APPENDIX 4F

HABITAT SUITABILITY CRITERIA, BY MARK A. ALLEN, THOMAS R. PAYNE & ASSOCIATES

KLAMATH HYDROELECTRIC PROJECT (FERC NO. 2082)

HABITAT SUITABILITY CRITERIA

FINAL REPORT

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ABSTRACT

Habitat Suitability Criteria (HSC) data were collected for rearing rainbow trout (*Oncorhynchus mykiss*), smallscale suckers (*Catostomus rimiculus*), and other species in the upper Klamath River between Copco reservoir and J.C. Boyle dam during the summers of 2002 and 2003. Data were collected from locations within the 4.3-mile reach of the river between J.C. Boyle dam and powerhouse (the "Bypass reach") and the 16.4-mile reach between the powerhouse and Copco reservoir (the "Peaking reach"). Spawning HSC data was also collected for rainbow trout in the Bypass reach during the spring of 2003. Sample sizes were sufficient to develop site-specific HSC only for rainbow trout rearing in the Bypass reach. HSC curves were developed using 3-point running means, non-parametric tolerance limits, and binary methodologies. Site-specific HSC were compared to observations made in the Peaking reach, and with HSC developed from other locations. For trout spawning and sucker rearing, the limited site-specific observations were compared to HSC developed from other locations. Rainbow trout fry (<5cm) were most often observed along stream margins in shallow depths(<2ft) with slow velocities (<0.5 fps), and were most often associated with escape cover formed by aquatic vegetation. Juvenile trout (5-15cm) occupied slightly deeper (1-2 ft), faster (0.25-1.0 fps) locations associated with velocity shelters and escape cover composed of aquatic vegetation, cobbles, and boulders. Adult trout (>15cm) were mostly observed in midchannel locations in deep (2-6 ft), fast (0.75-2.0 fps) water with escape cover and velocity shelters formed by boulders.

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FINAL REPORT

INTRODUCTION

The Klamath Hydroelectric Project (FERC Project Number 2082) on the upper Klamath River is currently being relicensed by PacifiCorp. As part of the relicensing process, Thomas R. Payne & Associates (TRPA) is assisting with the analysis of instream flow effects on aquatic species. An important component of an instream flow study is the Habitat Suitability Criteria (HSC) that typically describes the relative suitability of water depth, water velocity, stream substrate, and cover types to the fish species and life stages of interest in the Project area. The preferred method of developing HSC is by site-specific direct observations of a sufficient number of each species and life stage within a rigorous study plan designed to minimize observer or habitat availability bias. When conditions allow, snorkeling (S.C.U.B.A. when necessary) is the most useful method for collecting direct observation HSC data due to the ability to accurately identify a fish's selected focal position while it maintains normal, non-disturbed behavior.

Relatively clear water is found in the J.C. Boyle bypass reach that allowed collection of HSC data using direct observation methodologies. However, direct observation sampling was restricted in both the Oregon and California portions of the J.C. Boyle peaking reach of the Klamath River to periods of non-generation, when the streamflows were largely composed of spring water from the J.C. Boyle bypass reach. During generation when higher streamflows (>1,000 cfs) were available, water visibilities typically declined to one to three feet. The extremely poor visibility of water coming through the J.C. Boyle powerhouse effectively prevented the use of any direct observation methodology except during low flow conditions (i.e., when the powerhouse is not generating and most of the flow is clear spring water from the bypass reach), however the typically short duration of low flow events did not allow the turbid water to completely “flush out”, consequently direct observation efforts were significantly hampered by poor visibility in the peaking reach.

The Aquatics Work Group is a stakeholder-based group formed as part of the Project relicensing process to coordinate on development and implementation of technical study plans. An HSC Subgroup of the Aquatics Work Group met on several occasions to specifically discuss the HSC study. At previous meetings held by the HSC Subgroup for PacifiCorp’s Klamath Hydroelectric Project, the considerable and unique difficulties of developing site-specific HSC in the turbid waters of the peaking reach of the project area were discussed. The HSC Subgroup agreed to a conceptual plan to develop site-specific HSC in a tiered approach (PacifiCorp 2002). First, attempts would be made towards developing site-specific HSC using direct observation with a minimum sample size of 150 to 200 fish observations, according to accepted methodologies (Bovee 1986). However, failing the collection of an adequate sample size using direct observation, a secondary goal would be to assess or “validate” existing, non-local HSC with a limited data set collected in the upper Klamath River project area, using direct observation methodologies. A recent HSC validation study suggested that at least 55 fish focal observations were necessary to adequately represent habitat (Thomas and Bovee 1993). If, likewise, stream conditions or low fish densities prevented the collection of enough validation measurements, the HSC Subgroup would then consider the application of non-local HSC from rivers that are similar in character and fish populations to the Klamath project area, or new "judgment-based" HSC would be developed using a consensus approach.

OBJECTIVES

The primary goal of the HSC study was to collect site-specific microhabitat data for the rearing life-stages of fry (<5cm FL), juvenile (5-15cm FL), and adult (>15cm FL) rainbow trout (*Oncorhynchus mykiss*). If adequate observations permitted, site-specific HSC would also be developed for trout spawning and rearing Klamath smallscale suckers (*Catostomus rimiculus*). Divers did not positively identify any of the remaining sucker species, which are the Klamath largescale sucker (*C. snyderi*), shortnose sucker (*Chasmistes brevirostris*), and the Lost River sucker (*Deltistes luxatus*). Limited HSC data was collected for other species common in the project area, such as Blue and Tui chubs (Gila spp.), and sculpin (Cottus sp.). HSC data was not collected for speckled dace (*Rhinichthys osculus*), although common in the study area.

STUDY AREA DESCRIPTION

For purposes of this study, the Klamath River from J. C. Boyle dam downstream to the headwaters of Copco reservoir was divided into four study reaches: the J.C. Boyle bypass reach (Bypass) (4.6 mi), the Oregon peaking reach (OR Peaking) (5.9 mi), the Hells Corner peaking reach (5.1 mi), and the California peaking reach (CA Peaking) (5.4 mi) (Figure 1). Except during periods of spill, the Bypass receives approximately 100 cfs from the diversion dam. However several large springs are located approximately one mile below the dam, that contribute approximately 225 cfs of cold (8-10ºC), crystal-clear water. The spring inflow stabilizes seasonal water temperatures and minimizes summer maxima, and also increases water visibility.

In contrast to the cool, low, stable flow regime of the Bypass, the three peaking reaches are subject to near daily flow fluctuations from the J.C. Boyle powerhouse over most of the year. During summer and fall months, typical peaking operations at the J.C. Boyle powerhouse consist of no generation during the night (thus the peaking reach receives the approximately 325 cfs from the bypass reach), upramping in the morning to a peak of about 1,500 cfs by late-morning or noon, then downramping to minimum flow from afternoon to early evening. During the spring and at other times of high water availability and electrical demand, maximum daily flows typically reach 2,800-3,000 cfs in the peaking reaches, and generation may occur for extended periods (i.e., flows may not drop to minimum levels). During peaking operations, wide fluctuations occur not only in streamflow characteristics, but also in water temperature and other water quality characteristics (i.e., suspended solids, see Water Resource Final Technical Report).

Physical habitat also differs among the four study reaches (Table 1). The Bypass can be described as a high gradient, highly confined channel containing an abundance of very large (>four ft diameter) boulders. All reaches in the study area are generally lacking in gravel and other fine substrate components. However the Bypass does receive some gravel recruitment from an eroded spillway channel approximately midway in the reach. Reed canary grass, a tall (1-3 ft) herbaceous plant, grows along the water's edge in all but the steepest rapids. Larger riparian plants are typically restricted to higher elevations several feet from the water's edge. The upper one-half of the Bypass is bordered on one bank by the power canal and associated road, which occur approximately 100 to 300 ft above the stream elevation.

Figure 1. Map of upper Klamath HSC study area showing study reaches, Bypass segments, and miscellaneous landmarks.

Table 1. Physical characteristics of the upper Klamath River according to reach and flow.

Reach	Length (mi)	Upper Elevation (msl)	% Slope	Mean Channel Widths @ ~ 350 cfs	1,600 cfs	3,000 cfs
Boyle Bypass	4.57	3,750	1.7	87	115	-
OR Peaking	5.95	3,335	0.7	134	166	181
Hells Corner	5.06	3,125	1.3	-	116	-
CA Peaking	5.41	2,765	0.6	110	142	154

The OR Peaking reach is moderate gradient for the first 2.5 mi below the powerhouse, and then the gradient lessens into the relatively flat area known as Frain Ranch (Figure 1). The wetted channel width and the floodplain width increase in this three mile stretch, with a decrease in riffle gradients and overall substrate size. Canary grass is the dominant riparian plant where is grows at the water's edge produced by medium flow levels (i.e., 1,000 to 2,000 cfs). Larger riparian plants, including willows and other woody trees, are also abundant along the lower gradient habitats, particularly in the Frain Ranch area. Most of the woody plant species are not flooded except at higher flow levels (i.e., >2,000 cfs). Virtually all stream margins are non-vegetated at low flows, and some large bars are exposed in the Frain Ranch area. This reach is bordered by a gravel road on one bank well offset from the stream channel.

The Hells Corner peaking reach begins at Caldera Rapid at the bottom of the Frain Ranch area (Figure 1). This high gradient, highly confined channel contains numerous class IV whitewater rapids and is renown for recreational rafting. HSC sampling was not conducted in this reach due to difficult access (it is road less) and hazardous diving conditions. Below Stateline, the Upper Klamath River enters the CA Peaking reach. Gradient lessens and the channel becomes bordered by flat agricultural fields and a well maintained road (mostly distant from the channel). Canary grass, willows, and larger woody plants dominate the riparian community, but stream margins are generally devoid of vegetation except at medium and higher flows. Some large cobble bars are exposed during periods of low flow. Several low berms formed by boulders have been constructed to divert water for local agricultural use near the river. The magnitude of diversion is less than a few cfs and varies seasonally. Islands and associated side channels are relatively common in this reach, however most of the side channels are not wetted during low flows and thus are periodically dewatered during summer and fall peaking operations.

METHODS

Sampling Periodicity

Spawning HSC data was collected along margin areas of the Bypass in mid-May and early June of 2003; however, midchannel areas were not surveyed due to poor visibility. All rearing HSC data was collected in 2002 and 2003 during the summer from mid-July to early September (Table 2). Attempts were made to initiate work earlier in 2003; however poor water visibilities in all reaches prevented direct observation sampling of midchannel areas until July.

Target Sampling Flows

All spawning and rearing HSC data was collected under base flow conditions (i.e., about 325 cfs). Water visibility was monitored in the peaking reaches during higher flows, however visibilities remained insufficient (typically <3 ft) to conduct direct observations surveys under those conditions.

Table 2. Periodicity and habitat characteristics during HSC sampling in the upper Klamath River.

Life Stage	Reach	Year	Sampling Dates			Flow (cfs)	Water Temperature (^{o}F) Min	Max
Spawning	Bypass	2003	12-May	&	4-Jun	350	50	61
Rearing	Bypass	2002	25-Jul	to	30-Aug	300-350	55	61
Rearing	Bypass	2003	21-Jul	to	3-Sep	350	59	62
Rearing	OR Peaking	2003	9-Sep	to	24-Sep	350	54	64
Rearing	CA Peaking	2003	18-Aug	to	23-Sep	350	57	63

Sampling Stratifications

For spawning HSC, sampling was conducted during two surveys. The first survey was a drift dive utilizing two snorkelers who surveyed both stream margins of the Bypass from the springs downstream to the mouth (Figure 1). Because of poor visibility and hazards associated with diving in swift, turbid water, most of the midchannel areas and some margin areas were not sampled. The first survey and observations from a concurrent radio-telemetry study both identified two major spawning areas in the Bypass, consequently the second survey only encompassed the margin areas in those two locations.

For rearing HSC, data collection was stratified by reach (Bypass, OR Peaking, and CA Peaking), mesohabitat type, and transect type. For rearing, the Bypass was further divided into four segments, each approximately 6,000 ft in length (Figure 1). The highest segment was above the springs where water visibility was insufficient to conduct direct observation surveys, and therefore was not sampled. The "lower" segment (from the mouth upstream ~6,000 ft) and "upper" segment (from the spillway to the springs) were sampled in 2002, and the "middle" segment (from the lower segment up to the spillway) was sampled in 2003. The two peaking reaches were not sub-divided, and were both sampled in 2003 only. Overall sampling effort (measured in ft^2 of diving area) was variable among the reaches and segments.

Sampling was also stratified according to mesohabitat type. Mesohabitat types were deep pools (pools with maximum depths >8 ft in Bypass reach, >10 ft in Peaking reaches), shallow pools, glides (peaking reaches only), runs (low, moderate, or high gradient), riffles (low, moderate, or high gradient), pocketwaters (Bypass only), and side-channels (CA Peaking only). These meso-habitat type classes were designed to partition sampling effort among the various combinations of depth and velocity (the primary variables in HSC studies). For example, deep pools = deep water/slow velocity; shallow pools and glides = shallow water/slow velocity; runs = deep water/high velocity; and riffles = shallow water/high velocity. Pocketwaters are highly complex and can take on any of the above definitions, depending upon local gradient and size of the elements creating the pockets. Side channels were themselves split into shallow pool, run, and riffle components. Sampling efforts within runs and riffles were partitioned among the gradient sub-types, however most high gradient units were not sampleable by diving due to excessive velocities or whitewater. During habitat mapping, all habitat units deemed unsafe or infeasible for diving, including cascades, falls, diversion rapids, or individual units of the above mesohabitat types, were so identified and were excluded from selection.

HSC sampling effort was allocated equally (as measured in ft^2 of diving area) within each of the meso-habitat types. Equal-area sampling is a method currently recommended by instream flow specialists as a way of accounting for the effects of habitat availability on fish habitat use (Ken Bovee, USGS, personal communication).

Direct observation dives were conducted along margin transects and midchannel transects. Margin transects were longitudinal transects eight ft in width of variable length that extended upstream and downstream equidistant from the cross-sectional midchannel transects (Figure 2). Sampling area was equal between margin transects and midchannel transects in all study areas, except for the upper segment of the Bypass. In that reach, only cross-sectional transects were sampled where the first and last eight ft of the transect was classified as margin transect and the remaining portion was midchannel transect. Consequently, in that segment more effort was allocated to midchannel areas than to margin areas.

