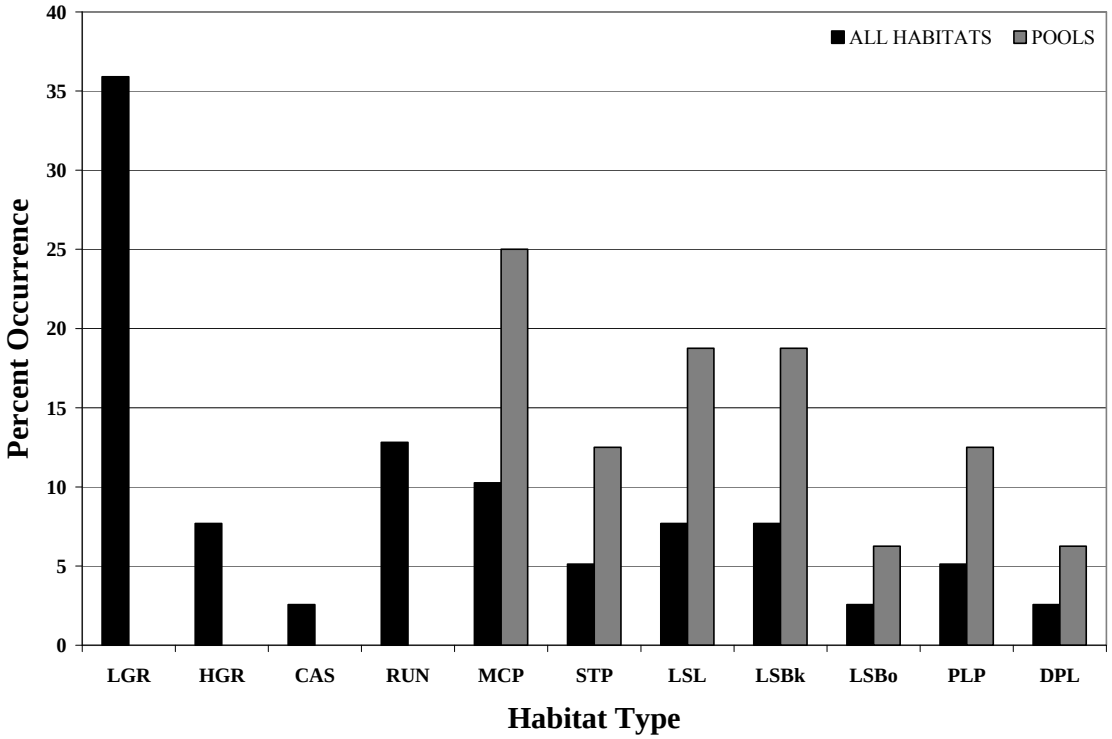

Figure F-18. Percent occurrence of habitat types surveyed in segment CE11 within the Elk WAU, 2005.

Unnamed Left Bank Tributary to Elk Creek (Segment CE12)

The segment surveyed consisted of 16% pool, 75% riffle, and 8% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered low with a high frequency of riffle habitat. The majority of pools were plunge pools (27%, Figure F-19). The dominant cover available to fish in pools in the segment was LWD (47%, Table F-4). The mean residual pool depth was 1.1 feet, with 0% of pools having residual depths ≥3 feet. The shelter rating was moderate (94), mainly due to an availability of cover. There were minimal amounts of key LWD (1.1 pieces per 328 feet) observed in the segment.

However, 20% of pools were formed by LWD and there were 21.8 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was high (>50%).

Spawning Habitat

Spawning habitat in the segment was poor due to a low percentage of spawnable gravels available to fish in tailouts (17% of tailout area), the dominant tailout substrate size (small gravel) is slightly smaller than the preferred range of salmonids, and the spawning gravels were embedded.

Summer Rearing Habitat

Summer rearing habitat in the segment was poor due to a low frequency of pools, a minimal amount of key LWD, and an absence of pools with residual depths ≥3 feet. However, there was a moderate shelter rating.

Over-wintering Habitat

Over-wintering habitat in the segment was poor due to minimal amounts of key LWD, a low frequency of pools, minimal over-wintering substrate and side channels, and an absence of pools with residual depths ≥3 feet. However, there was a moderate shelter rating.

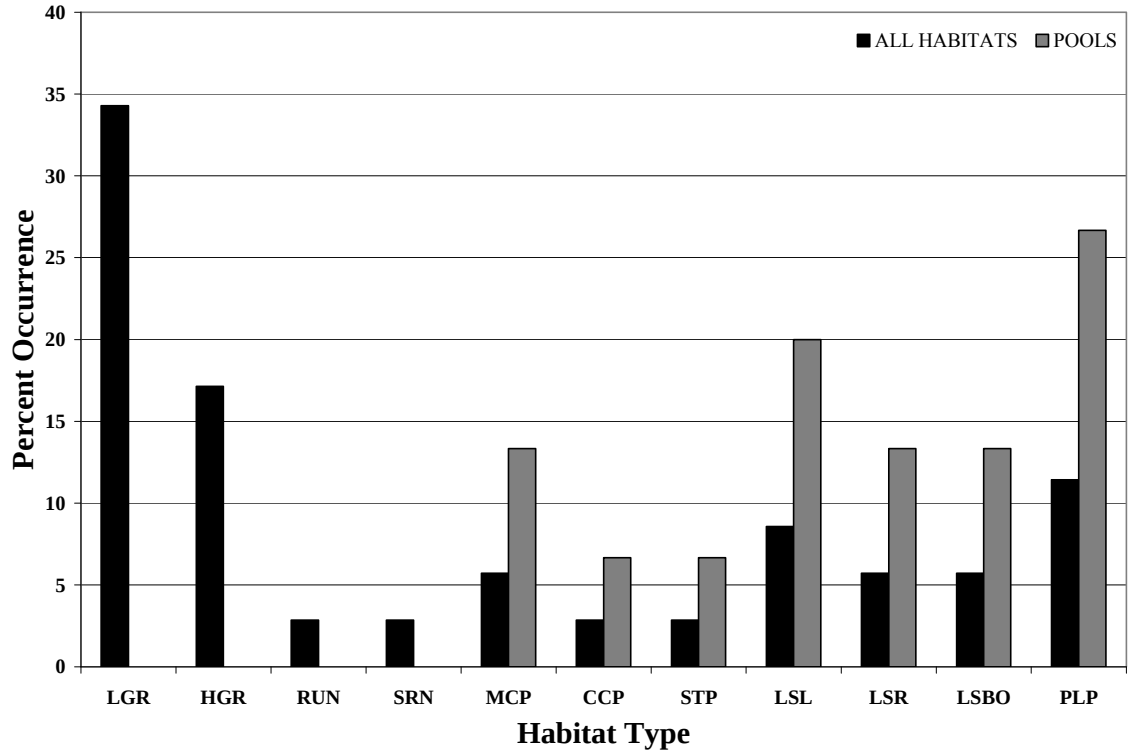

Figure F-19. Percent occurrence of habitat types surveyed in segment CE12 within the Elk WAU, 2005.

Unnamed Left Bank Tributary to Elk Creek (Segment CE13)

The segment surveyed consisted of 12% pool, 88% riffle, and 0% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered low with a high frequency of riffle habitat. The majority of pools were plunge pools (75%, Figure F-20). The dominant cover available to fish in pools in the segment was boulder (50%, Table F-4). The mean residual pool depth was 1.4 feet, with 0% of pools

having residual depths ≥3 feet. The shelter rating was moderate (90), mainly due to an availability of cover. There was an absence of key LWD (0.0 pieces per 328 feet) in the segment with none of the pools formed by LWD. However, there were 12.4 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was high (>50%).

Spawning Habitat

Spawning habitat in the segment was poor due to a low percentage of spawnable gravels available to fish in tailouts (23% of tailout area), the dominant tailout substrate size (small gravel) is slightly smaller than the preferred range of salmonids, and the spawning gravels were embedded.

Summer Rearing Habitat

Summer rearing habitat in the segment was poor due to a low frequency of pools, an absence of key LWD, and an absence of pools with residual depths ≥3 feet. However, there was a moderate shelter rating.

Over-wintering Habitat

Over-wintering habitat in the segment was poor due to a low frequency of pools, an absence of key LWD, and an absence of pools with residual depths ≥3 feet and side channels. However, there was a moderate shelter rating and moderate over-wintering substrate.

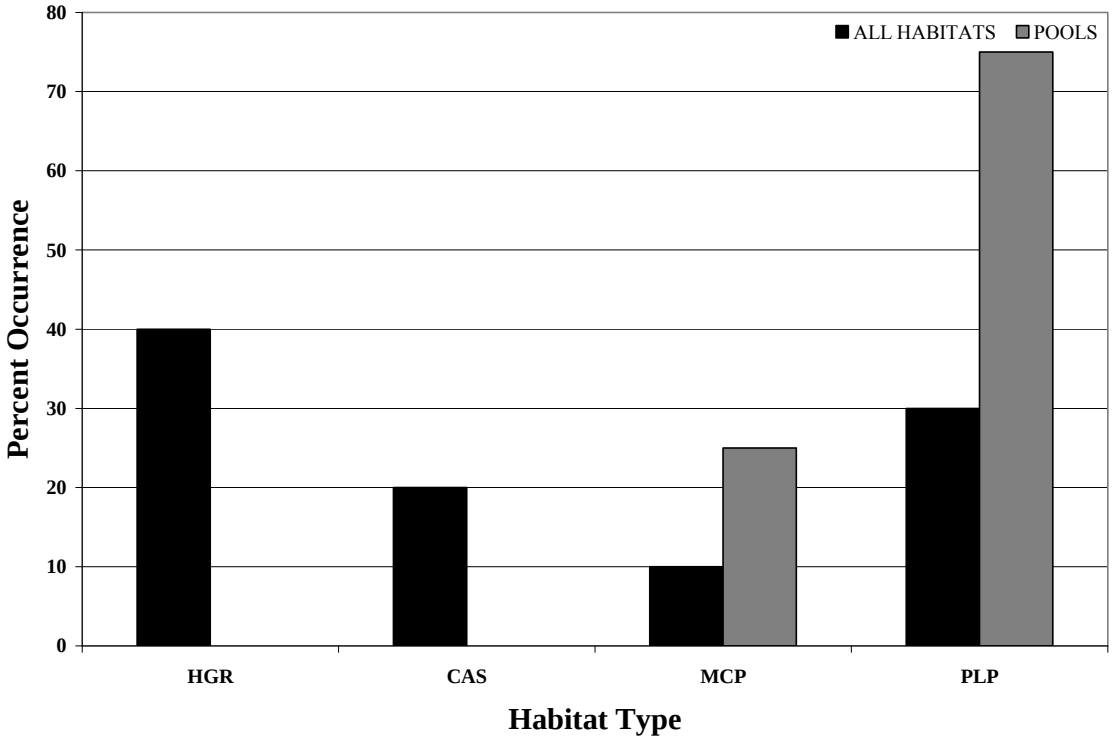

Figure F-20. Percent occurrence of habitat types surveyed in segment CE13 within the Elk WAU, 2005.