Study Site and Transect Selection

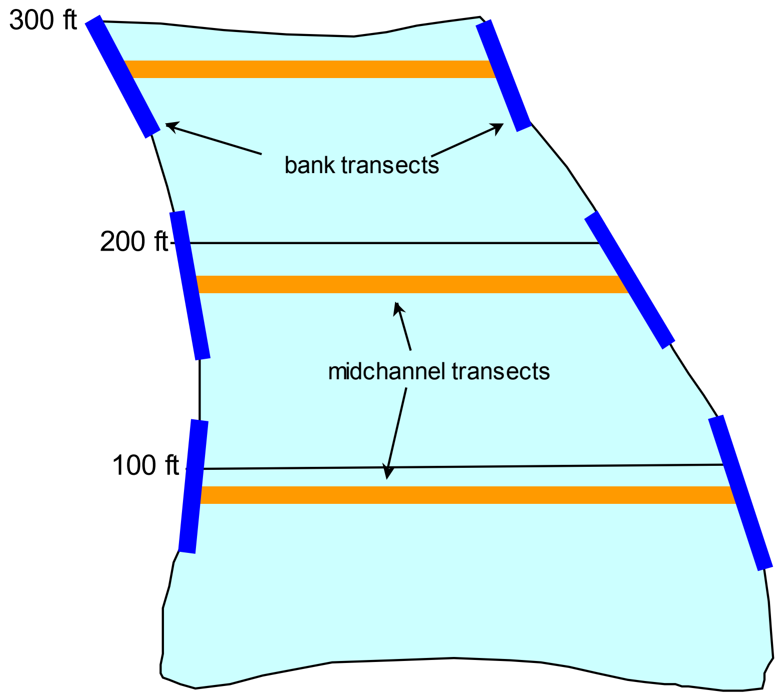


Figure 2. Example of transect layout within a hypothetical mesohabitat unit.

Spawning HSC data were collected wherever a redd was observed in the dive areas, which were not determined through sampling design, but by either a longitudinal reach approach (first survey) or by the known presence of spawning areas (second survey). In contrast, all data collection for rearing HSC was conducted within individual mesohabitat units selected by a stratified random design within reaches (or within segments in the Bypass). The number of habitat units sampled of each mesohabitat type varied among reaches due to differences in habitat unit sizes and equal-area sampling requirements. For example, riffles in the Bypass were shorter than other mesohabitat types; therefore more riffles were selected in order to equalize effort (in ft^2 of dive area) with other mesohabitat types.

Prior to diving a selected mesohabitat unit, midchannel transects were placed systematically with a random start. Systematic selection of transect locations ensured coverage of head, body, and tail portions of each habitat unit (Figure 2). Midchannel transects extended across the river channel perpendicular to flow, beginning at the far edge of a margin transect and extending across the river to the opposite margin transect, or as far as was feasible and safe for divers. Midchannel transects were placed at least 50 ft apart to minimize fish disturbance between transects. The number of transects placed per mesohabitat unit was dependent upon unit length and type and on the amount of sampling area needed to equalize effort (in ft^2) among mesohabitat types. Margin transect lengths for each bank were determined by dividing the midchannel transect length by two. Margin transects were then measured and flagged above and below (evenly when possible) each midchannel transect (Figure 2). Consequently, the margin transects were typically located with reference to the systematically selected midchannel transects. The only exception to this placement rule was in isolated habitat units in the peaking reach, where uncommon stream margin edge types (SMET) were present in the unit, but not located where the midchannel transects were selected. In such cases, the margin transects were placed along the uncommon margin type rather than placed in association with the midchannel transect (this exception occurred only rarely).

Diving Methodologies

For spawning surveys, a single diver surveyed a margin area in an upstream direction while looking for signs of disturbed substrate or paired trout exhibiting spawning behavior (i.e., digging, redd defense, etc.). Another individual walked along the bank and assisted in the location of redds and fish. When a redd was positively identified, depth and mean column velocity was measured immediately upstream of the redd pit (if present) or in the center of the disturbed substrate (in the absence of a pit and mound). The dominant, subdominant, and dominant-adjacent (i.e., Bovee code) substrate types were evaluated for each redd using an underwater ruler and the size classifications given in Table 3. The percentage of fine substrate (<0.2 in diameter) in the redd was also eye-estimated, and the distance to bank, adjacent SMET category, and water temperature were also recorded. Redd and associated gravel patch dimensions were measured (length x width), and the structural feature thought to have formed the gravel deposit was noted (i.e., upstream obstruction, downstream obstruction, boulder pocket, pool tail, bank influence, etc.). All redds were drawn on a habitat unit map (also showing the habitat unit type and number), were photographed, and were marked with a handheld GPS unit (where coverage permitted) and a labeled flag along the stream margin.

Rearing HSC data was collected by a single diver who quietly entered the river and moved slowly along the flagged transect area. Diving typically occurred in margin transects prior to midchannel transects, and a waiting period of at least 10 minutes (typically >30 minutes) occurred before diving the associated midchannel transect. The diver placed numbered markers on the stream bottom whenever the focal position of a fish was identified. However, prior to placing the marker, the diver first identified the species, estimated its fork length to the nearest cm (with reference to a ruler), estimated its focal height above the substrate, and classified its behavior (feeding, holding, roving, disturbed). In 2003, the food capture position for all trout observed feeding was also recorded (as eye-estimated distance and direction from the original focal position). Markers were placed to identify positions of disturbed fish, however focal position data were not collected for those individuals (only for non-disturbed fish). After placing the marker, the diver cautiously moved

Table 3. Substrate and cover codes used to describe characteristics at HSC data positions. Code from lower Klamath study, Hardin-Davis et al. (2002).

Code	Cover Type	Size (in)
0	no cover	-
1	filamentous algae	-
2	non-emergent rooted aquatics	-
3	emergent rooted aquatics	-
4	grass, sedge, herbaceous plants	-
5	trees	-
6	multi-stem shrubs	-
7	organic debris	-
8	large woody debris	>4
9	small woody debris	<4
10	rootwad	-
11	aggregates of vegetation	-
12	fines or river bank	<0.2
13	small gravel	0.2-1
14	medium gravel	1-2
15	large gravel	2-3
16	small cobble	3-6
17	medium cobble	6-9
18	large cobble	9-12
19	small boulder	12-24
20	medium boulder	24-48
21	large boulder	>48
22	bedrock	-

past the fish or herded it out of the sampling area, then continued the survey. Typically, one marker was placed for each fish. However, occasionally a group of closely spaced trout fry would be described by a single marker placed at the center of the group, and that data was treated as a single HSC observation.

When habitat units contained deep, fast midchannels, divers traversed the transect while suspended from rope suspended above the water surface along the midchannel transect. For all rope-assisted surveys, a minimum waiting period of 30 minutes was observed prior to conducting the dive in order to allow disturbed fish to return to normal positions and behavior. Most pools and some runs required S.C.U.B.A. to effectively survey the deeper portions of midchannel transects. Underwater divers carried extra weight and sometimes a grapnel anchor to maintain position along the transect area, which was traversed while following a pre-determined compass heading. Additional information collected during each dive transect included dive time, water temperature, water visibility (estimated as the distance a diver could clearly identify a 2 inch fish lure), diver search width (for midchannel transects, margin transects were eight ft wide), and GPS coordinates (at one end of each midchannel transect). The SMET category was recorded for all margin transects (Table 4). All surveyed habitat units were also photographed.

Table 4. SMET codes and descriptions. Code from lower Klamath study, Hardin-Davis et al. (2002).

Stream Margin Edge Type (SMET) Code	
1. Trees (diameter @ water surface >4")	
2. Trees and emergent vegetation	
3. Dense aggs of willow / WD / berry	
4. Emergent Shrubs (willow / black berry)	
5. Open Areas	
6. Sparse herbaceous vegetation	
7. Dense herbaceous vegetation	
8. Large sub / Rip-Rap (natural or man made)	
9. Large substrate / Rip Rap with vegetation	
10. Eddy	a. Bank influenced
	b. Substrate influenced
11. Backwater	

After the dive survey was completed the crew returned to each marker and measured the total depth, mean column velocity, focal velocity (at the height of the fishes focal position), distance to the nearest bank (using a tape measure or laser rangefinder with ±0.5m accuracy), and presence of any other trout within four ft of the marker (as indicated by other nearby markers). Most depths and velocities were measured with a rotating cup current meter attached to a top-setting wading rod, using standard stream measurement procedures. For deeper low velocity locations, depths and velocities were measured by snorkeling or on S.C.U.B.A using a rotating cup current meter clamped to stadia rod. Substrate and cover evaluations followed procedures used in the lower Klamath River (Hardy and Addley 2001). Substrate composition was evaluated in a 2_X2 ft area surrounding each marker, with reference to an underwater ruler showing substrate class sizes (Table 3). Instream escape cover and overhead (out-of-water) cover characteristics were recorded at each marker according to functional cover type (Table 5), and specific elements forming the cover (Table 3). Distance to cover element was recorded for escape cover, which was used to determine a maximum distance criteria from which HSC were developed and PHABSIM cells were characterized (see more details in section below on Development of Site-Specific HSC). Distance criteria were not used for velocity shelter functional types, but overhead cover must be directly above a measurement position and within 18 in of the water surface to be classified as present.

Table 5. Functional cover types used to describe HSC positions. Code from lower Klamath study, Hardin-Davis et al. (2002).

Code	Cover Type*
1	no cover
2	velocity only
3	escape only (but may include overhead)
4	overhead only
5	velocity & escape (but may incl overhead)
6	velocity & overhead only

*all types assume escape distance criteria

Trout use of feeding stations was evaluated by two methods. In 2002, mean column velocities where taken wherever a visually recognizable "shear" zone was observed within four feet of a fish focal position. In 2003, adjacent mean column velocities were measured at one ft and two ft increments to the right and left of each marker, as well as at food capture positions for those trout observed feeding. All mean column velocities measured for feeding station analysis used an abbreviated methodology with single measurement at 0.6 total depth for an interval of 10 sec or 20 sec, rather than the standard procedures that were used for all fish focal position measurements.

Habitat Availability Data

Habitat availability data was collected in association with all rearing HSC data. After all fish focal data was collected, habitat availability data was collected at randomly selected locations within each of the dive transects. Availability points were selected using systematic sampling with a random start, with a sampling rate of one point per 150 sq ft. The sampling rate was derived based on expected sampling effort and an availability sample size goal of 200 points per reach. For midchannel transects, each systematically selected point was located along the midline of the transects using a tape measure or a laser rangefinder shooting from the transect margin to the current meter (or operator). For margin transects, availability points were taken at each systematically selected distance upstream from the lower boundary with an additional random number to determine the distance from the bank (i.e., from >0-8 ft). The data collected and techniques for collection at each availability point were identical to the data collected at each fish focal position (see above), except data could not be collected for food capture location, since availability points were not associated with fish.

Development of Site-Specific HSC

Site-specific HSC were constructed for rearing rainbow trout fry (<5cm), juveniles (5-15cm), and adults (>15cm), but data for trout spawning and sucker rearing did not meet the generally accepted minimum sample size requirement of 150-200 observations (Bovee 1986). Rainbow trout HSC were developed from Bypass data directly pooled among all segments, mesohabitat types, and channel location strata. HSC data collected from the Oregon and California peaking reaches were not pooled with the Bypass HSC data due to the belief among HSC Subgroup participants that sample sizes from those reaches were insufficient to adequately represent habitat use in those reaches. Sample sizes were also insufficient to develop separate site-specific HSC for the peaking reaches.

Although sampling effort was equalized among mesohabitat types in the Bypass, unequal effort occurred among the three study segments as well as among the two transect types. Consequently, a visual comparison of habitat use data according to trout size class, segment, and transect type was conducted using graphical procedures. The degree of similarity or dissimilarity was visually assessed to determine if and how HSC data from the segments and transect types could be pooled prior to HSC curve construction. Statisticians employed by ODFW and CH2MHill conducted this analysis.

Numerous meetings held by the HSC Subgroup discussed potential methods for constructing HSC curves from the habitat use and habitat availability data. Discussed options to develop curves included the application of polynomial regression, running means, Sturges rule (Sturges 1927), and Non-Parametric Tolerance Limits (NPTL). The relative merits of creating HSC from use only data, versus HSC derived from a use/availability ratio, were also discussed. The HSC Subgroup decided that use/availability HSC smoothed by running means was the preferred alternative, due to the incorporation of habitat availability data, the visual fit to the data, the avoidance of assuming a specific functional form for the data, and the relatively minor amount of modifications by “professional judgment” necessary to produce final curves.

Running means HSC were created for each rainbow trout life stage and for the habitat availability data by creating frequency histograms for depth (using bin sizes of 0.2 ft) and velocity (using 0.1 fps bins), then applying a 3-pt running mean to the frequency values. The running means procedure was “run” or reapplied to each frequency dataset from one to five times until all significant “humps” were removed from the frequency distribution. Use to availability ratio HSC (U/A HSC) were created by dividing the smoothed use frequencies by the smoothed availability frequencies, and then normalized to the maximum value. The resulting U/A HSC for rainbow trout depth and velocity continued to contain large, unrealistic humps in deeper and faster water. For depth, consensus within the HSC Subgroup was to keep suitability at 1.0 from the initial peak into deeper water, thus overriding any remaining humps in the depth HSC. For velocity, a series of running means was applied to the calculated U/A HSC values, and then a hand-drawn line was applied to characterize the declining suitability trend into faster velocities. The hand-drawn modifications were confined to regions of low suitability (i.e., <0.2).

At the request of the HSC Subgroup, site-specific HSC were also fit to the trout habitat use data using the method of Non-Parametric Tolerance Limits (NPTL). Two-tailed NPTL curves were fit to velocity and depth distributions for all trout life-stages according to procedures described in Bovee (1986), except for adult depth which was fit with one-tailed NTPL (due to the assumption that suitability remains at 1.0 into deeper water).

Additional consultation with Ken Bovee of the USGS suggested the consideration of binary HSC, where a pair of habitat use HSC are constructed to represent both “optimal” habitat (the central 50% of use observations) and “suitable” habitat (the central 75%). The depth and velocity ranges encompassed by the central 50% and central 75% of each habitat use dataset were determined using the Excel rank and percentile function.