Three Spring Creek (Segment CE30)

The segment surveyed consisted of 36% pool, 49% riffle, and 15% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered moderate with a moderate frequency of riffle

habitat. The majority of pools were lateral scour formed by bedrock (53%, Figure F-21). The dominant cover available to fish in pools in the segment was bedrock ledges (47%, Table F-4). The mean residual pool depth was 2.1 feet, with 11% of pools having residual depths ≥3 feet. The shelter rating was moderate (86), mainly due to an availability of cover. There was an absence of key LWD (0.0 pieces per 328 feet) in the segment with none of the pools
formed by LWD. However, there were 6.0 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was high (>50%).

Spawning Habitat

Spawning habitat in the segment appeared to be fair due to a moderate percentage of spawnable gravels available to fish in tailouts (27% of tailout area). However, the dominant tailout substrate size (small gravel) is slightly smaller than the preferred range of salmonids and the spawning gravels were embedded.

Summer Rearing Habitat

Summer rearing habitat in the segment was poor due to a low occurrence of pools with residual depths ≥3 feet and an absence of key LWD. However, there was a moderate shelter rating and a moderate frequency of pools.

Over-wintering Habitat

Over-wintering habitat in the segment was poor due to a low occurrence of pools with residual depths ≥3 feet, a minimal over-wintering substrate, and an absence of side channels and key LWD. However, there was a moderate shelter rating and a moderate frequency of pools.

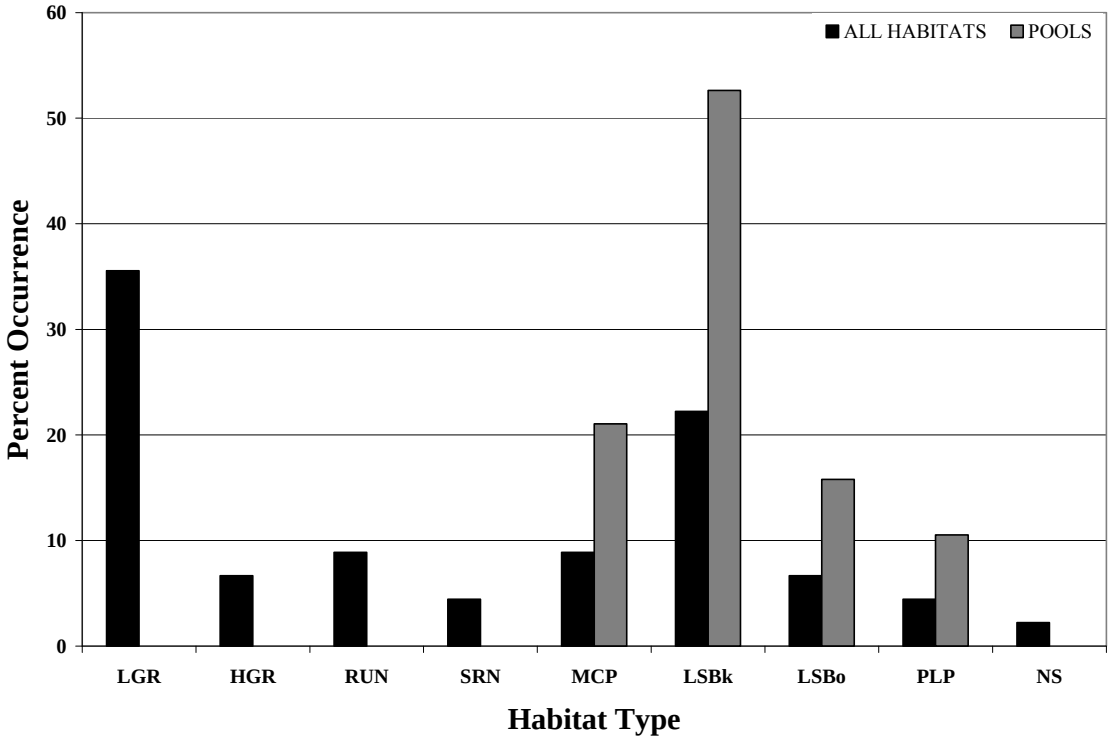

Figure F-21. Percent occurrence of habitat types surveyed in segment CE30 within the Elk WAU, 2005.

Three Spring Creek (Segment CE31)

The segment surveyed consisted of 29% pool, 49% riffle, and 22% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered moderate with a moderate frequency of riffle habitat. There was an equal proportion of lateral scour pools formed by logs to lateral scour pools formed by bedrock (29%, Figure F-22). The dominant cover available to fish in pools in the segment was LWD (43%, Table F-4). The mean residual pool depth was 2.2 feet, with 21% of pools having residual depths ≥3 feet. The shelter rating was moderate (96), mainly due to an availability of cover. There were minimal amounts of key LWD (0.3 pieces per 328 feet) observed in the segment. However, 29% of pools in this segment were formed by LWD and there were also 13.4 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was high (>50%).

Spawning Habitat

Spawning habitat in the segment appeared to be fair due to a moderate percentage of spawnable gravels available to fish in tailouts (34% of tailout area). However, the dominant tailout substrate size (small gravel) was slightly smaller than the preferred range of salmonids and the spawning gravels were embedded.

Summer Rearing Habitat

Summer rearing habitat in the segment was poor due to a minimal amount of key LWD and a low occurrence of pools with residual depths ≥3 feet. However, there was a moderate frequency of pools and a moderate shelter rating.

Over-wintering Habitat

Over-wintering habitat in the segment was poor due to a low occurrence of pools with residual depths ≥3 feet, minimal over-wintering substrate and key LWD, and an absence of side channels. However, there was a moderate shelter rating and a moderate frequency of pools.

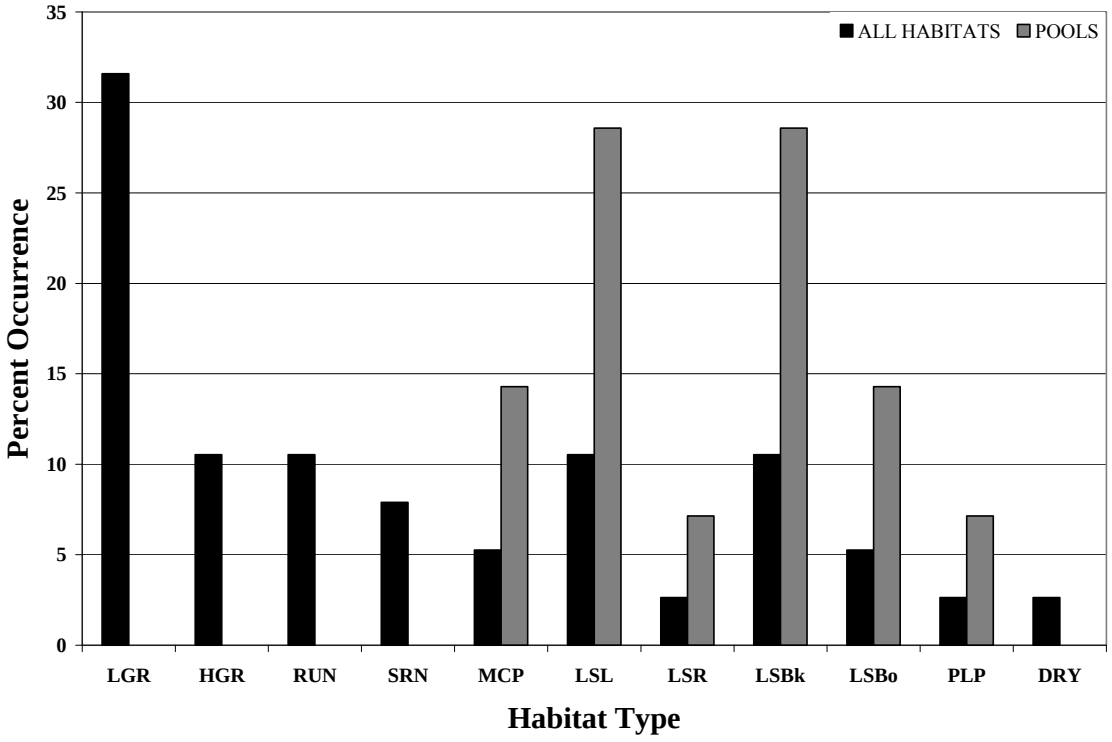

Figure F-22. Percent occurrence of habitat types surveyed in segment CE31 within the Elk WAU, 2005.

Three Spring Creek (Segment CE32)

The segment surveyed consisted of 28% pool, 56% riffle, and 16% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered moderate with a high frequency of riffle habitat. There was similar proportion of the dominant pool types: lateral scour formed by bedrock, mid channels pools, and step pools (24%, Figure F-23). The dominant cover available to fish in pools in the segment was boulder (47%, Table F-4). The mean residual pool depth was 2.1 feet, with 12% of pools having residual depths ≥3 feet. The shelter rating was moderate (65), mainly due to an availability of cover. There were minimal amounts of key LWD (0.3 pieces per 328 feet) observed in the segment. However, 6% of pools were formed by LWD and there were 9.3 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was high (>50%).

Spawning Habitat

Spawning habitat in the segment was poor due to a low percentage of spawnable gravels available to fish in tailouts (14% of tailout area), the dominant tailout substrate size (small gravel) is slightly smaller than the preferred range of salmonids, and the spawning gravels were embedded.

Summer Rearing Habitat

Summer rearing habitat in the segment was poor due to minimal amounts of key LWD and a low occurrence of pools with residual depths ≥3 feet. However, there was a moderate frequency of pools and shelter rating.

Over-wintering Habitat

Over-wintering habitat in the segment was poor due to minimal amounts of key LWD, a low occurrence of pools with residual depths ≥3 feet, and an absence of side channels. However, there was a high amount of over-wintering substrate, a moderate frequency of pools, and a moderate shelter rating.