Cover HSC were also developed using both the functional cover type code (6 categories, Table 5) and the specific cover type code (22 categories, Table 3), in a manner similar to HSC developed in the lower Klamath River (Hardin et al. 2002, Hardy and Addley 2001). Frequency histograms of habitat use were developed for functional and specific cover types for each life stage of rainbow trout, normalized to the maximum value. Frequency histograms for escape cover were developed only from those observations where the cover object was within a specified distance from the fish focal position. The specified distance was calculated separately for trout fry, juveniles, and adults using the 90% cumulative percentage value for the distance to escape cover. Only the cover HSC for habitat use of functional cover types were utilized in the PHABSIM analysis, which was consistent with the analysis conducted in the lower Klamath River. However, the lower study also applied a cover modifier used to model fry habitat (Hardy and

Addley 2001). The modifier was a fourth variable inserted into the hydraulic model following modification of the software code. The necessary modifications to the modeling software and a site-specific cover modifier has not yet been developed or applied for this study. Use/availability ratio values were also calculated for both functional and specific cover types for comparison with use only values.

Transferability Testing of Existing Curves

In the event that sample sizes for a target species or life-stage were insufficient to develop site-specific HSC, the use of formal transferability tests was proposed. However, the number of rearing HSC observations for suckers (in all reaches combined) and for trout (in the peaking reaches) were well less than the 55 observations recommended for conducting such tests (Thomas and Bovee 1993). Although the number of spawning observations (n=66) did meet the sample size criteria, the spawning study did not include the collection of random measurements to describe "unoccupied" spawning habitat, which is a necessary component of the transferability methodology.

Use of Existing HSC Curves

Use of existing HSC curves developed from other locations was therefore necessary due to inadequate sample sizes for trout spawning in the Bypass and rearing in the peaking reaches, and for sucker and anadromous rearing in all reaches. HSC for anadromous species will be discussed in a separate report. Although adequate HSC are not available for rearing life stages of the suckers inhabiting the upper Klamath project area, limited data was collected for suckers (most were probably smallscale suckers) during this project, and miscellaneous observations (mostly spawning) have been collected for other species in the Klamath Basin. The available HSC data was compiled from these sources and directly overlaid with the site-specific data from this study. Similarly, the existing site-specific HSC data for trout rearing in the peaking reach was overlaid with HSC data from the Bypass, and from other large river datasets. Bypass spawning data was visually compared to spawning HSC from other studies. The characteristics of the source streams, sampling designs, and other pertinent factors for the non-local curves were also compiled (where known) for evaluating the applicability to the upper Klamath project area. The HSC Subgroup has yet to consider these datasets, however it is expected that a group consensus approach will be used to develop HSC for suckers in the project area, and for trout spawning and rearing in the peaking reaches.

RESULTS

Site-specific HSC data was collected for rearing rainbow trout and, to a limited extent, for other fish species resident in the J.C. Boyle reaches encompassing the project study area (Figure 1). Physical habitat characteristics and sampling periodicities for the study reaches are given in Tables 1 and 2. Raw HSC data and habitat availability data are given in Appendices A and B, respectively. Photographs of all sampled mesohabitat units can be made available on a CD, if requested.

General Observations

Allocation of Sampling Effort

HSC data collection for rainbow trout spawning did not follow a pre-defined sampling strategy, instead redd data was collected within a single long reach during the first survey, and within two specific, discontinuous reaches in the second survey. Sampling areas were thus not dictated by a stratified or an equal-area design, largely because trout spawning is highly restrictive in location, based on the limited availability of suitable gravels.

In contrast, data collection for rearing HSC did follow a stratified design with equal effort among mesohabitat type strata. In the Bypass, sampling was conducted in a total of 37 mesohabitat units among the lower, middle, and upper segments (Figure 3). Of the total sampling area of ca. 47,000 ft^2, 47% of the effort occurred in the lower segment, 21% in the middle segment, and 32% in the upper segment (Table 6). Effort was equally allocated among margin and midchannel transects in the lower and middle segments, but most effort (80%) in the upper segment occurred in midchannel areas. When combined across segments, 60% of effort occurred in midchannel habitat and 40% in margins. Within segments, sampling effort was allocated fairly equally among mesohabitat types, with a combined total of 9,200 to 9,700 ft^2 of area per type (Figure 4).

HSC sampling was conducted in 8 mesohabitat units in the OR Peaking reach; with equal effort allocated among transect type (at 7,000 ft^2 each) and mesohabitat type (at 1,700 to 1,800 ft^2) (Table 6, Figure 5). Similarly, sampling effort in 6 mesohabitat units and 2 side channels in the CA Peaking reach included equal effort among transect types (at 7,500 ft^2) and mesohabitat types (at 1,700 to 1,900 ft^2) (Table 6, Figure 6). When the two peaking reaches are combined, sampling area equaled 7,000 to 7,300 ft^2 per mesohabitat type. Approximately 3,500 ft^2 of area was sampled in the two side channels in the CA peaking reach. Overall sampling effort in the Peaking reaches was somewhat less than in the Bypass reach (~7,000 ft^2 per mesohabitat type versus 9,500 ft^2 per type) because the poor visibilities encountered in the Peaking reaches resulted in extremely low efficiency in collecting HSC data. For example, the average observation rate in the Bypass reach was 9 trout/day/diver, whereas the average rate in the Peaking reaches was only ½ trout/day/diver. Consequently, data collection in the Peaking reach was terminated after effort was equalized at 7,000 ft^2 of area per mesohabitat type.

General Habitat Availability Observations

Habitat availability data was collected using a randomized design within bank and midchannel transects. Because availability data was collected using a constant sampling rate of one point observation per 150 ft^2 of sampling area in each of the study areas, the combined total of 540 habitat availability observations were allocated among reaches, segments, mesohabitat types, and transect types similarly to the distribution of sampling effort (i.e., equal availability points among mesohabitat types, more points from the Bypass reach than from the two peaking reaches, etc.).

A visual comparison of the relative frequencies of mean column velocities and depths between the three segments of the Bypass reach shows high similarity in depths among all three segments, and similar velocity distributions in the upper and lower segments (Figure 7). Although velocities from ¼ fps to two fps dominated all three segments, the middle segment contained a higher proportion of near zero velocities than did the other segments. The differences in sampling effort within margin versus midchannel transects did not appear to produce a distinct difference in the habitat availability of the upper segment versus availability in the other segments.

A similar comparison of habitat availability between the Bypass reach (all segments combined) and the two peaking reaches reveals similarities among the peaking reaches, but considerable difference with the Bypass reach (Figure 8). The two peaking reaches show very similar velocity distributions, but a much greater proportion of observations in slow water (<0.5 fps) than in the

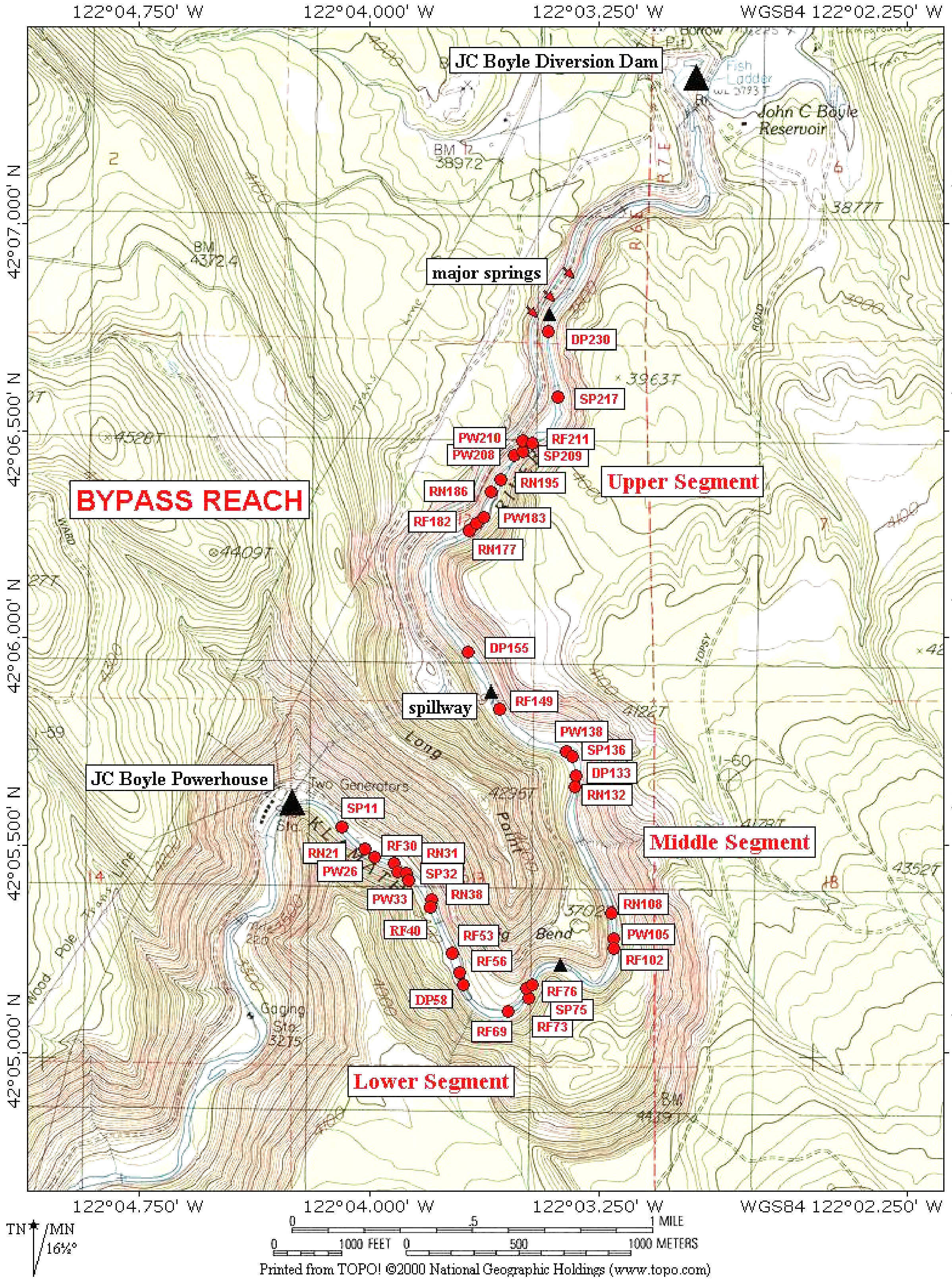


Figure 3. Map of Bypass reach showing location of study segments, HSC sample units (type and ID#), and miscellaneous landmarks. See Table 6 for habitat type abbreviations.

Table 6. Sampling areas (in sq ft) according to mesohabitat type, reach, and transect type. Side-channel sampling was divided among SP, RN, and RF sub-types.

Habitat Type	Reach	Bank	Mid-channel	Sum
Deep Pools (DP)	BP low	2,208	2,296	4,504
	BP up	512	1,720	2,232
	BP mid	1,198	1,288	2,486
	PK OR	1,680	1,683	3,363
	PK CA	1,932	1,956	3,888
	Totals:	**7,530**	**8,943**	**16,473**
Shallow Pools (SP)	BP low	2,176	2,336	4,512
	BP up	752	3,206	3,958
	BP mid	624	595	1,219
	PK OR	1,716	1,716	3,432
	PK CA	1,910	1,906	3,816
	Totals:	**7,178**	**9,759**	**16,937**
Runs (RN)	BP low	2,248	2,232	4,480
	BP up	736	3,201	3,937
	BP mid	544	448	992
	PK OR	1,768	1,756	3,524
	PK CA	1,944	1,875	3,819
	Totals:	**7,240**	**9,512**	**16,752**
Riffles (RF)	BP low	2,256	2,200	4,456
	BP up	464	1,906	2,370
	BP mid	1,270	1,267	2,537
	PK OR	1,801	1,792	3,593
	PK CA	1,728	1,710	3,438
	Totals:	**7,519**	**8,875**	**16,394**
Pocket-waters (PW)	BP low	2,240	2,122	4,362
	BP up	624	1,807	2,431
	BP mid	1,296	1,216	2,512
	PK OR	0	0	0
	PK CA	0	0	0
	Totals:	**4,160**	**5,145**	**9,305**
Side-channels (sc)	BP low	0	0	0
	BP up	0	0	0
	BP mid	0	0	0
	PK OR	0	0	0
	PK CA	3,590	0	3,590
	Totals:	**3,590**	**0**	**3,590**
All Habitats	BP low	11,128	11,186	22,314
	BP up	3,088	11,840	14,928
	BP mid	4,932	4,814	9,746
	PK OR	6,965	6,947	13,912
	PK CA	11,104	7,447	18,551
	Totals:	**37,217**	**42,234**	**79,451**

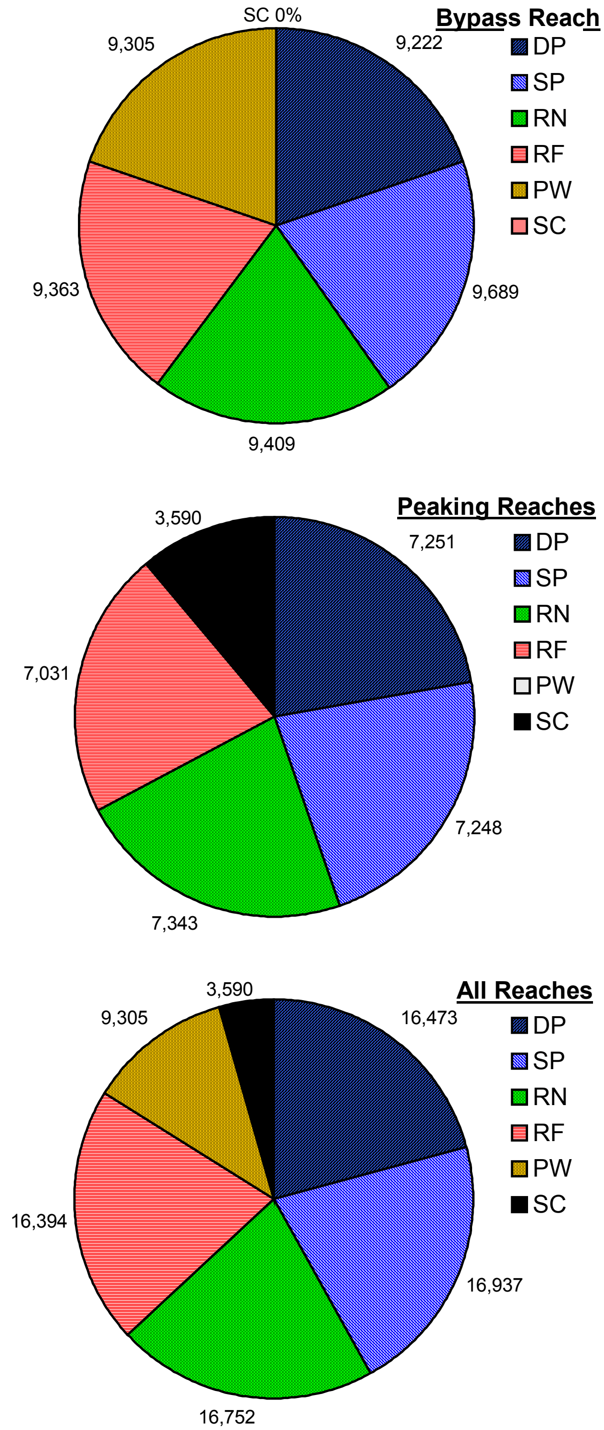


Figure 4. Sampling areas (in sq ft) according to mesohabitat type and various combinations. See Table 6 for mesohabitat type abbreviations.