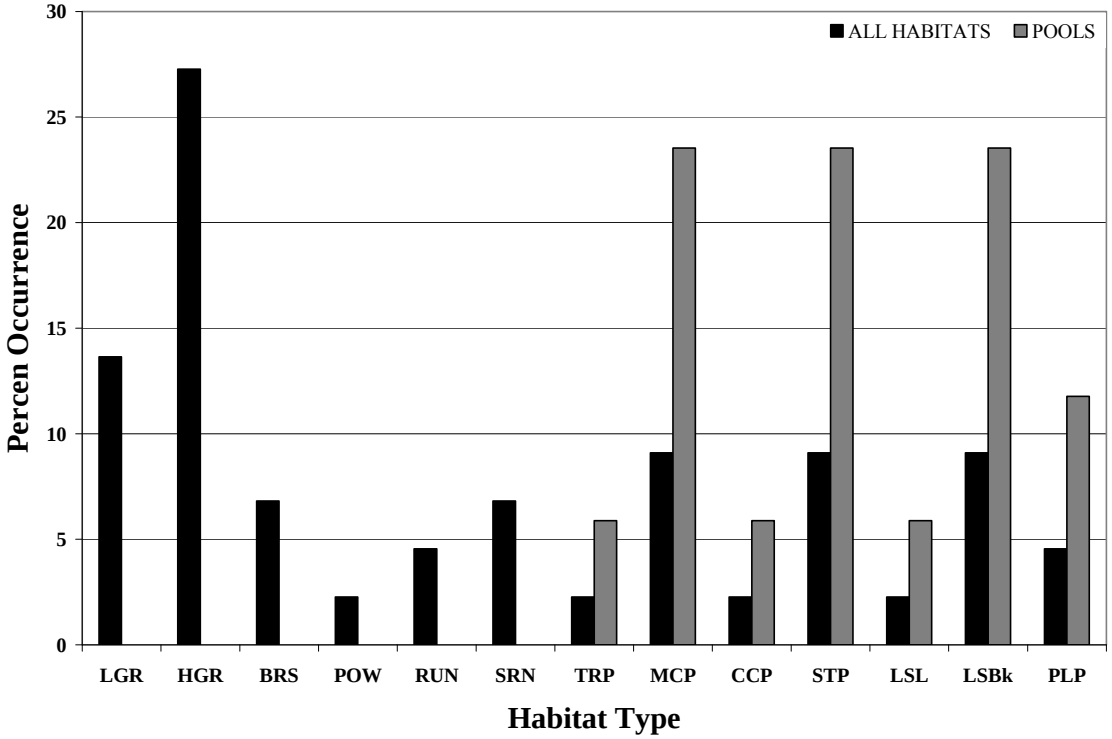

Figure F-23. Percent occurrence of habitat types surveyed in segment CE32 within the Elk WAU, 2005.

Three Spring Creek (Segment CE33)

The segment surveyed consisted of 25% pool, 57% riffle, and 18% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered moderate with a high frequency of riffle habitat. The majority of pools were mid channel pools (71%, Figure F-24). The dominant cover available to fish in pools in the segment was boulder (71%, Table F-4). The mean residual pool depth was 1.6 feet, with 0% of pools having residual depths ≥3 feet. The shelter rating was high (121), mainly due to good cover complexity and availability. There were minimal amounts of key LWD (0.1 pieces per 328 feet) observed in the segment with none of the pools formed by LWD. However, there were 18.4 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was high (>50%).

Spawning Habitat

Spawning habitat in the segment was poor due to a low percentage of spawnable gravels available to fish in tailouts (23% of tailout area), the dominant tailout substrate size (small gravel) is slightly smaller than the preferred range of salmonids, and the spawning gravels were embedded.

Summer Rearing Habitat

Summer rearing habitat in the segment was poor due to minimal amounts of key LWD and an absence of pools with residual depths ≥3 feet. However, there was a high shelter rating and a moderate frequency of pools.

Over-wintering Habitat

Over-wintering habitat in the segment was poor due to a minimal amount of key LWD, an absence of pools with residual depths ≥3 feet, and an absence of side channels. However, there was a high amount of over-wintering substrate, a moderate frequency of pools, and a moderate shelter rating.

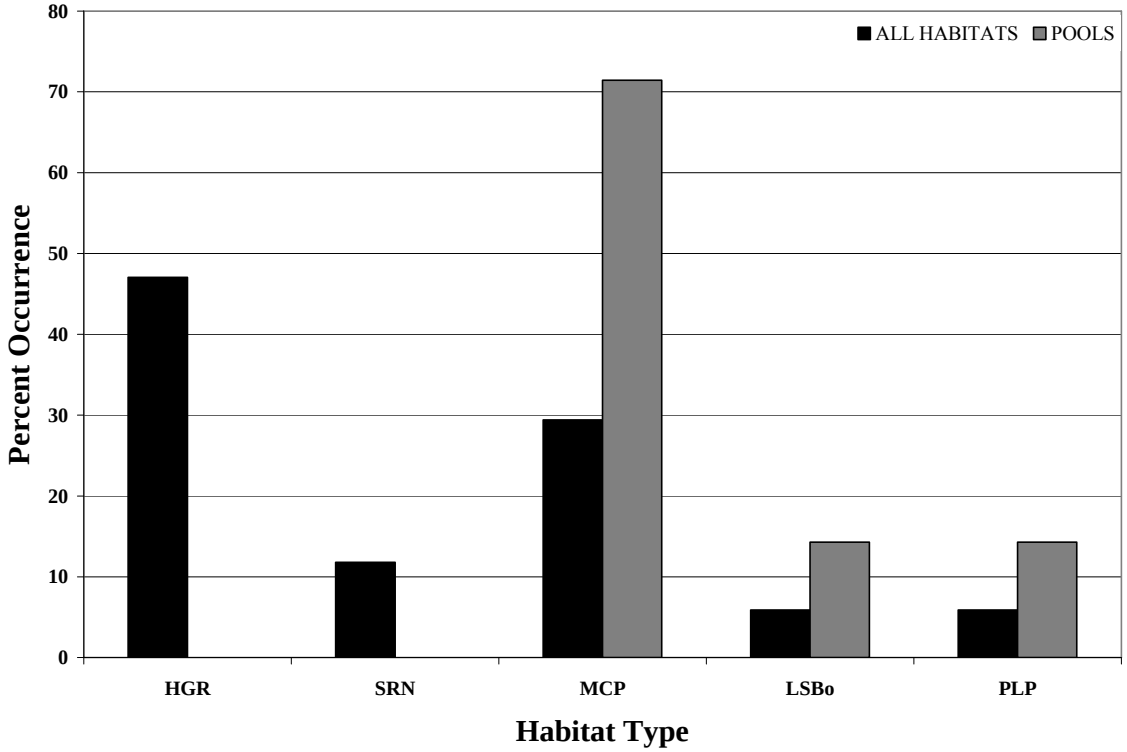

Figure F-24. Percent occurrence of habitat types surveyed in segment CE33 within the Elk WAU, 2005.

Sulphur Fork (Segment CE39)

The segment surveyed consisted of 18% pool, 62% riffle, and 20% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered low with a high frequency of riffle habitat. The majority of pools were lateral scour pools formed by bedrock (47%, Figure F-25). The dominant cover available to fish in pools in the segment was bedrock ledges (25%, Table F-4). The mean residual pool depth was 1.8 feet, with 0% of pools having residual depths ≥3 feet. The shelter rating was moderate (88), mainly due to an availability of cover. There were minimal amounts of key LWD (0.7 pieces per 328 feet) observed in the segment with none of the pools formed by LWD. However, there were 13.5 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was high (>50%).

Spawning Habitat

Spawning habitat in the segment appeared to be fair due to a moderate percentage of spawnable gravels available to fish in tailouts (34% of tailout area). However, the dominant tailout substrate size (small gravel) was slightly smaller than the preferred range of salmonids and the spawning gravels were embedded.

Summer Rearing Habitat

Summer rearing habitat in the segment was poor due to minimal amounts of key LWD, a low frequency of pools, and an absence of pools with residual depths ≥3 feet. However, there was a moderate shelter rating.

Over-wintering Habitat

Over-wintering habitat in the segment was poor due to a minimal amount of key LWD, a low frequency of pools, an absence of pools with residual depths ≥3 feet, and an absence of side channels. However, there was a moderate amount of over-wintering substrate and a moderate shelter rating.

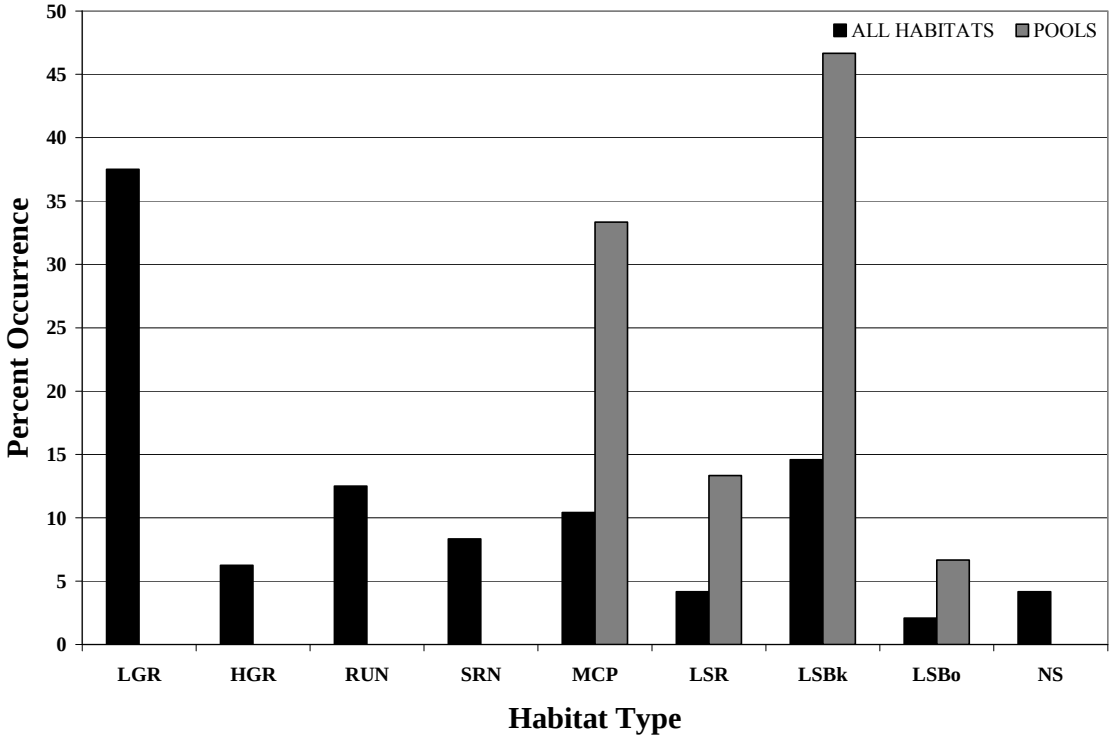

Figure F-25. Percent occurrence of habitat types surveyed in segment CE39 within the Elk WAU, 2005.