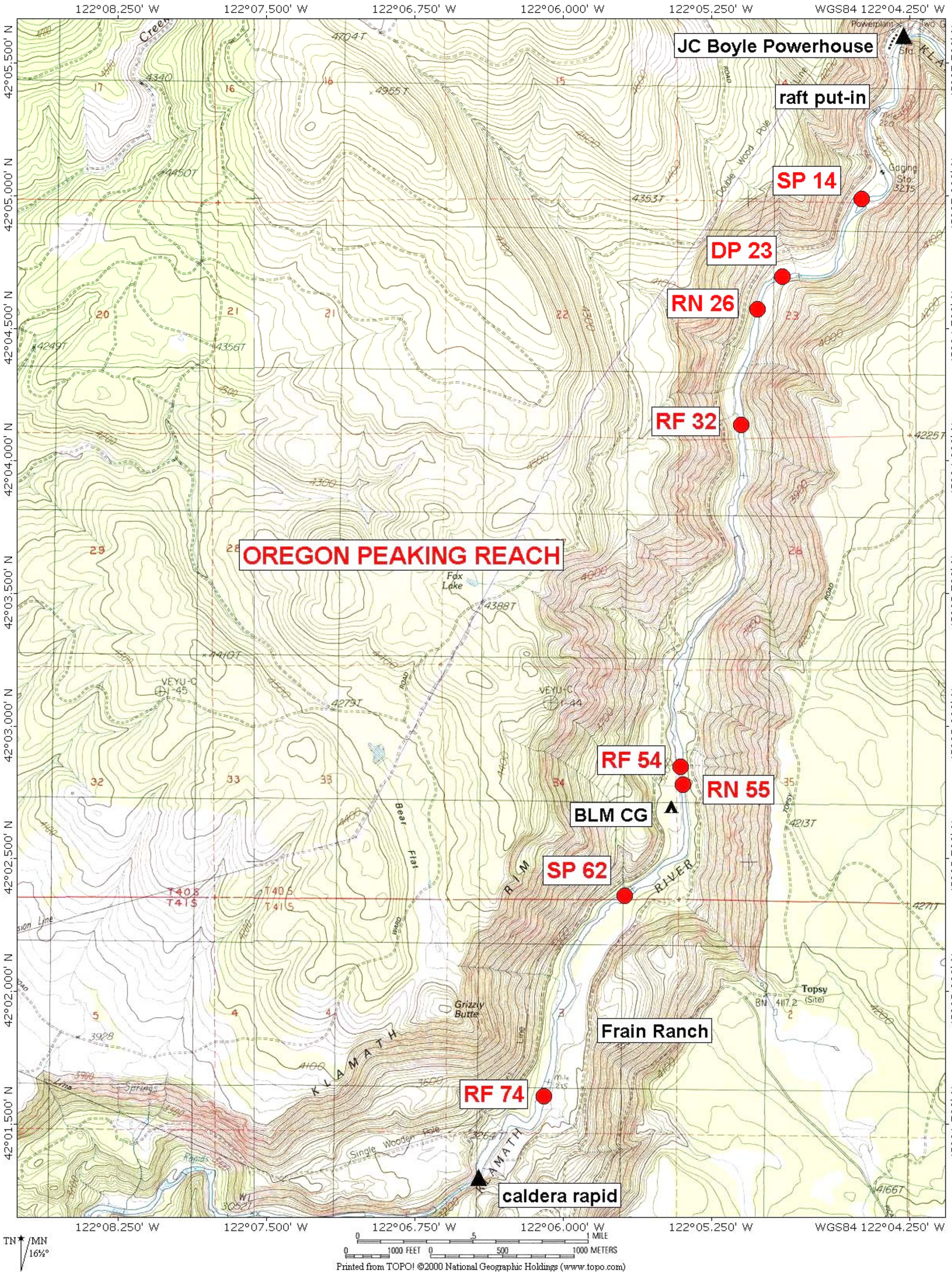


Figure 5. Map of Oregon Peaking reach showing location of HSC sample units (type and ID#), and miscellaneous landmarks. See Table 6 for habitat type abbreviations.

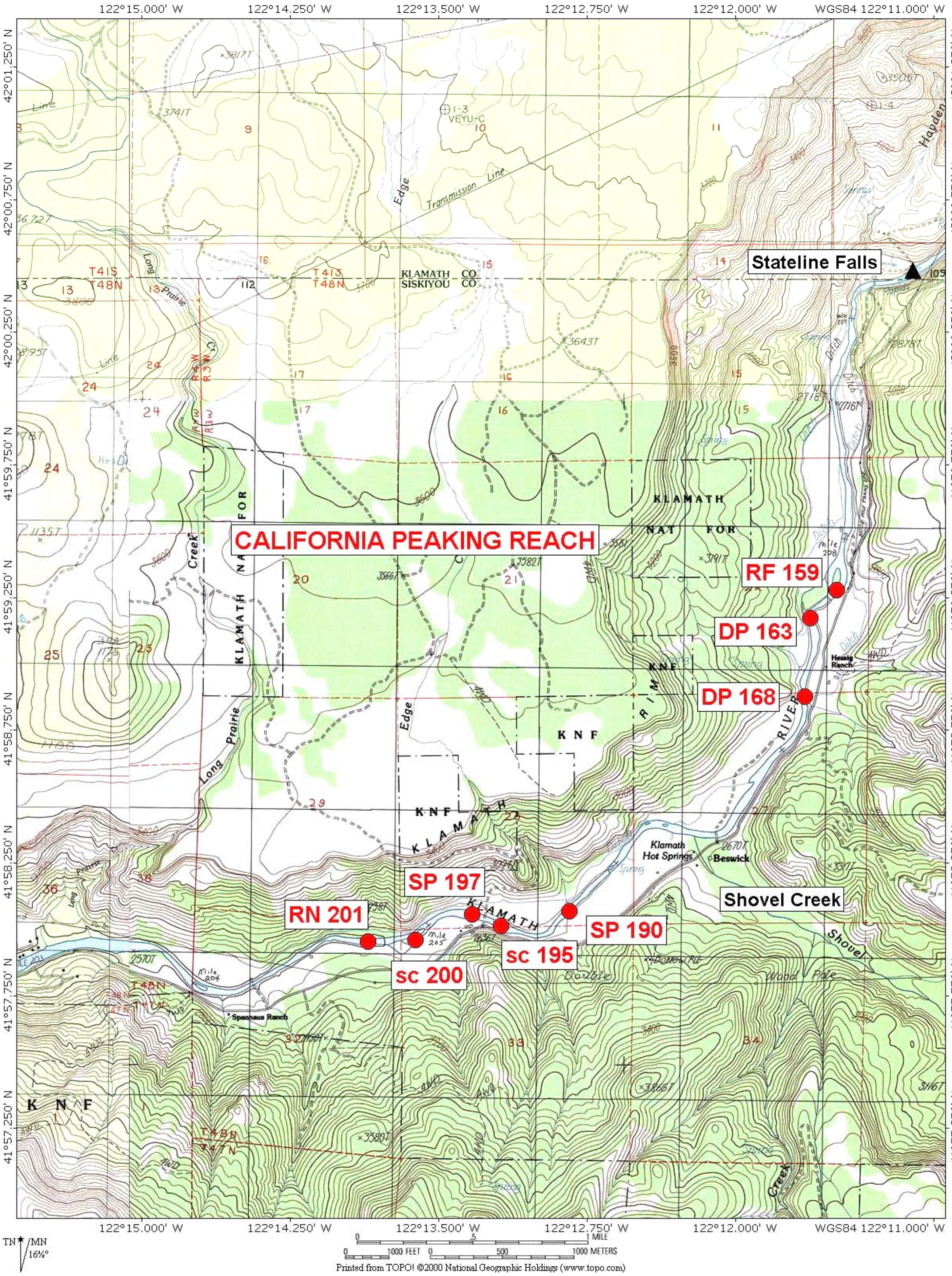


Figure 6. Map of California Peaking reach showing location of HSC sample units (type and ID#), and miscellaneous landmarks. See Table 6 for habitat type abbreviations.

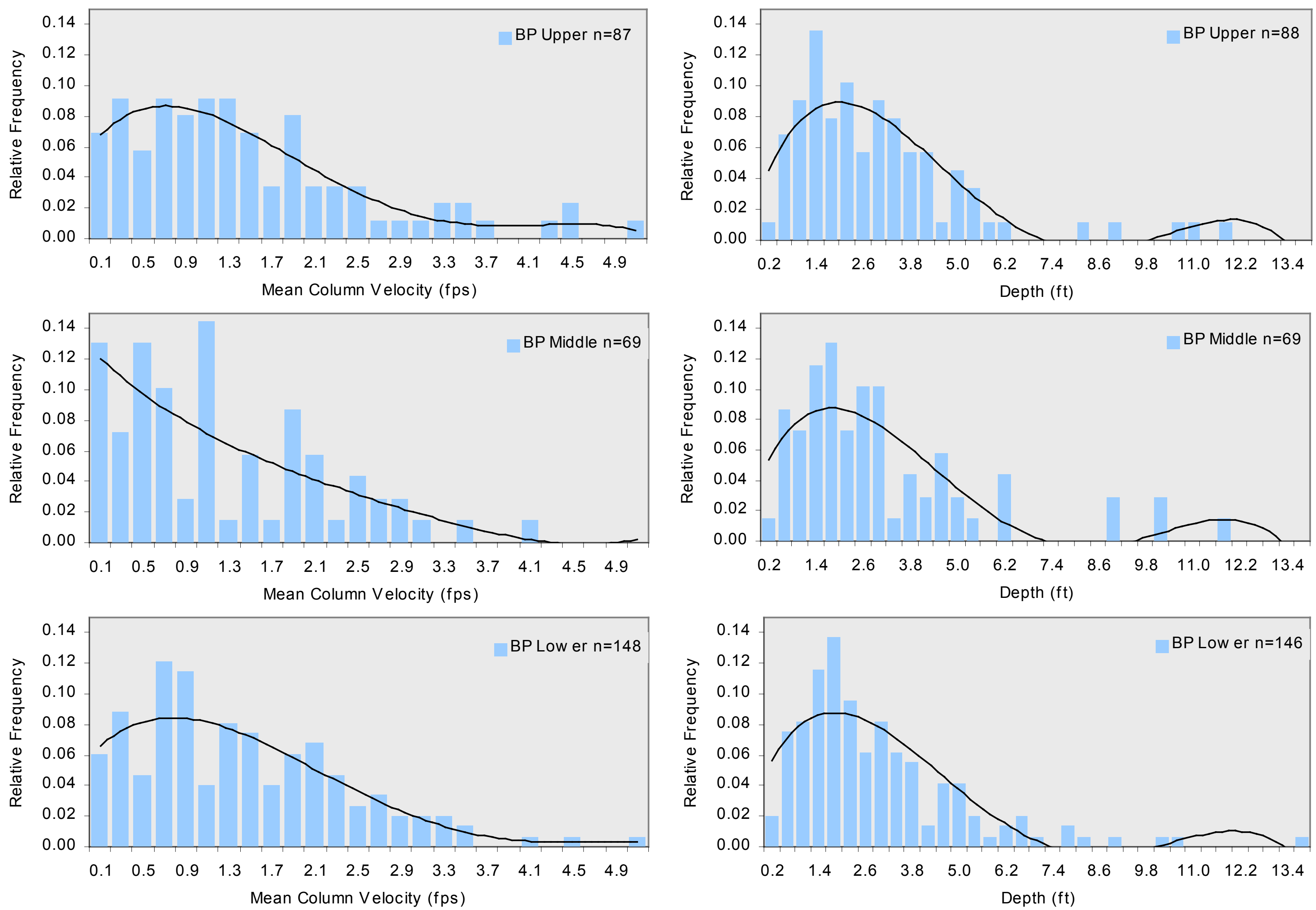


Figure 7. Comparison of habitat availability data for velocities (left figures) and depths (right figures) in the three segments of the Bypass reach. Curves are 4th order polynomials intended to show overall trend.

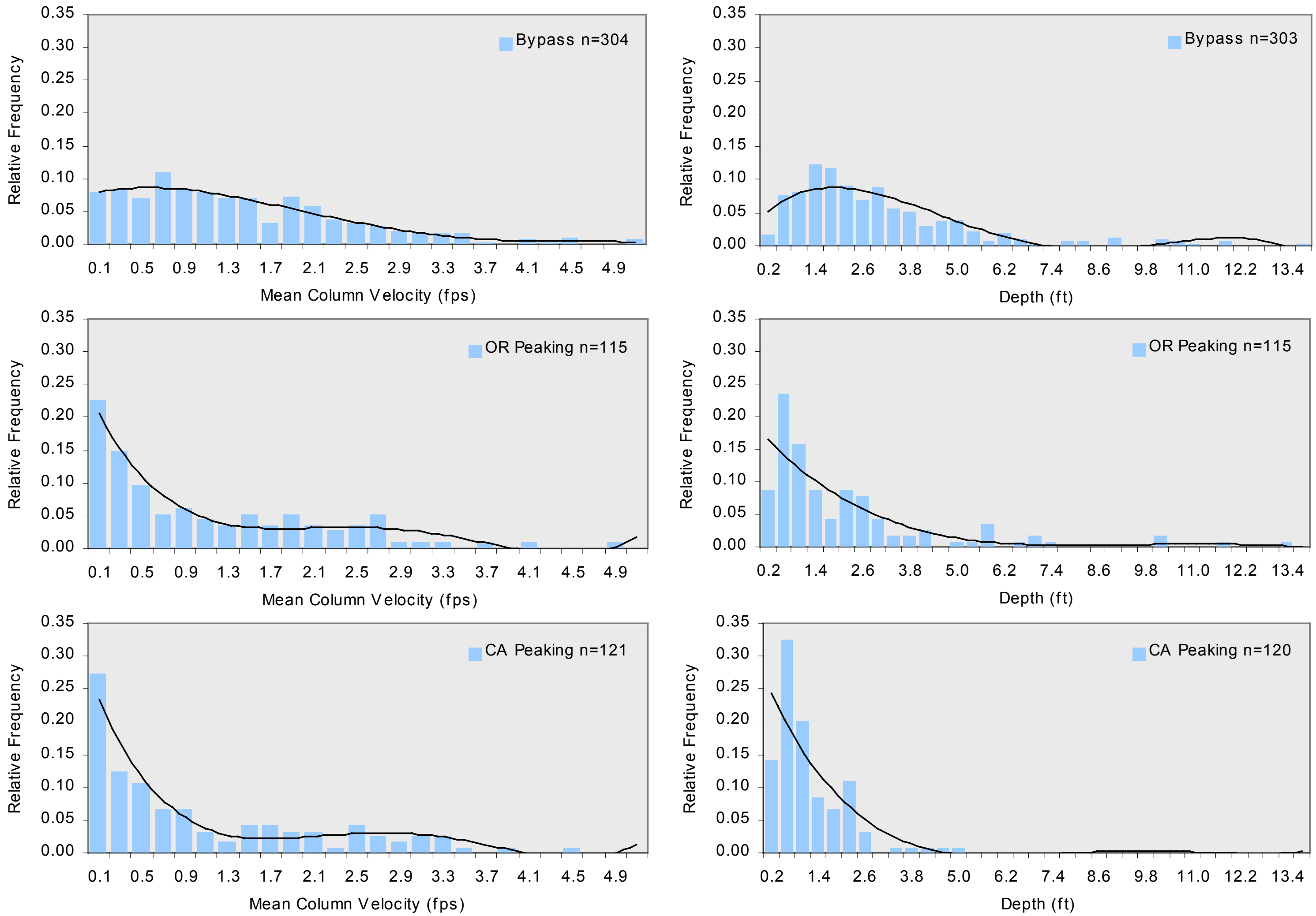


Figure 8. Comparison of habitat availability data for velocities (left figures) and depths (right figures) in the Bypass reach (all segments combined) and the two Peaking reaches. Curves are 4th order polynomials intended to show overall trend.

Bypass reach. The depth distributions of both peaking reaches showed a dominance of depths 0.5 ft to 1.5 ft, but the OR Peaking reach contained relatively more observations at depths >5 ft. In contrast to the peaking depth distributions, very shallow depths were relatively rare in the Bypass, but depths >1.5 ft occurred more frequently. These differences may be due to the preponderance of larger boulders along the stream margin and the more confined stream channel within the Bypass reach.

All of the availability data discussed above was collected in the same locations and at the same flows as the HSC observation data. Consequently, this habitat availability data reflects the equal-area sampling design, whereas availability data generated by PHABSIM (which uses a proportional habitat design) may yield different frequency distributions. However, because the HSC availability dataset was derived from a single flow regime rather than from multiple flows (which are generally thought to produce more robust HSC data), a comparison of habitat availability at different flow levels (based on PHABSIM estimates) would help to illustrate how habitat changes with flow, and whether HSC derived from a single flow regime in the Bypass might be applicable to higher flow regimes. Use of PHABSIM-generated availability data might also serve to evaluate the potential differences or similarities in habitat availability in the Bypass at the sampled flow of about 325 cfs, versus habitat availability in the peaking reaches at higher flows (which would likely result in more deeper, faster water). An analysis of PHABSIM-estimated habitat availability under different flow regimes will be completed in the near future and discussed in a separate analysis report.

General Spawning Observations

Two spawning surveys conducted in the Bypass reach in the spring of 2003 yielded HSC data on 66 rainbow trout redds. Most of the redds were found in two areas: within or immediately below a side channel located just downstream of the spillway (43 redds), and a pool/run transition (units 109 and 108) approximately 3,500 ft downstream (19 redds). The four remaining redds were found scattered along the main channel between the spillway and the mouth of the Bypass (Figure 9). Pre-survey observations also noted concentrated spawning activity in a pool tail approximately 0.75 mi above the Bypass mouth, however during the HSC survey only a single redd could be positively identified at that location.

The 66 identified redds occurred in 44 separate gravel patches, 36 of which were characterized by the mechanism that appeared responsible for the deposition of the gravels. Most of the characterized patches (81%) were deposited within “boulder pockets” that contained multiple objects creating a velocity break (Figure 10). Five of the patches (14%) were deposited along relatively straight banks where velocities slowed enough for gravel to settle out. Only one gravel patch with a redd occurred in a classic pool tail/riffle crest (the redd at mile 0.75, Figure 9).

The majority of the observed redds (58%) occurred within 10 ft of the bank, however a few redds (mostly those immediately below the side channel) occurred well away from the bank but in shallow water (Figure 10). Poor water visibilities during the spawning surveys limited most of the sampling to shallow (<3 ft), nearshore areas. Most of the measured redds (60%) were 1.5 ft to 2.0 ft in length and 1.0 to 1.5 ft in width, and most gravel patches (82%) containing redds were ≤10 ft in length and width (Figure 11). Two-thirds (66%) of all utilized patches were no more than 35 ft^2 in area, and almost 80% of patches encompassed less than 75 ft^2 (Figure 12).

Attendant trout were observed near 12 of the 66 redds; some of the fish were actively digging or exhibiting redd defense behavior (i.e., nipping or chasing other fish). Observed trout ranged in

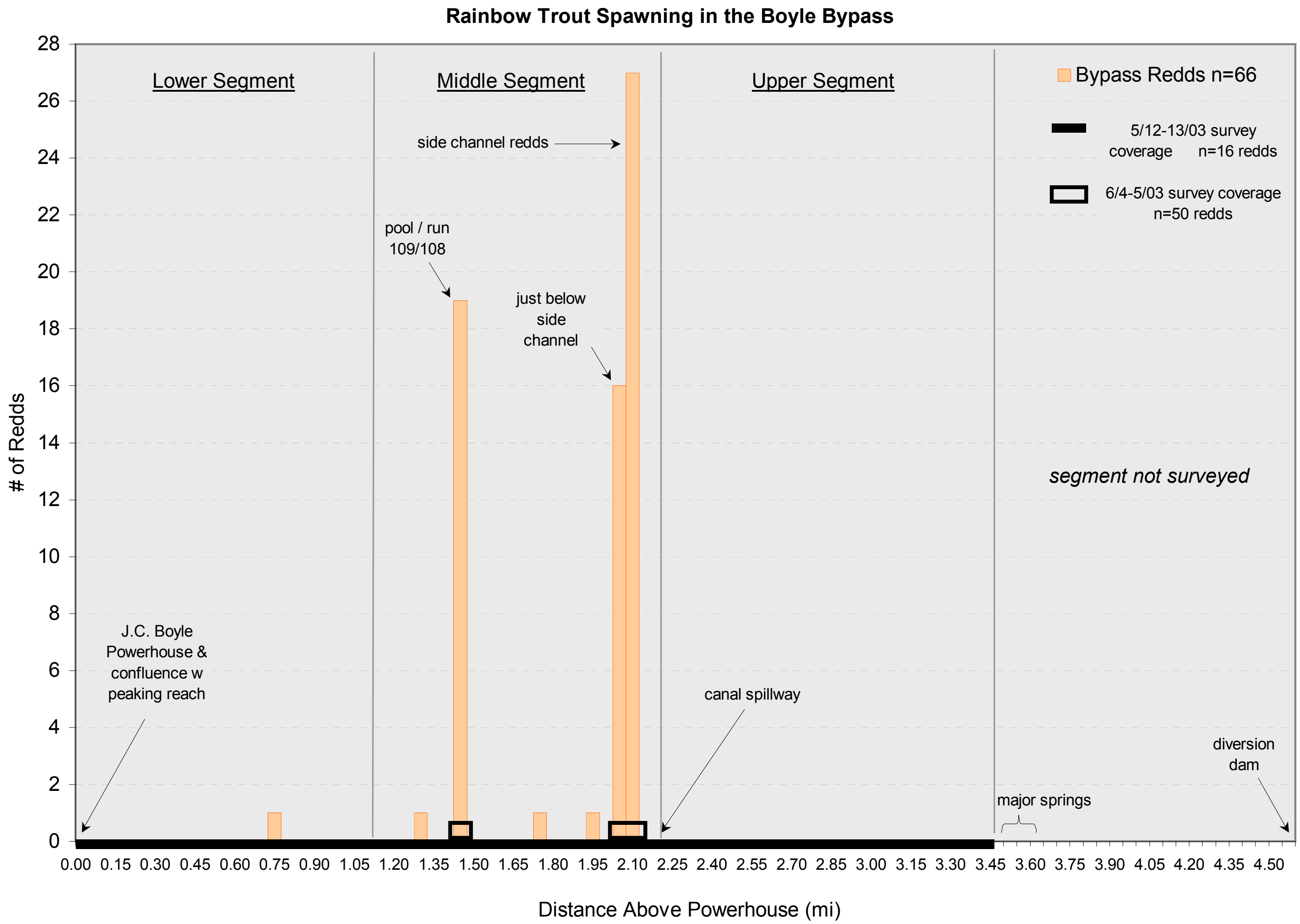
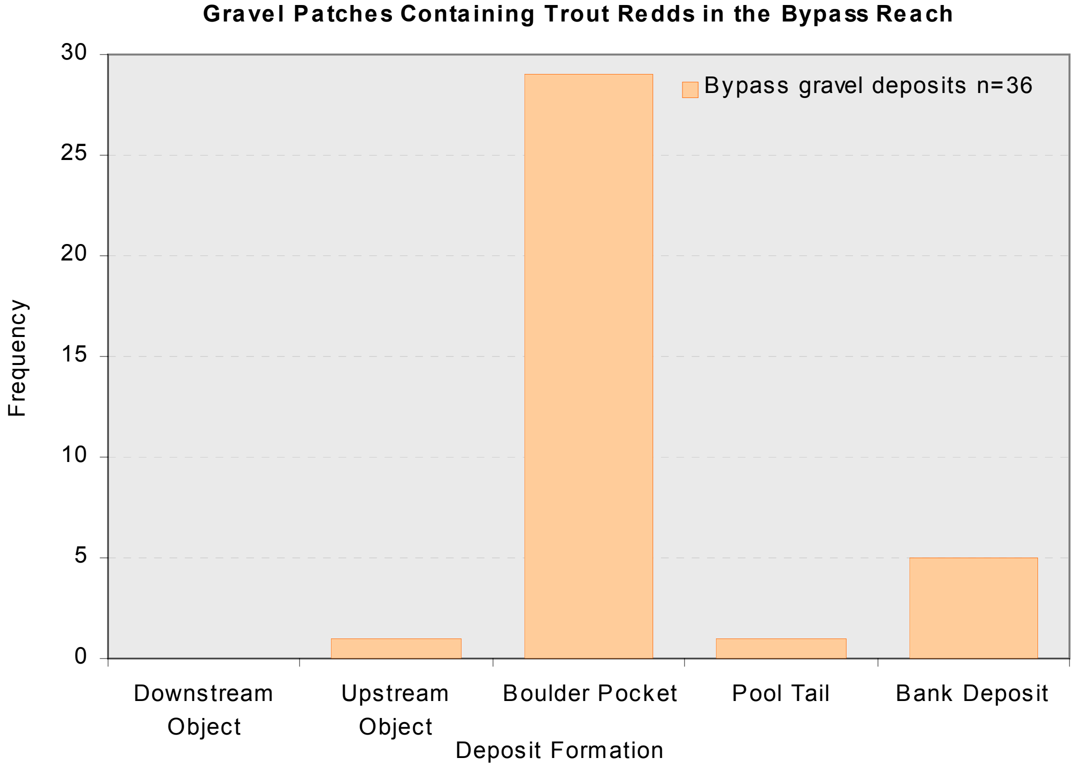


Figure 9. Location of rainbow trout redds observed in the Bypass reach according to survey period. Segment and landmark locations are also shown.