Sulphur Fork (Segment CE40)

The segment surveyed consisted of 29% pool, 51% riffle, and 20% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered moderate with a high frequency of riffle habitat. The majority of pools were mid channel pools (38%, Figure F-26). The dominant cover available to fish in pools in the segment was boulder (50%, Table F-4). The mean residual pool depth was 1.7 feet, with 13% of pools having residual depths ≥3 feet. The shelter rating was moderate (93), mainly due to an availability of cover. There were minimal amounts of key LWD (0.3 pieces per 328 feet) observed in the segment. However, 6% of pools were formed by LWD and there were 10.1 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was high (>50%).

Spawning Habitat

Spawning habitat in the segment was poor due to a low percentage of spawnable gravels available to fish in tailouts (24% of tailout area), the dominant tailout substrate size (small gravel) is slightly smaller than the preferred range of salmonids, and the spawning gravels were embedded.

Summer Rearing Habitat

Summer rearing habitat in the segment was poor due to minimal amounts of key LWD and a low occurrence of pools with residual depths ≥3 feet. However, there was a moderate shelter rating and a moderate frequency of pools.

Over-wintering Habitat

Over-wintering habitat in the segment was poor due to a minimal amount of key LWD, a low occurrence of pools with residual depths ≥3 feet, and an absence of side channels. However, there was a moderate amount of over-wintering substrate, moderate shelter rating, and a moderate frequency of pools.

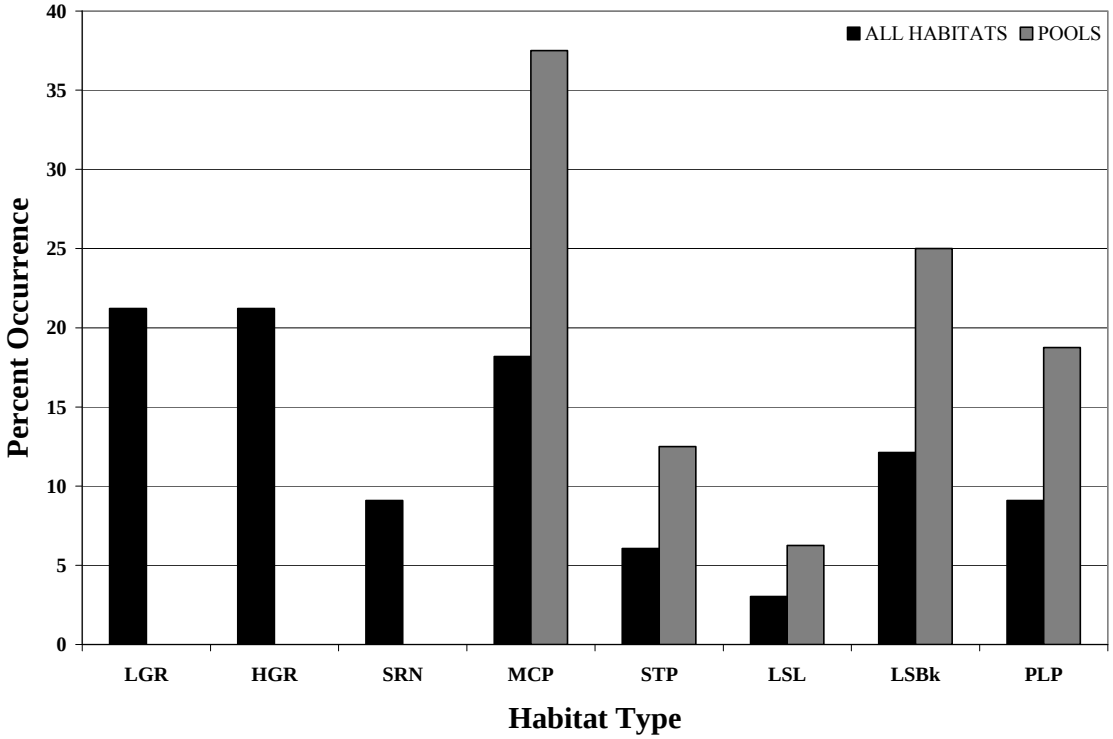

Figure F-26. Percent occurrence of habitat types surveyed in segment CE40 within the Elk WAU, 2005.

Sulphur Fork (Segment CE41)

The segment surveyed consisted of 14% pool, 72% riffle, and 14% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered low with a high frequency of riffle habitat. The majority of pools were plunge pools (60%, Figure F-27). The dominant cover available to fish in pools in the segment was bedrock ledges (40%, Table F-4). The mean residual pool depth was 2.1 feet, with 0% of pools having residual depths ≥3 feet. The shelter rating was high (138), mainly due to good cover complexity and availability. There were minimal amounts of key LWD (0.2 pieces per 328 feet) observed in the segment and none of the pools were formed by LWD. However, there were 6.7 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was boulder and the embeddedness rating was high (>50%).

Spawning Habitat

Spawning habitat in the segment was poor due to a low percentage of spawnable gravels available to fish in tailouts (10% of tailout area), the dominant tailout substrate size (boulder) is significantly larger than the preferred range of salmonids, and the spawning gravels were embedded.

Summer Rearing Habitat

Summer rearing habitat in the segment was poor due to minimal amounts of key LWD, a low frequency of pools, and an absence of pools with residual depths ≥3 feet. However, there was a high shelter rating.

Over-wintering Habitat
Over-wintering habitat in the segment was poor due to a minimal amount of key LWD, a low frequency of pools, an absence of pools with residual depths ≥3 feet, and an absence of side channels. However, there was a high amount of over-wintering substrate and a high shelter rating.

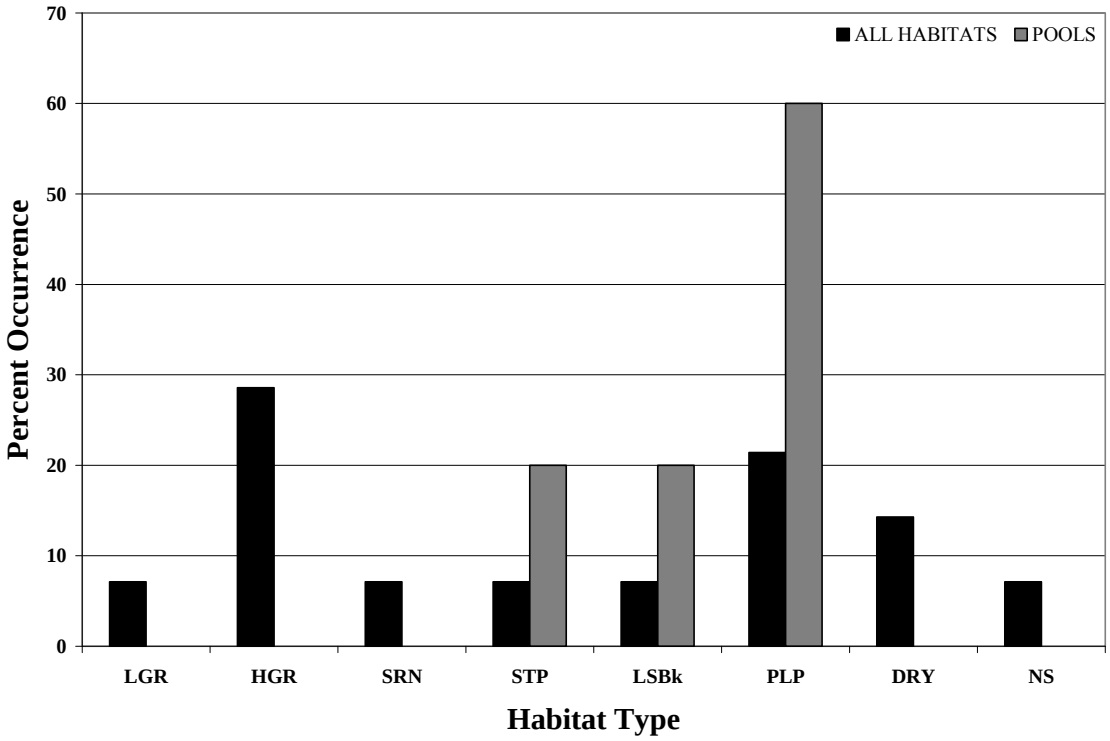

Figure F-27. Percent occurrence of habitat types surveyed in segment CE41 within the Elk WAU, 2005.

Soda Fork (Segment CE44)
The segment surveyed consisted of 23% pool, 61% riffle, and 16% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered low with a high frequency of riffle habitat. The majority of pools were lateral scour formed by bedrock (50%, Figure F-28). The dominant cover available to fish in pools in the segment was bedrock ledges (33%, Table F-4). The mean residual pool depth was 2.0 feet, with 13% of pools having residual depths ≥3 feet. The shelter rating was moderate (85), mainly due to an availability of cover. There were minimal amounts of key LWD (0.5 pieces per 328 feet) observed in the segment. However, 8% of pools were formed by LWD and there were 5.7 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was large gravel and the embeddedness rating was high (>50%).
Spawning Habitat
Spawning habitat in the segment appeared to be fair due to a moderate percentage of spawnable gravels available to fish in tailouts (42% of tailout area) and the dominant tailout substrate size (large gravel) was within the preferred range of salmonids. However, the spawning gravels were embedded.
Summer Rearing Habitat

Summer rearing habitat in the segment was poor due to a minimal amount of key LWD, a low frequency of pools, and a low occurrence of pools with residual depths ≥3 feet. However, there was a moderate shelter rating.

Over-wintering Habitat

Over-wintering habitat in the segment was poor due to a minimal amount of key LWD, a low frequency of pools, a low occurrence of pools with residual depths ≥3 feet, and an absence of side channels. However, there was a high amount of over-wintering substrate and a moderate shelter rating.