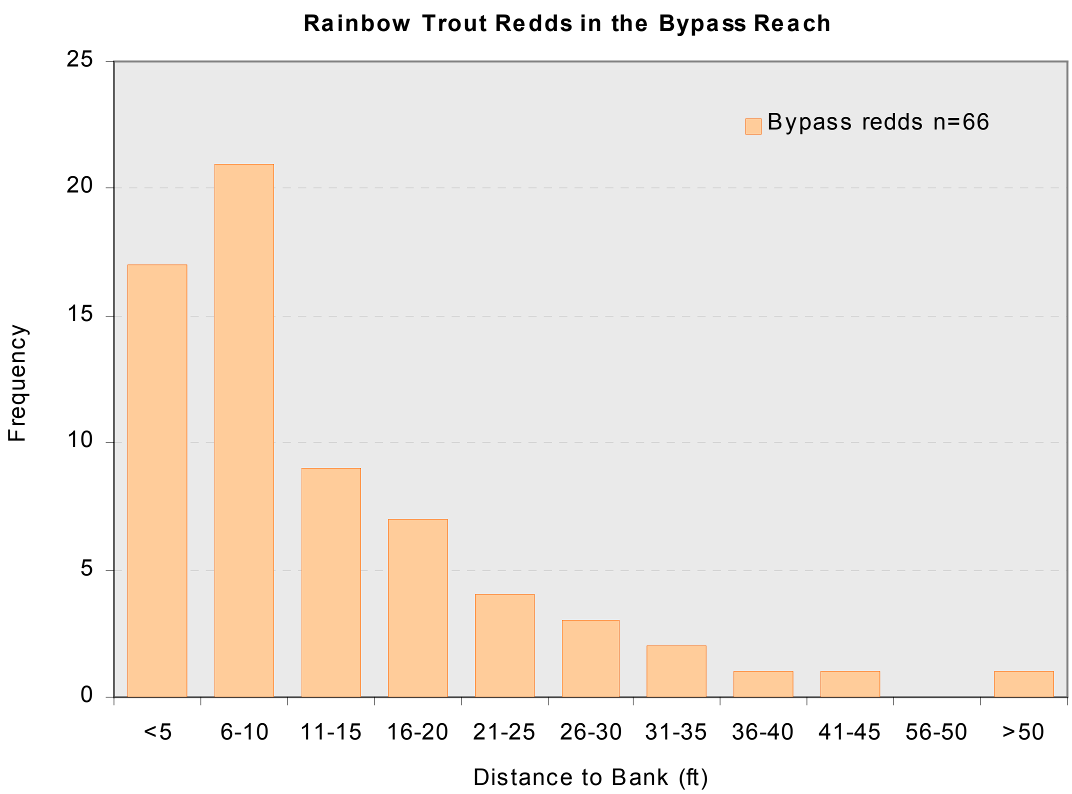
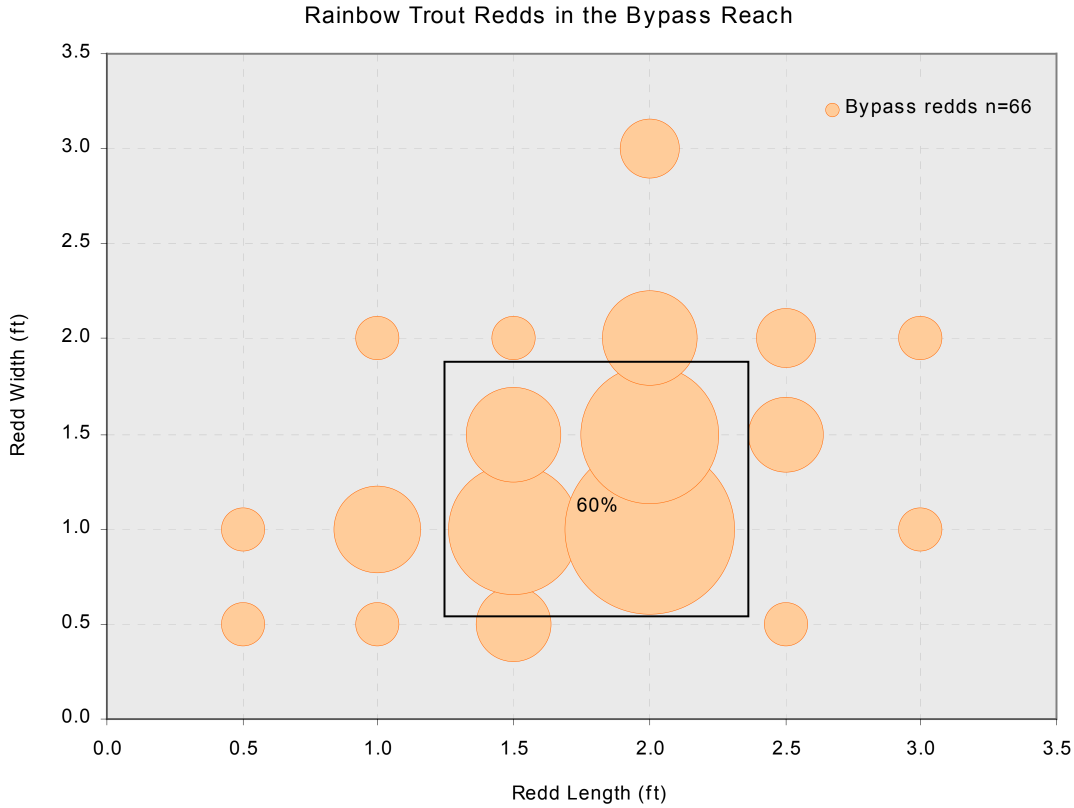


Figure 10. Hydraulic feature forming deposition of spawning gravels (upper figure), and distance to bank of rainbow trout redds (lower figure) in the Bypass reach.



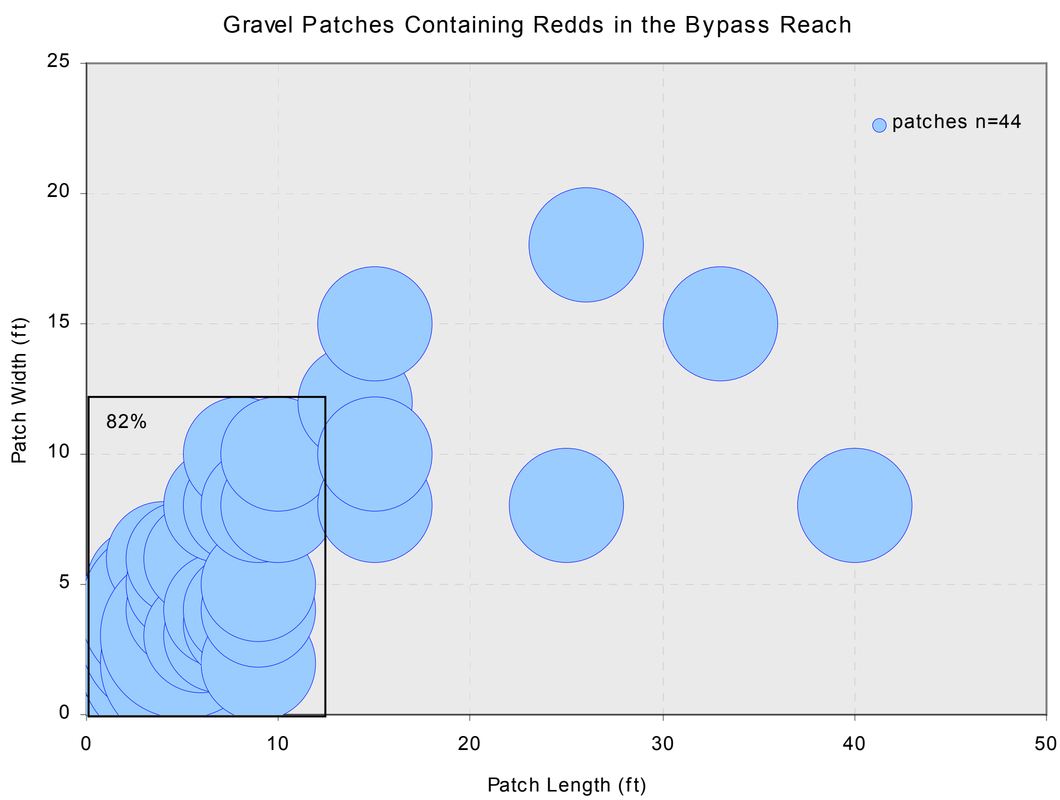


Figure 11. Bubble charts showing dimensions of trout redds (upper figure) and gravel patches containing the redds (lower figure) in the Bypass reach.

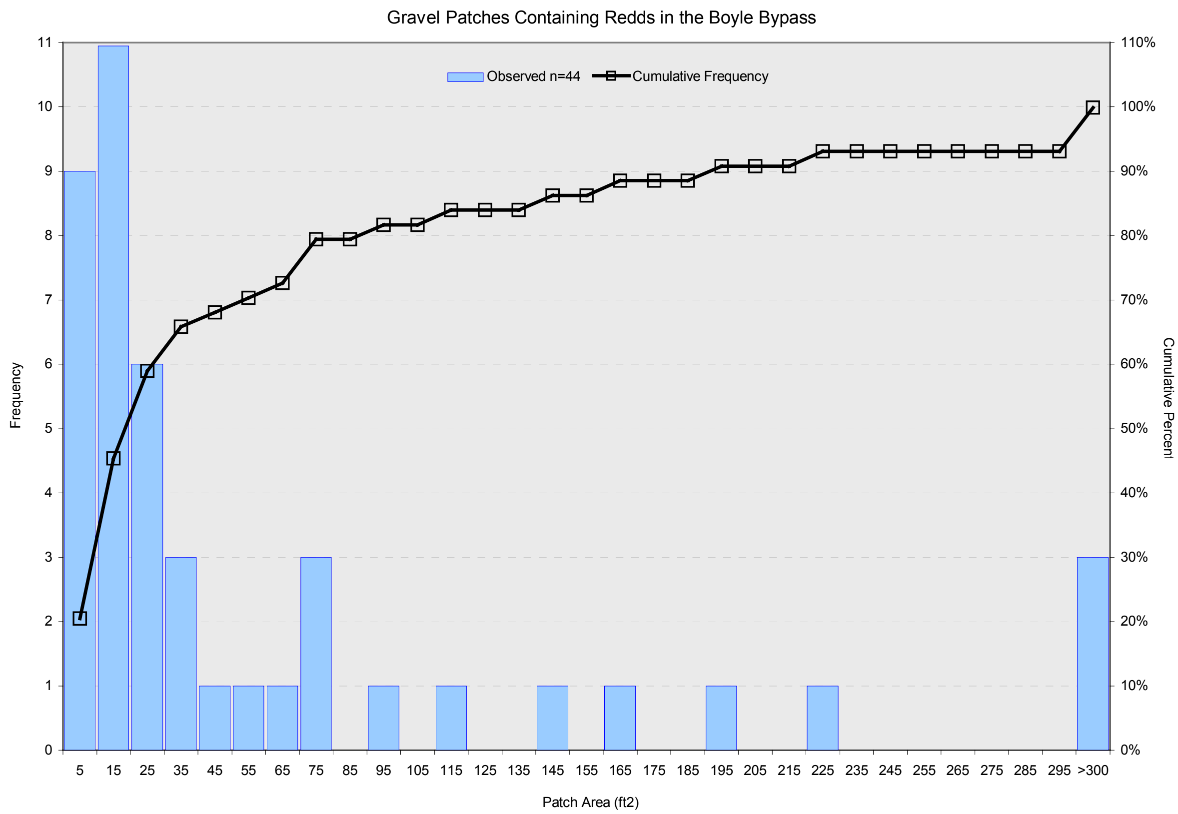


Figure 12. Observed and cumulative frequency of size of gravel patches containing rainbow trout redds in the Bypass reach.

length from 12-30cm FL, however the majority of fish (61%) were eye-estimated at ≤15cm, which falls within our definition of "juvenile" trout.

General Rearing Observations

HSC observation data were collected on summer rearing positions at 1,049 fish locations, most of which (86%) were focal positions occupied by rainbow trout (Table 7). The sample size goal of 150 observations was exceeded for fry (<5cm FL), juvenile (5-15cm), and adult (>15cm) rainbow trout, but was not met for trout spawning or for sucker rearing. Sample sizes for non-target

Table 7. HSC observation sample sizes by year, reach, species, and size class. Sucker observations may include other sucker species. Dashes indicate where HSC data was not recorded.

		Rainbow Trout			Smallscale Suckers			Sculpin	Chubs
Year	Reach	Fry	Juv(5-15)	Adult	Fry	Juv(5-15)	Adult	all	all
2002	Bypass low	129	285	75	0	3	1	53	6
2002	Bypass up	2	44	61	0	1	0	13	2
2003	Bypass mid	44	172	28	0	0	0	18	9
2003	OR Peaking	5	8	7	2	20	0	-	-
2003	CA Peaking	7	26	6	3	4	7	-	8
	Totals:	**187**	**535**	**177**	**5**	**28**	**8**	**84**	**25**

species (i.e., sculpin and chubs) were also insufficient for developing site-specific HSC.A comparison of trout length frequencies between the Bypass reach and Peaking reaches show a common dominance of fish 3-8cm in length, presumably all representing young-of-year trout (Figure 13). A relatively greater proportion of larger trout (≥20cm FL) were observed in the Peaking reaches than in the Bypass, however observation sample sizes for large trout in the Peaking reach were small. In general, the length frequency distributions for all species show that fish <10cm were dominant in the observation data, and relatively few fish >30cm were observed (Figure 14). The peaks in the distributions for larger fish tended to occur at 5cm intervals because of the difficulty of eye-estimating such fish at 1cm intervals.

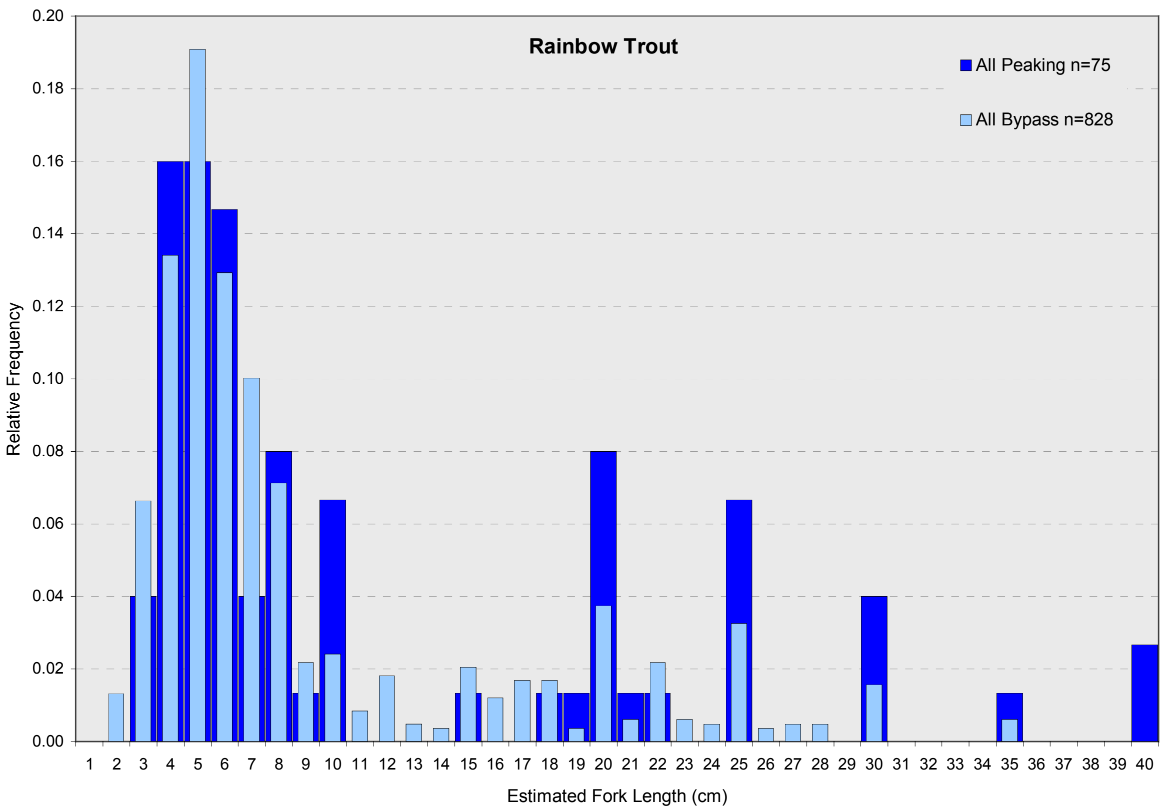


Figure 13. Relative length-frequencies of rainbow trout from the Bypass reach and the Peaking reaches (combined) from 2002-2003 HSC observation data.

The relative number of HSC observations for rearing trout by reach was a function of several factors, including differences in sampling efforts (e.g., more effort in the Bypass reach than in the Peaking reaches, Table 6), differences in observability (e.g., the peaking reaches had much poorer water visibility), and differences in fish densities. Because the sampling areas within reaches were equal among mesohabitat types, the number of fish observations per type can be compared to give some indication of relative fish densities within reaches. For example, in the Bypass reach fry were most often observed in pool habitats and least often observed in runs and pocketwaters (Figure 15). Juveniles, in contrast, were more evenly distributed among mesohabitat types. Adult trout were mostly observed in habitats having intermediate depths and velocities, and less commonly observed in the deep pools and riffles. Although sample sizes are minimal, most fry and juveniles observed in the Peaking reaches occurred in shallow pools, whereas most adults were observed in riffles.

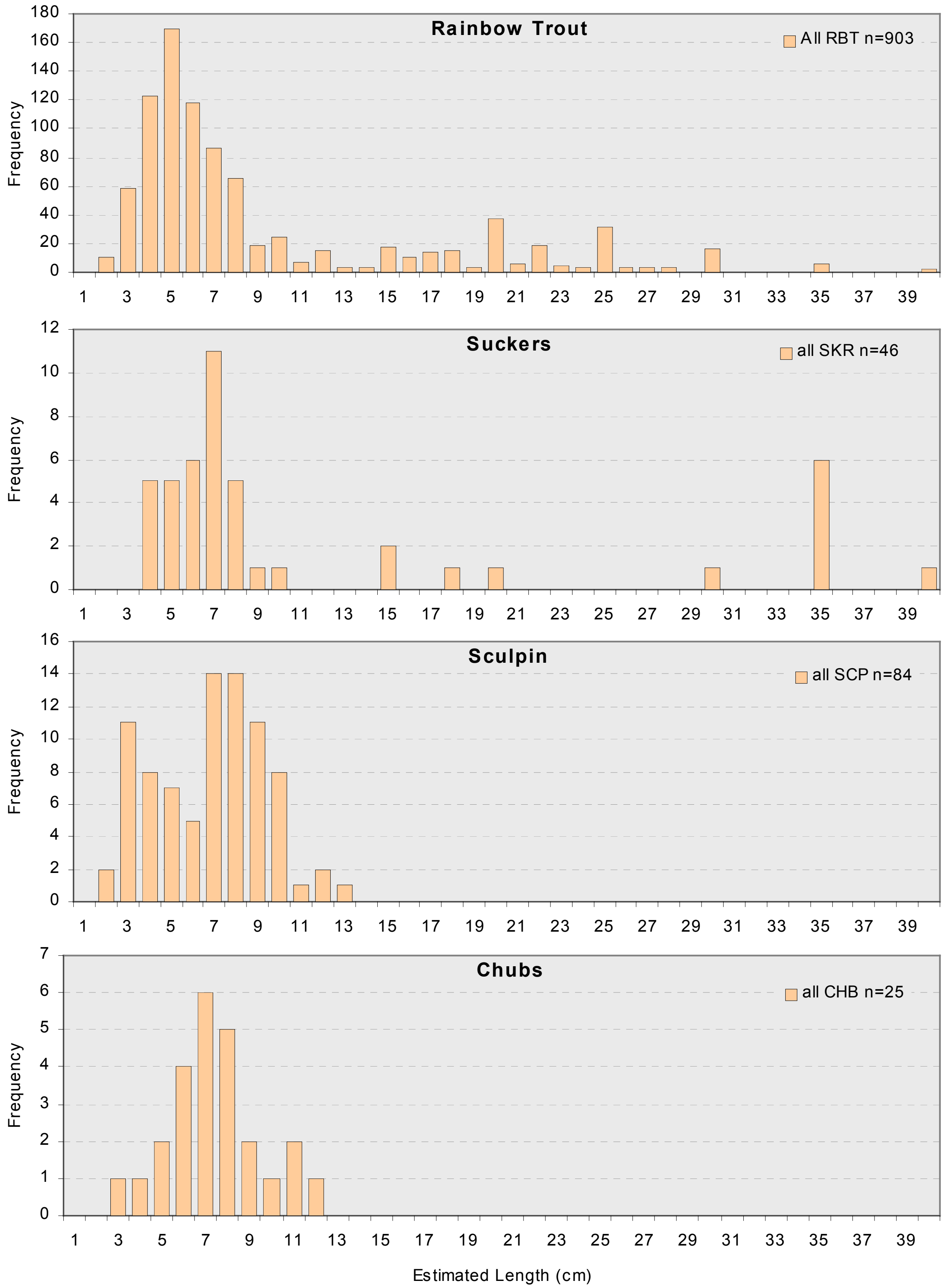


Figure 14. Eye-estimated length-frequencies of fish observed in the Bypass reach and Peaking reaches (all combined) from 2002-2003 HSC observations.

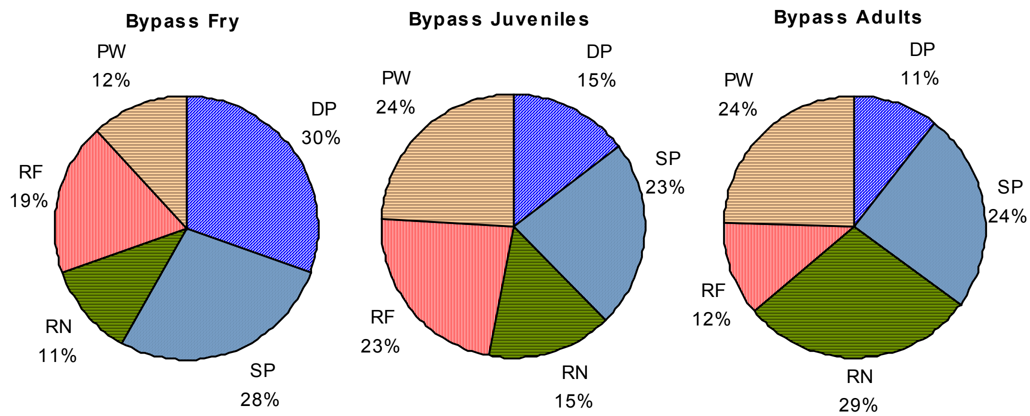


Figure 15. Percentage of rainbow trout HSC observations made in each mesohabitat type in the Bypass reach (all segments combined), according to fish size-class. See Table 6 for mesohabitat type abbreviations.

Differences were clearly evident when comparing the number of observations in margin transects (within eight ft of the bank) versus midchannel transect (>8 ft) in those reaches and segments where effort was equalized among transect types. In both of the lower two segments of the Bypass reach, 98% of all observed fry were found in margin transects. Although juveniles did occur somewhat farther from the bank than did fry (means of 5.8 ft vs. 3.0 ft, respectively), 92% and 91% of all juvenile observations were also made within margin transects in the lower and middle segments, respectively. In contrast, adult trout were observed farther offshore (mean=15.8 ft) and mostly occurred along midchannel transects (75% in the lower segment, 76% in the middle segment). In the Peaking reaches, over 90% fry and juveniles were observed along margin transects, whereas 84% of adults were observed in midchannel areas.

Prior to the pooling of HSC data from the three segments of the Bypass reach, an assessment of the habitat use characteristics was made among transect types and segments because of the unequal effort allocation and resulting sample sizes within those study strata. As expected, HSC observations made within margin transects were shallower and slower than observations made in midchannel transects, which were deeper and faster. However, within margin transects or within midchannel transects the differences in depths and velocities were minimal between segments. Further, because fry and juveniles were largely restricted to margin transects, and adults were mostly observed in midchannel transects, unequal effort among transect types by segment was not anticipated to introduce bias when pooling the data together, as long as habitat use did not differ among segments.

A comparison of habitat use among segments by size class did not reveal any pronounced differences for juvenile or adult rainbow trout (Figure 16). The difference indicated for fry depth use (upper left plot) is likely an artifact of low sample size (only 2 fry were observed in the upper segment margin transects). Following the above analysis, HSC data for rainbow trout were directly pooled together from all three segments to form a single dataset representing the Bypass reach.

<u>Development of Site-Specific Habitat Suitability Curves</u>

Site-specific HSC curves were developed for rainbow trout fry, juveniles, and adults from all segments (combined) of the Bypass Reach (Table 8). In general, trout were observed to utilize

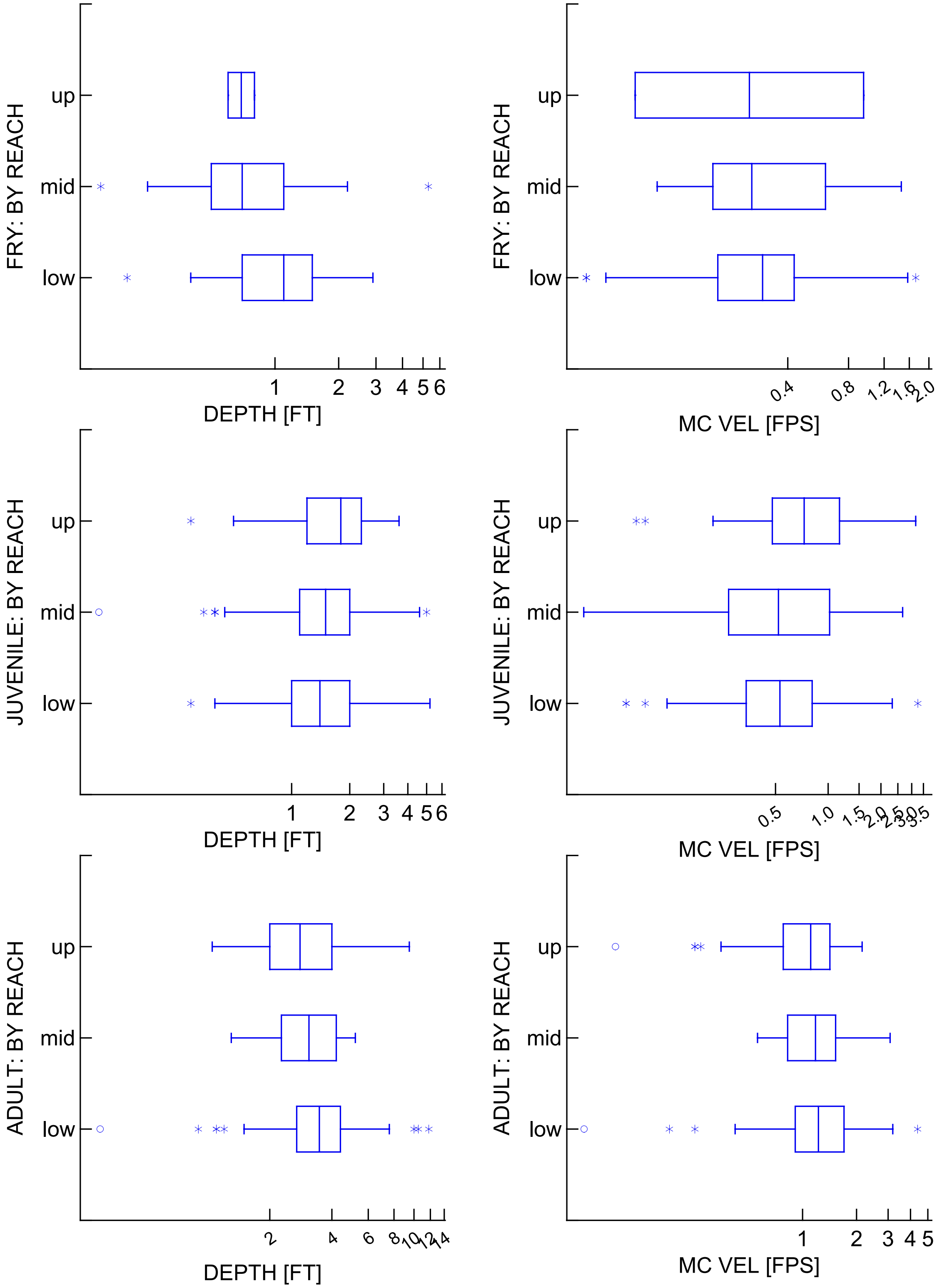


Figure 16. Boxplots comparing the use of depths (left plots) and mean column velocities (right plots) by rainbow trout in the Bypass reach according to segment (labeled as reach) and size class. X-axes are in log scale.

Table 8. Interim HSC values for rainbow trout in the Bypass reach of the upper Klamath River project area.