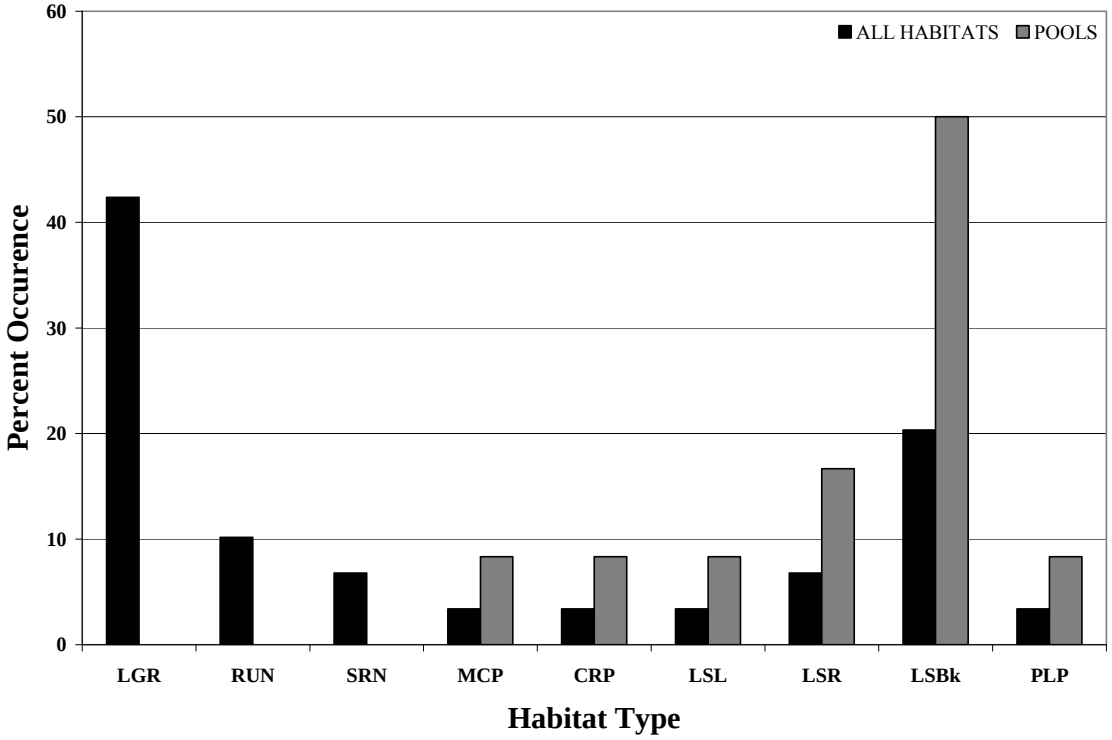

Figure F-28. Percent occurrence of habitat types surveyed in segment CE44 within the Elk WAU, 2005.

Soda Fork (Segment CE45)

The segment surveyed consisted of 22% pool, 52% riffle, and 26% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered low, although there was a moderate frequency of flatwater habitat. The majority of pools were lateral scour formed by bedrock (83%, Figure F-29). The dominant cover available to fish in pools in the segment was bedrock ledges (67%, Table F-4). The mean residual pool depth was 1.4 feet, with 0% of pools having residual depths ≥3 feet. The shelter rating was moderate (68), mainly due to an availability of cover. There were minimal amounts of key LWD (0.1 pieces per 328 feet) observed in the segment with none of the pools formed by LWD. However, there were 3.4 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was moderate (25-50%).

Spawning Habitat

Spawning habitat in the segment was fair due to the spawning gravels being slightly embedded. However, there was a low percentage of spawnable gravels available to fish in tailouts (16% of tailout area) and the dominant tailout substrate size (small gravel) is slightly smaller than the preferred range of salmonids.

Summer Rearing Habitat
Summer rearing habitat in the segment was poor due to a minimal amount of key LWD, a low frequency of pools, and an absence of pools with residual depths ≥3 feet. However, there was a moderate shelter rating.
Over-wintering Habitat
Over-wintering habitat in the segment was poor due to a minimal amount of key LWD, a low frequency of pools, a minimal amount of over-wintering substrate, an absence of pools with residual depths ≥3 feet, and an absence of side channels. However, there was a moderate shelter rating.

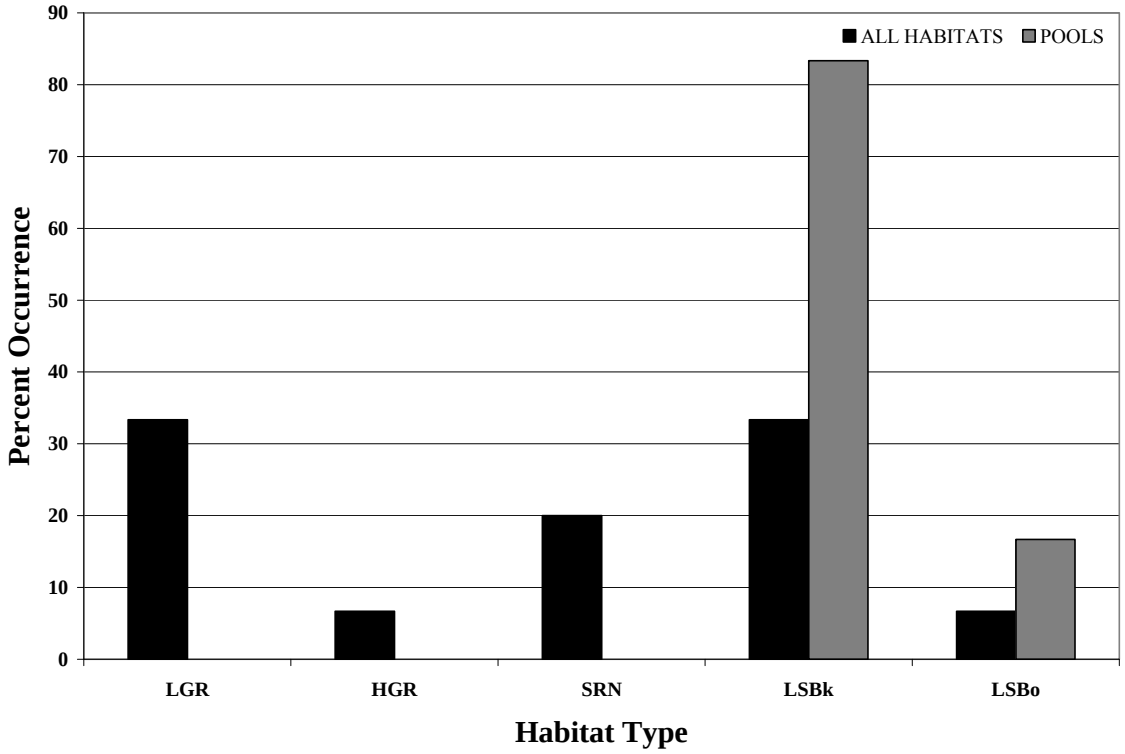

Figure F-29. Percent occurrence of habitat types surveyed in segment CE45 within the Elk WAU, 2005.

Soda Fork (Segment CE46)
The segment surveyed consisted of 32% pool, 61% riffle, and 7% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered moderate with a high frequency of riffle habitat. The majority of pools were lateral scour formed by bedrock (36%, Figure F-30). The dominant cover available to fish in pools in the segment was boulder (50%, Table F-4). The mean residual pool depth was 2.7 feet, with 0% of pools having residual depths ≥3 feet. The shelter rating was moderate (89), mainly due to an availability of cover. There was an absence of key LWD (0.0 pieces per 328 feet) in the segment. However, 7% of pools were formed by LWD and there were 4.7 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was high (>50%).
Spawning Habitat
Spawning habitat in the segment was poor due to a low percentage of spawnable gravels available to fish in tailouts (18% of tailout area), the dominant tailout substrate size (small gravel) is slightly smaller than the preferred range of salmonids, and the spawning gravels were embedded.

Summer Rearing Habitat
Summer rearing habitat in the segment was poor due to an absence of key LWD and pools with residual depths ≥3 feet. However, there was a moderate shelter rating and a moderate frequency of pools.
Over-wintering Habitat
Over-wintering habitat in the segment was poor due to a low amount of over-wintering substrate, and an absence of key LWD, pools with residual depths ≥3 feet, and side channels. However, there was a moderate shelter rating and a moderate frequency of pools.

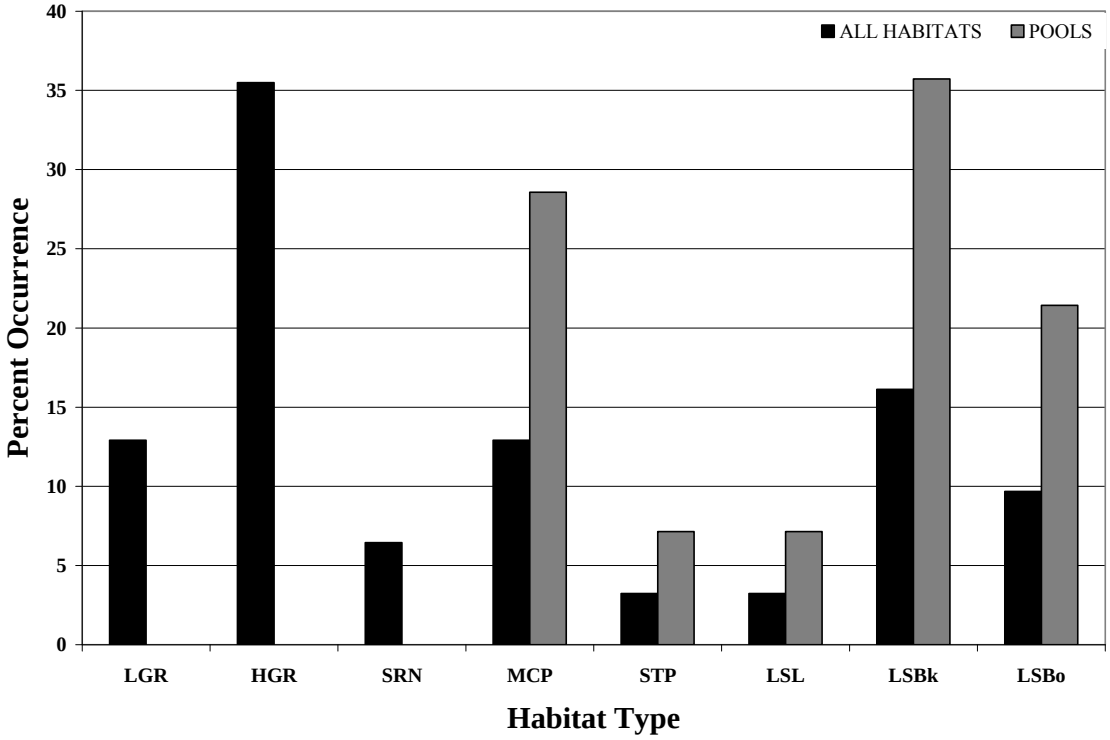

Figure F-30. Percent occurrence of habitat types surveyed in segment CE46 within the Elk WAU, 2005.

Soda Fork (Segment CE47)
The segment surveyed consisted of 20% pool, 67% riffle, and 13% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered low with a high frequency of riffle habitat. The majority of pools were plunge pools (75%, Figure F-31). The dominant cover available to fish in pools in the segment was boulder (100%, Table F-4). The mean residual pool depth was 2.2 feet, with 0% of pools having residual depths ≥3 feet. The shelter rating was high (133), mainly due to good cover complexity and availability. There was an absence of key LWD (0.0 pieces per 328 feet) in the segment and none of the pools were formed by LWD. However, there were 5.6 pieces of functional LWD per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was high (>50%).
Spawning Habitat

Spawning habitat in the segment was poor due to a low percentage of spawnable gravels available to fish in tailouts (11% of tailout area), the dominant tailout substrate size (small gravel) is slightly smaller than the preferred range of salmonids, and the spawning gravels were embedded.

Summer Rearing Habitat

Summer rearing habitat in the segment was poor due to a low frequency of pools, an absence of key LWD and pools with residual depths ≥3 feet. However, there was a high shelter rating.

Over-wintering Habitat

Over-wintering habitat in the segment was fair due to a high shelter rating and a high occurrence of over-wintering substrate. However, there was a low frequency of pools, an absence of key LWD and pools with residual depths ≥3 feet, and an absence of side channels.

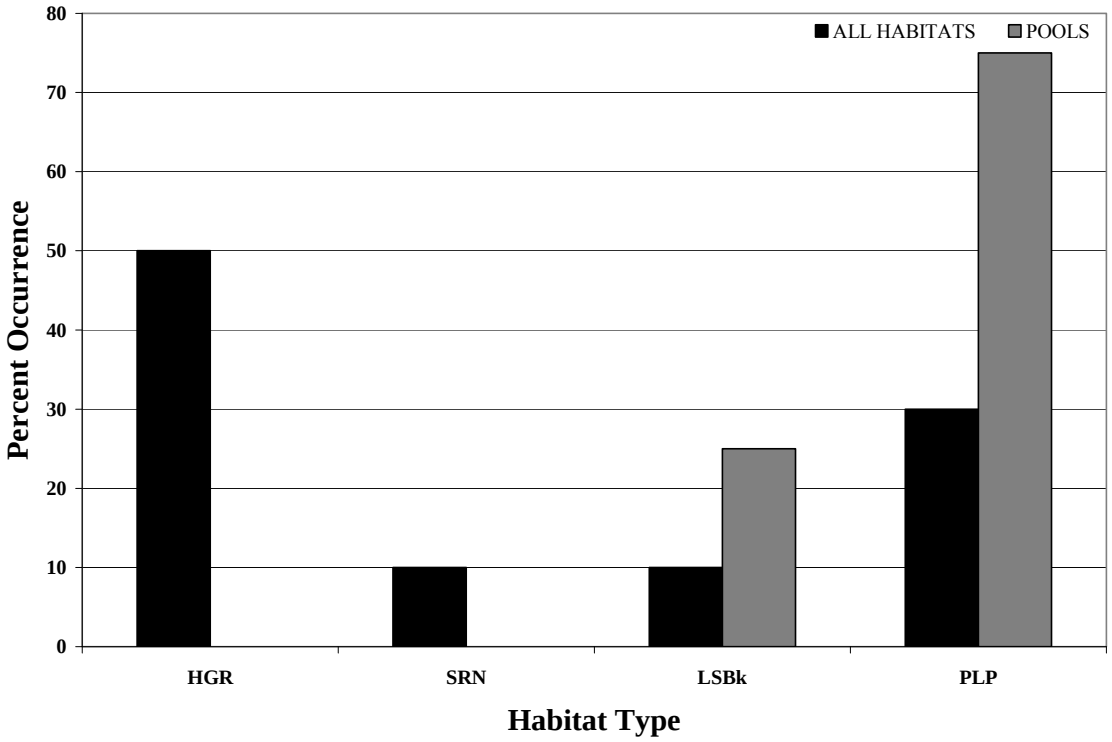

Figure F-31. Percent occurrence of habitat types surveyed in segment CE47 within the Elk WAU, 2005.

Elk Creek (Segment CE51)

The segment surveyed consisted of 20% pool, 69% riffle, and 11% flatwater by stream length (Table F-6). The frequency of pools in the segment was considered low with a high frequency of riffle habitat. The majority of pools were plunge pools (43%, Figure F-32). The dominant cover available to fish in pools in the segment was LWD (62%, Table F-4). The mean residual pool depth was 1.3 feet, with 0% of pools having residual depths ≥3 feet. The shelter rating was high (142), mainly due to good cover complexity and availability. There were minimal amounts of key LWD (0.8 pieces per 328 feet) observed in the segment. However, 21% of pools were formed by LWD and there were 23.8 pieces of functional LWD

per 328 feet surveyed. The dominant tailout substrate was small gravel and the embeddedness rating was high (>50%).

Spawning Habitat

Spawning habitat in the segment was poor due to a low percentage of spawnable gravels available to fish in tailouts (10% of tailout area), the dominant tailout substrate size (small gravel) is slightly smaller than the preferred range of salmonids, and the spawning gravels were embedded.

Summer Rearing Habitat

Summer rearing habitat in the segment was poor due to minimal amounts of key LWD, a low frequency of pools, and an absence of pools with residual depths ≥3 feet. However, there was a high shelter rating.

Over-wintering Habitat

Over-wintering habitat in the segment was poor due to a minimal amount of key LWD, a low frequency of pools, an absence of pools with residual depths ≥3 feet, and an absence of over-wintering substrate and side channels. However, there was a high shelter rating.

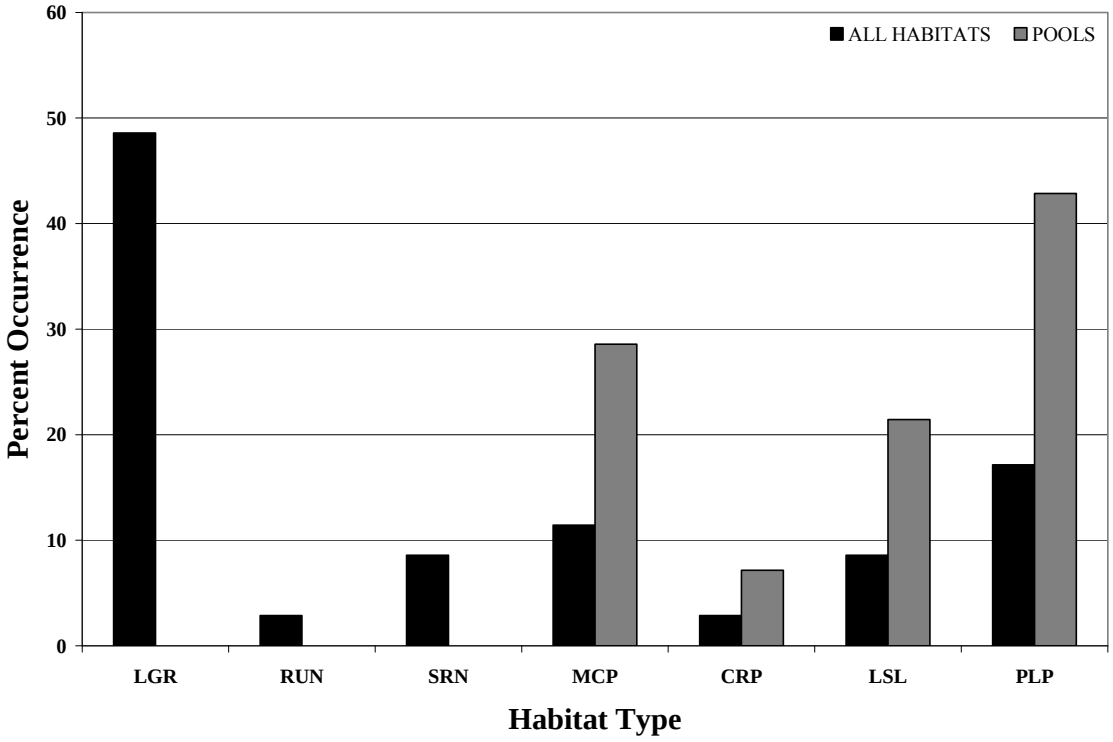

Figure F-32. Percent occurrence of habitat types surveyed in segment CE51 within the Elk WAU, 2005.

Permeability and Bulk Gravel Samples

Results from permeability and percent fine particles <0.85 mm for the stream monitoring segments CE01 in Upper Elk Creek and CL01 in Lower Elk Creek are presented in Table F-7. MRC used the following criteria for evaluating permeability: 0-3000 cm/hr is deficient, 3000-10,000 cm/hr is marginal, and >10,000 cm/hr is on target. The geometric mean permeability observations for both stream monitoring segments are in the marginal category. A mean observation, as presented for the segments, provides an index of the segment's condition, however, observations ranged from deficient to on target. This suggests that though the mean observations are low, and of concern, there are some areas of good quality spawning gravels within the segments sampled.

The results from the percent of particles <0.85 mm were encouraging. The percentage of particles (from a cumulative distribution of all particles sampled) sieved out into the less than 0.85 mm size class was below the 7% value for an on-target rating. The resulting survivability predictions, based on the bulk gravel sampling, were also well within desirable levels.

Table F-7. Permeability and Percent Fine Sediment <0.85 mm and associated survival indices for Long Term Monitoring Segments of the Elk Creek WAU, 2005.

Segment ID	Stream Name	Geometric Mean Permeability for Segment (cm/hr)	Standard Error Permeability (cm/hr)	Range of Permeability Observations (cm/hr)	Permeability Survival Index (Taggart/ McCuddin)	Percent Particles <0.85 mm	Bulk Gravel Survival Index (Tappel/ Bjorn)
CE01	Elk Creek (at Twin Bridges)	6,293	2,113	867 - 37,368	48%	5 - 6%	75-85%
CL01	Elk Creek (below South Fork Elk)	8,852	3,880	701 – 82,585	53%	2 - 6%	79 – 94%

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APPENDIX F

Appendix F. Summary of results for aquatic species surveys within the Elk Creek watershed, Mendocino Co., California. Refer to Maps F-1 & F-2.

STREAM NAME	SITE ID	DATE	STH <70 MM	STH 70-130 MM	STH >130 MM	COH <70 MM	COH 70-130 MM	OTHER SPECIES
TRIB TO ELK CREEK #1	87-01	7/27/1996						CGS RLF
TRIB TO ELK CREEK #1	87-01	7/27/2000						CGS
TRIB TO ELK CREEK #1	87-01	7/25/2001						CGS
TRIB TO ELK CREEK #1	87-01	7/15/2002						CGS
ELK CREEK	87-02	8/23/1994	1	2				CGS RLF SCP
ELK CREEK	87-02	7/27/1996	PRESENT	PRESENT				SCP
ELK CREEK	87-02	7/27/2000	6	7				CR
ELK CREEK	87-02	7/18/2001	28	5	1			CR STB
ELK CREEK	87-02	7/11/2002	55	28	2	2		
SF ELK CREEK	87-03	8/4/1995	PRESENT	PRESENT		PRESENT		CGS SCP
SF ELK CREEK	87-03	7/27/1996	PRESENT	PRESENT				CGS SCP STB YLF
SF ELK CREEK	87-03	7/27/2000	10	1				CR
SF ELK CREEK	87-03	7/18/2001	8					CR
SF ELK CREEK	87-03	7/11/2002	13					
SF ELK CREEK	87-03	6/29/2007	22	3	1			CR CGS PR

* Species Abbreviations; AMM=Pacific Lamprey Larvae; BLF=Bullfrog; BKS=Black Salamander; BUFO=Western Toad; CDS=Clouded Salamander; CGS=Coastal Giant Salamander; CHK=Chinook Salmon; CNT=California Newt; COH=Coho Salmon; CR=Coast Range Sculpin; CRY=Crayfish; LAM=Pacific Lamprey; NAL=Northern Alligator Lizard; NEW=Newt (Unidentified Species); NWP=Western Pond Turtle; PBL=Pacific Brook Lamprey; PR=Prickly Sculpin; PTF=Pacific Tree Frog; RBN= Red Bellied Newt; RCH=California Roach; RLF=Red Legged Frog; RSN=Rough Skinned Newt; SCP=Sculpin (Unidentified Species); SKR=Sacramento Sucker; STB=Stickleback; STH=Steelhead Trout; TLF=Coastal Tailed Frog; WAGS=Western Aquatic Garter Snake; YLF=Yellow Legged Frog.

* Blank spaces indicate that no organisms were observed.

Appendix F. Summary of results for aquatic species surveys within the Elk Creek watershed, Mendocino Co., California. Refer to Maps F-1 & F-2.

STREAM NAME	SITE ID	DATE	STH <70 MM	STH 70-130 MM	STH >130 MM	COH <70 MM	COH 70-130 MM	OTHER SPECIES
SF ELK CREEK	87-23	7/27/2000	1					CGS
SF ELK CREEK	87-23	7/18/2001						CGS
SF ELK CREEK	87-04	7/27/2000						CGS YLF
SF ELK CREEK	87-21	8/14/2000		2				CGS
SF ELK CREEK	87-21	7/18/2001	2					CGS
LITTLE SF ELK CREEK	87-20	8/14/2000		2	1			CGS
LITTLE SF ELK CREEK	87-20	7/18/2001	5					CGS
LITTLE SF ELK CREEK	87-20	8/19/2002		2				BKS
SF ELK CREEK	87-22	8/14/2000						CGS
SF ELK CREEK	87-22	7/18/2001						CGS
ELK CREEK	87-05	8/5/1994	22	15	2			AMM SCP
ELK CREEK	87-05	7/31/2000	41	19				CGS STB YLF
ELK CREEK	87-05	7/19/2001	13	12				PR
TRIB TO ELK CREEK #2	87-31	7/31/2000		1				CGS
TRIB TO ELK CREEK #2	87-31	7/20/2001						CGS

* Species Abbreviations; AMM=Pacific Lamprey Larvae; BLF=Bullfrog; BKS=Black Salamander; BUFO=Western Toad; CDS=Clouded Salamander; CGS=Coastal Giant Salamander; CHK=Chinook Salmon; CNT=California Newt; COH=Coho Salmon; CR=Coast Range Sculpin; CRY=Crayfish; LAM=Pacific Lamprey; NAL=Northern Alligator Lizard; NEW=Newt (Unidentified Species); NWP=Western Pond Turtle; PBL=Pacific Brook Lamprey; PR=Prickly Sculpin; PTF=Pacific Tree Frog; RBN= Red Bellied Newt; RCH=California Roach; RLF=Red Legged Frog; RSN=Rough Skinned Newt; SCP=Sculpin (Unidentified Species); SKR=Sacramento Sucker; STB=Stickleback; STH=Steelhead Trout; TLF=Coastal Tailed Frog; WAGS=Western Aquatic Garter Snake; YLF=Yellow Legged Frog.

* Blank spaces indicate that no organisms were observed.

Appendix F. Summary of results for aquatic species surveys within the Elk Creek watershed, Mendocino Co., California. Refer to Maps F-1 & F-2.

STREAM NAME	SITE ID	DATE	STH <70 MM	STH 70-130 MM	STH >130 MM	COH <70 MM	COH 70-130 MM	OTHER SPECIES
TRIB TO ELK CREEK #2	87-31	7/15/2002						CGS TLF
ELK CREEK	87-06	6/21/1995	PRESENT	PRESENT				
ELK CREEK	87-06	6/14/1996	PRESENT	PRESENT				SCP
ELK CREEK	87-06	7/15/2002	4		1		1	PR
ELK CREEK	87-07	6/21/1995	PRESENT	PRESENT	PRESENT			CGS
ELK CREEK	87-07	6/14/1996	PRESENT	PRESENT				YLF
ELK CREEK	87-07	7/31/2000	26	10	1			CGS
ELK CREEK	87-07	7/19/2001	23	4				AMM CGS
ELK CREEK	87-07	7/15/2002	14					CGS
ELK CREEK	87-07	10/20/2006	41	18	1			
TRIB TO ELK CREEK #3	87-08	8/5/1994	3	3	1			CGS
TRIB TO ELK CREEK #3	87-08	6/21/1995	PRESENT	PRESENT	PRESENT			
TRIB TO ELK CREEK #3	87-08	6/14/1996		PRESENT				
TRIB TO ELK CREEK #3	87-08	7/31/2000	1	4	1			CGS
TRIB TO ELK CREEK #3	87-08	7/19/2001	1	5				CGS

* Species Abbreviations; AMM=Pacific Lamprey Larvae; BLF=Bullfrog; BKS=Black Salamander; BUFO=Western Toad; CDS=Clouded Salamander; CGS=Coastal Giant Salamander; CHK=Chinook Salmon; CNT=California Newt; COH=Coho Salmon; CR=Coast Range Sculpin; CRY=Crayfish; LAM=Pacific Lamprey; NAL=Northern Alligator Lizard; NEW=Newt (Unidentified Species); NWP=Western Pond Turtle; PBL=Pacific Brook Lamprey; PR=Prickly Sculpin; PTF=Pacific Tree Frog; RBN= Red Bellied Newt; RCH=California Roach; RLF=Red Legged Frog; RSN=Rough Skinned Newt; SCP=Sculpin (Unidentified Species); SKR=Sacramento Sucker; STB=Stickleback; STH=Steelhead Trout; TLF=Coastal Tailed Frog; WAGS=Western Aquatic Garter Snake; YLF=Yellow Legged Frog.

* Blank spaces indicate that no organisms were observed.

Appendix F. Summary of results for aquatic species surveys within the Elk Creek watershed, Mendocino Co., California. Refer to Maps F-1 & F-2.

STREAM NAME	SITE ID	DATE	STH <70 MM	STH 70-130 MM	STH >130 MM	COH <70 MM	COH 70-130 MM	OTHER SPECIES
TRIB TO ELK CREEK #3	87-08	7/15/2002	3					
ELK CREEK	87-09	8/5/1994	13	15	3			AMM CGS
ELK CREEK	87-09	7/28/2000	10	2				CGS
ELK CREEK	87-09	7/11/2002	50	11				
TRIB TO ELK CREEK #4	87-10	8/4/1995	PRESENT	PRESENT	PRESENT			CGS
TRIB TO ELK CREEK #4	87-10	6/14/1996		PRESENT	PRESENT			CGS
TRIB TO ELK CREEK #4	87-10	7/28/2000	2	1				CGS
TRIB TO ELK CREEK #4	87-10	7/23/2001	1	1				
TRIB TO ELK CREEK #4	87-10	9/11/2002	2					TLF
TRIB TO ELK CREEK #4	87-11	7/26/1996	PRESENT	PRESENT	PRESENT			
TRIB TO ELK CREEK #4	87-11	7/31/2000	1	4				CGS
TRIB TO ELK CREEK #4	87-11	9/11/2002	1	1				
TRIB TO ELK CREEK #4	87-32	7/25/2001						CGS
ELK CREEK	87-12	6/21/1995	PRESENT	PRESENT	PRESENT			CGS
ELK CREEK	87-12	6/14/1996	PRESENT					

* Species Abbreviations; AMM=Pacific Lamprey Larvae; BLF=Bullfrog; BKS=Black Salamander; BUFO=Western Toad; CDS=Clouded Salamander; CGS=Coastal Giant Salamander; CHK=Chinook Salmon; CNT=California Newt; COH=Coho Salmon; CR=Coast Range Sculpin; CRY=Crayfish; LAM=Pacific Lamprey; NAL=Northern Alligator Lizard; NEW=Newt (Unidentified Species); NWP=Western Pond Turtle; PBL=Pacific Brook Lamprey; PR=Prickly Sculpin; PTF=Pacific Tree Frog; RBN= Red Bellied Newt; RCH=California Roach; RLF=Red Legged Frog; RSN=Rough Skinned Newt; SCP=Sculpin (Unidentified Species); SKR=Sacramento Sucker; STB=Stickleback; STH=Steelhead Trout; TLF=Coastal Tailed Frog; WAGS=Western Aquatic Garter Snake; YLF=Yellow Legged Frog.

* Blank spaces indicate that no organisms were observed.

Appendix F. Summary of results for aquatic species surveys within the Elk Creek watershed, Mendocino Co., California. Refer to Maps F-1 & F-2.

STREAM NAME	SITE ID	DATE	STH <70 MM	STH 70-130 MM	STH >130 MM	COH <70 MM	COH 70-130 MM	OTHER SPECIES
ELK CREEK	87-12	7/28/2000	6					CGS
ELK CREEK	87-12	7/23/2001	19	3				
ELK CREEK	87-12	7/11/2002	35	8				
THREE SPRINGS CREEK	87-13	8/8/1994	16	9	2			CGS
THREE SPRINGS CREEK	87-13	8/4/1995	PRESENT	PRESENT	PRESENT			
THREE SPRINGS CREEK	87-13	7/18/1996	PRESENT	PRESENT	PRESENT			CGS YLF
THREE SPRINGS CREEK	87-13	7/28/2000	13					CGS
THREE SPRINGS CREEK	87-13	7/20/2001	8	3				CGS
THREE SPRINGS CREEK	87-13	7/15/2002	11	2				CGS
THREE SPRINGS CREEK	87-14	7/26/1996	PRESENT	PRESENT				
THREE SPRINGS CREEK	87-14	7/28/2000	11					CGS
THREE SPRINGS CREEK	87-14	7/20/2001	22	2				CGS
THREE SPRINGS CREEK	87-26	10/9/2000	5	2	1			
THREE SPRINGS CREEK	87-26	7/20/2001		2				CGS
THREE SPRINGS CREEK	87-26	7/15/2002	4		2			CGS

* Species Abbreviations; AMM=Pacific Lamprey Larvae; BLF=Bullfrog; BKS=Black Salamander; BUFO=Western Toad; CDS=Clouded Salamander; CGS=Coastal Giant Salamander; CHK=Chinook Salmon; CNT=California Newt; COH=Coho Salmon; CR=Coast Range Sculpin; CRY=Crayfish; LAM=Pacific Lamprey; NAL=Northern Alligator Lizard; NEW=Newt (Unidentified Species); NWP=Western Pond Turtle; PBL=Pacific Brook Lamprey; PR=Prickly Sculpin; PTF=Pacific Tree Frog; RBN= Red Bellied Newt; RCH=California Roach; RLF=Red Legged Frog; RSN=Rough Skinned Newt; SCP=Sculpin (Unidentified Species); SKR=Sacramento Sucker; STB=Stickleback; STH=Steelhead Trout; TLF=Coastal Tailed Frog; WAGS=Western Aquatic Garter Snake; YLF=Yellow Legged Frog.

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Appendix F. Summary of results for aquatic species surveys within the Elk Creek watershed, Mendocino Co., California. Refer to Maps F-1 & F-2.

STREAM NAME	SITE ID	DATE	STH <70 MM	STH 70-130 MM	STH >130 MM	COH <70 MM	COH 70-130 MM	OTHER SPECIES
TRIB TO THREE SPRINGS CREEK #1	87-24	10/9/2000						CGS
TRIB TO THREE SPRINGS CREEK #1	87-24	7/20/2001						CGS
TRIB TO THREE SPRINGS CREEK #1	87-24	7/15/2002						CGS
TRIB TO THREE SPRINGS CREEK #2	87-25	10/9/2000						CGS
TRIB TO THREE SPRINGS CREEK #2	87-25	7/20/2001						CGS
TRIB TO THREE SPRINGS CREEK #2	87-25	7/15/2002						CGS
SULPHUR FORK CREEK	87-15	8/8/1994	13	10	1			CGS
SULPHUR FORK CREEK	87-15	8/4/1995	PRESENT	PRESENT				CGS
SULPHUR FORK CREEK	87-15	7/18/1996	PRESENT		PRESENT			YLF
SULPHUR FORK CREEK	87-15	7/27/2000	12	1	1			CGS
SULPHUR FORK CREEK	87-15	7/22/2001	4	2				CGS
SULPHUR FORK CREEK	87-15	7/12/2002	5	2				CGS
SULPHUR FORK CREEK	87-16	7/26/1996						CGS
SULPHUR FORK CREEK	87-16	7/27/2000	3		2			CGS
SULPHUR FORK CREEK	87-27	10/10/2000		1				CGS

* Species Abbreviations; AMM=Pacific Lamprey Larvae; BLF=Bullfrog; BKS=Black Salamander; BUFO=Western Toad; CDS=Clouded Salamander; CGS=Coastal Giant Salamander; CHK=Chinook Salmon; CNT=California Newt; COH=Coho Salmon; CR=Coast Range Sculpin; CRY=Crayfish; LAM=Pacific Lamprey; NAL=Northern Alligator Lizard; NEW=Newt (Unidentified Species); NWP=Western Pond Turtle; PBL=Pacific Brook Lamprey; PR=Prickly Sculpin; PTF=Pacific Tree Frog; RBN= Red Bellied Newt; RCH=California Roach; RLF=Red Legged Frog; RSN=Rough Skinned Newt; SCP=Sculpin (Unidentified Species); SKR=Sacramento Sucker; STB=Stickleback; STH=Steelhead Trout; TLF=Coastal Tailed Frog; WAGS=Western Aquatic Garter Snake; YLF=Yellow Legged Frog.

* Blank spaces indicate that no organisms were observed.

Appendix F. Summary of results for aquatic species surveys within the Elk Creek watershed, Mendocino Co., California. Refer to Maps F-1 & F-2.

STREAM NAME	SITE ID	DATE	STH <70 MM	STH 70-130 MM	STH >130 MM	COH <70 MM	COH 70-130 MM	OTHER SPECIES
SULPHUR FORK CREEK	87-27	7/24/2001						CGS
SULPHUR FORK CREEK	87-27	7/12/2002			1			
SULPHUR FORK CREEK	87-28	10/10/2000						CGS
SULPHUR FORK CREEK	87-28	7/12/2002						CGS
SODA FORK CREEK	87-17	8/5/1994	19	3				CGS YLF
SODA FORK CREEK	87-17	8/4/1995	PRESENT	PRESENT				LAM CGS
SODA FORK CREEK	87-17	7/18/1996	PRESENT	PRESENT	PRESENT			CNT CGS YLF
SODA FORK CREEK	87-17	7/27/2000	19	4				CGS YLF
SODA FORK CREEK	87-17	7/23/2001	9					CGS YLF
SODA FORK CREEK	87-17	7/10/2002	7	1	1			AMM CGS YLF
SODA FORK CREEK	87-18	7/26/1996	PRESENT	PRESENT	PRESENT			CGS
SODA FORK CREEK	87-18	7/27/2000	18	5	1			CGS
SODA FORK CREEK	87-29	10/10/2000	8	2				
SODA FORK CREEK	87-29	7/24/2001	5	3				CGS
SODA FORK CREEK	87-29	7/10/2002	3	1				TLF

* Species Abbreviations; AMM=Pacific Lamprey Larvae; BLF=Bullfrog; BKS=Black Salamander; BUFO=Western Toad; CDS=Clouded Salamander; CGS=Coastal Giant Salamander; CHK=Chinook Salmon; CNT=California Newt; COH=Coho Salmon; CR=Coast Range Sculpin; CRY=Crayfish; LAM=Pacific Lamprey; NAL=Northern Alligator Lizard; NEW=Newt (Unidentified Species); NWP=Western Pond Turtle; PBL=Pacific Brook Lamprey; PR=Prickly Sculpin; PTF=Pacific Tree Frog; RBN= Red Bellied Newt; RCH=California Roach; RLF=Red Legged Frog; RSN=Rough Skinned Newt; SCP=Sculpin (Unidentified Species); SKR=Sacramento Sucker; STB=Stickleback; STH=Steelhead Trout; TLF=Coastal Tailed Frog; WAGS=Western Aquatic Garter Snake; YLF=Yellow Legged Frog.

* Blank spaces indicate that no organisms were observed.

Appendix F. Summary of results for aquatic species surveys within the Elk Creek watershed, Mendocino Co., California. Refer to Maps F-1 & F-2.

STREAM NAME	SITE ID	DATE	STH <70 MM	STH 70-130 MM	STH >130 MM	COH <70 MM	COH 70-130 MM	OTHER SPECIES
SODA FORK CREEK	87-30	10/10/2000						CGS
SODA FORK CREEK	87-30	7/24/2001						CGS
SODA FORK CREEK	87-30	7/10/2002						CGS
ELK CREEK	87-19	8/5/1994	5	9				CGS
ELK CREEK	87-19	6/21/1995	PRESENT					CGS
ELK CREEK	87-19	7/18/1996	PRESENT	PRESENT	PRESENT			
ELK CREEK	87-19	7/27/2000	8					CGS
ELK CREEK	87-19	7/19/2001	3					CGS YLF
ELK CREEK	87-19	7/12/2002	4	3				CGS YLF
ELK CREEK	87-33	9/29/2005	17	4	2			CGS

* Species Abbreviations; AMM=Pacific Lamprey Larvae; BLF=Bullfrog; BKS=Black Salamander; BUFO=Western Toad; CDS=Clouded Salamander; CGS=Coastal Giant Salamander; CHK=Chinook Salmon; CNT=California Newt; COH=Coho Salmon; CR=Coast Range Sculpin; CRY=Crayfish; LAM=Pacific Lamprey; NAL=Northern Alligator Lizard; NEW=Newt (Unidentified Species); NWP=Western Pond Turtle; PBL=Pacific Brook Lamprey; PR=Prickly Sculpin; PTF=Pacific Tree Frog; RBN= Red Bellied Newt; RCH=California Roach; RLF=Red Legged Frog; RSN=Rough Skinned Newt; SCP=Sculpin (Unidentified Species); SKR=Sacramento Sucker; STB=Stickleback; STH=Steelhead Trout; TLF=Coastal Tailed Frog; WAGS=Western Aquatic Garter Snake; YLF=Yellow Legged Frog.

* Blank spaces indicate that no organisms were observed.

Elk Creek Watershed Analysis Unit

Map F-1
Salmonid Distribution

This map illustrates the documented and potential distribution of steelhead trout and coho salmon in the Elk Creek WAU. Documented distribution is based on distribution surveys conducted by MRC through 2004. Documented distribution only shows presence of fish up to the observationsite. Potential distribution represents our interpretation, at this point in time, for larger streams where coho salmon or steelhead trout could occur. Since the potential distribution is assessed only for larger watercourses, it cannot be considered complete, and it is highly likely the actual potential distribution is larger.

Salmonid Distribution

	Presence	Potential
Coho		
Steelhead		

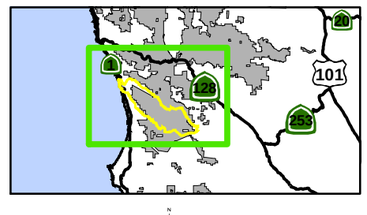
Barriers to Adult Salmonid Upstream Migration

- Gradient
- Waterfall

- Fish Distribution Sampling Locations
- MRC Ownership
- Planning Watershed Boundary
- Elk Creek Watershed Analysis Unit Boundary

Flow Class

- Class I
- Class II
- Class III



0 0.5 1 Miles

November 2005