Running Means Use/Availability HSC							
MCVel	Fry	Juvenile	Adult	**Depth**	Fry	Juvenile	Adult
0.00	0.35	0.15	0.05	0.0	0.00	0.00	0.00
0.05	0.53	0.32	0.08	0.1	0.39	0.13	0.02
0.15	0.89	0.63	0.16	0.3	0.64	0.29	0.04
0.25	1.00	0.91	0.23	0.5	0.96	0.50	0.06
0.35	0.90	1.00	0.32	0.7	1.00	0.68	0.08
0.45	0.68	0.97	0.41	0.9	0.83	0.84	0.11
0.55	0.46	0.83	0.52	1.1	0.61	0.97	0.14
0.65	0.29	0.67	0.63	1.3	0.43	1.00	0.18
0.75	0.18	0.52	0.74	1.5	0.39	0.86	0.22
0.85	0.12	0.41	0.84	1.7	0.25	0.68	0.29
0.95	0.08	0.35	0.92	1.9	0.18	0.65	0.38
1.05	0.06	0.34	0.97	2.1	0.10	0.60	0.50
1.15	0.06	0.31	1.00	2.3	0.09	0.53	0.63
1.25	0.06	0.25	1.00	2.5	0.07	0.30	0.73
1.35	0.06	0.20	0.97	2.7	0.05	0.26	0.77
1.45	0.06	0.19	0.94	2.9	0.03	0.22	0.77
1.55	0.05	0.19	0.90	3.1	0.02	0.24	0.78
1.65	0.03	0.20	0.86	3.3	0.00	0.25	0.82
1.75	0.02	0.17	0.82	3.5	0.00	0.20	0.89
1.85	0.01	0.13	0.77	3.7	0.00	0.15	0.95
1.95	0.00	0.09	0.69	3.9	0.00	0.09	1.00
2.05		0.06	0.59	4.1	0.00	0.10	1.00
2.15		0.06	0.49	4.3	0.00	0.10	1.00
2.25		0.05	0.40	4.5	0.00	0.09	1.00
2.35		0.06	0.32	4.7	0.00	0.05	1.00
2.45		0.05	0.25	4.9	0.00	0.04	1.00
2.55		0.07	0.22	5.1	0.03	0.04	1.00
2.65		0.05	0.20	5.3	0.04	0.05	1.00
2.75		0.03	0.19	5.5	0.05	0.03	1.00
2.85		0.01	0.18	5.7	0.00	0.00	1.00
2.95		0.01	0.17				
3.05		0.02	0.16				
3.15		0.04	0.15				
3.25		0.05	0.14				
3.35		0.03	0.13				
3.45		0.01	0.12				
3.55		0.00	0.11				
3.65			0.09				
3.75			0.08				
3.85			0.07				
3.95			0.06				
4.05			0.05				
4.15			0.04				
4.25			0.03				
4.35			0.02				
4.45			0.00				

Table 8. (continued)

Non-Parametric Tolerance Limits Use HSC

MCVel	Fry	Depth	Fry
0.00	0.20	0.00	0.00
0.09	0.50	0.10	0.00
0.13	1.00	0.20	0.10
0.49	1.00	0.30	0.20
0.74	0.50	0.45	0.50
1.21	0.20	0.60	1.00
1.46	0.10	1.40	1.00
1.75	0.00	1.70	0.50
		2.30	0.20
		2.80	0.10
		5.40	0.00

MCVel	Juvenile	Depth	Juvenile
0.00	0.05	0.00	0.00
0.09	0.10	0.05	0.00
0.14	0.20	0.10	0.05
0.21	0.50	0.40	0.10
0.30	1.00	0.60	0.20
0.95	1.00	0.80	0.50
1.37	0.50	1.00	1.00
1.82	0.20	2.00	1.00
2.20	0.10	2.70	0.50
3.25	0.05	3.50	0.20
3.30	0.00	4.00	0.10
		5.20	0.05
		5.40	0.00

MCVel	Adult	Depth	Adult
0.00	0.00	0.00	0.00
0.09	0.10	0.25	0.00
0.25	0.20	0.90	0.10
0.58	0.50	1.10	0.20
0.79	1.00	1.80	0.50
1.70	1.00	2.25	1.00
2.03	0.50	100	1.00
2.65	0.20		
3.08	0.10		
4.50	0.00		

Binary Optimal Use HSC

MCVel	Fry	Depth	Fry
0.16	0.00	0.64	0.00
0.17	1.00	0.65	1.00
0.46	1.00	1.35	1.00
0.47	0.00	1.36	0.00

MCVel	Juvenile	Depth	Juvenile
0.33	0.00	1.04	0.00
0.34	1.00	1.05	1.00
0.92	1.00	2.00	1.00
0.93	0.00	2.01	0.00

MCVel	Adult	Depth	Adult
0.81	0.00	2.49	0.00
0.82	1.00	2.50	1.00
1.65	1.00	4.20	1.00
1.66	0.00	4.21	0.00

Binary Suitable Use HSC

MCVel	Fry	Depth	Fry
0.10	0.00	0.59	0.00
0.11	1.00	0.60	1.00
0.65	1.00	1.65	1.00
0.66	0.00	1.66	0.00

MCVel	Juvenile	Depth	Juvenile
0.23	0.00	0.84	0.00
0.24	1.00	0.85	1.00
1.27	1.00	2.50	1.00
1.28	0.00	2.51	0.00

MCVel	Adult	Depth	Adult
0.63	0.00	1.99	0.00
0.64	1.00	2.00	1.00
1.97	1.00	5.20	1.00
1.98	0.00	5.21	0.00

greater velocities, greater depths, and greater distance from the bank with increasing size up to lengths of 12-14cm (Figure 17). Above 14cm, trout showed only a minor increase in mean depths and little change in mean velocities or offshore distances (Figure 18). This data and the observations of spawning trout <15cm suggest that a size criterion smaller than the 15cm used in this study (i.e., 12, 13, or 14cm) may have better contrasted the habitat requirements of juvenile and adult rainbow trout in the upper Klamath River project area. Rainbow trout HSC curves were collected from non-local sources for comparison with the site-specific data collected in the Bypass reach (Table 9). In general, non-local HSC curves were only included if they were derived from larger California or Oregon streams having flows greater than 100 cfs, or if they are commonly used as "reference" curves (e.g., Bovee and Raleigh curves). For species and lifestages where large river HSC curves are not abundant (i.e., fry), data from smaller streams were also included.

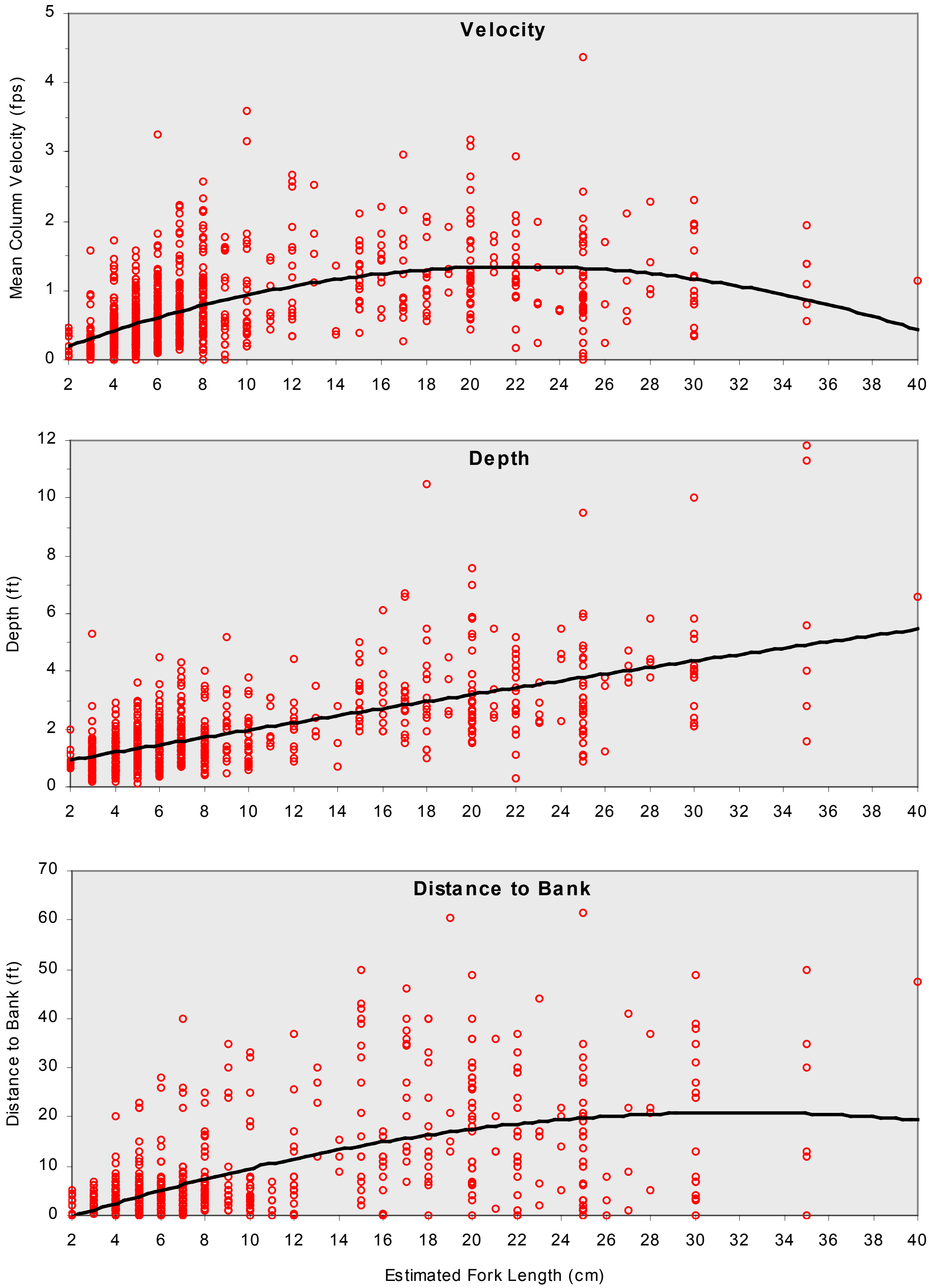


Figure 17. Scatterplots of habitat use by size for rainbow trout (all reaches combined). Trendlines are 2nd order polynomials.

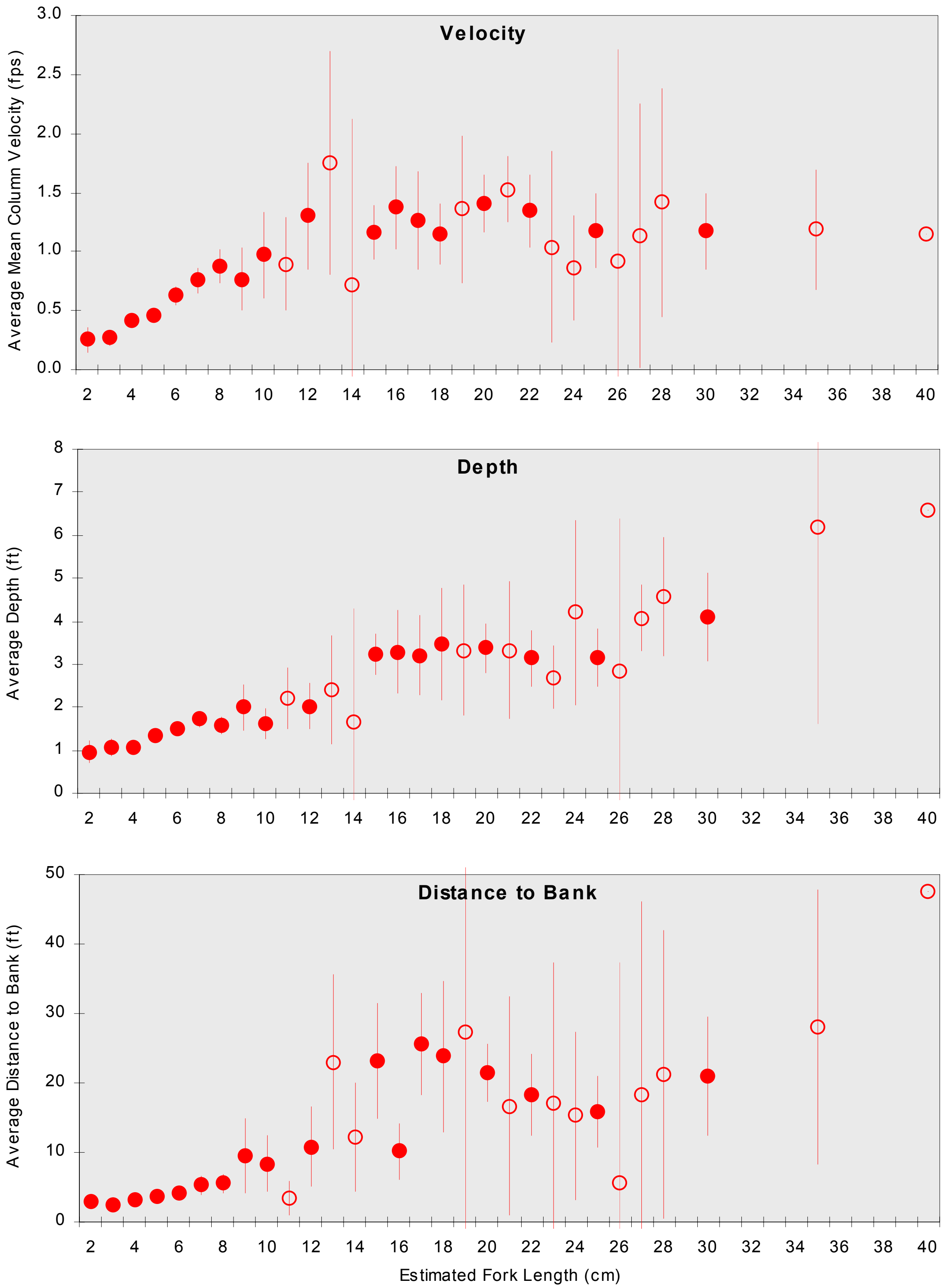


Figure 18. Mean habitat use (+/- 95% confidence intervals) by size for rainbow trout (all reaches combined). Open circles represent n's <10.

Table 9. Source information for rainbow trout HSC curves from other locations.

Curve Name	Location	Season	Water Temps	Channel Characteristics Width	Flow	Slope	Lifestages	Juv Size	# HSC Points	Methods	Source
Bovee	OR & WA		(°F)	(ft)	(cfs)	(%)	sp/fry/juv/adlt	(cm)		Cat II	Bovee 1978
E Sierras	Eastern Sierra	spring-fall		7-26		low-hi	sp/fry/juv/adlt	5-15	50/74/399/224	Cat III, RCH	Smith & Aceituno 1987
NF Stan	NF Stanislaus	June-Sept	49-64	30-67	26-333	1-2+	juv/adlt	7-15	287/243	Cat II, EA	TRPA 1993
LNFFR	low NF Feather	July-Aug	64-72	70-106	96-131	0.4-1.1	juv/adlt	5-15	74/95	Cat III	TRPA 2001
Pit	Pit		63-66	40-200	50-150	0.7-1.1	fry/juv/adlt	5-15	61/179/252	Cat III, RCH	Baltz & Vondracek 1985
Raleigh	west USA						sp/fry/juv/adlt			Cat I	Raleigh et al. 1984
SFAR	SF American	July-Aug	46-71	13-71	10-154	1-8	juv	5-15	169	Cat II, EA	TRPA 2000
SFAR lrg	low SFAR	Aug	62-71	71	154	1.3	adlt	ad >15	56	Cat II, EA	TRPA 2000
Kings	NF Kings & tribs	spring	-	-	<5-30	low-hi	sp	-	51	Cat II, Prop	EA 1987
Battle	Battle Crk	spring-wint	36-73	14-29	4-108	1-5	fry/juv/adlt	5-15	212/822/164	Cat II, EA	TRPA 1998 (draft)
Roaring	Roaring Crk	April-May	45-50	30-40	40	4-6	sp	ad 12-45	73	Cat II, total	TRPA unpub data
Butt	Butt Creek	April	48-52	18	5-10	4.5	sp	ad 15-40	57	Cat II, RCH	TRPA 2002
UNFFR	up NF Feather	April-Sept	57-72	40-50	40-140	0.5-2.6	sp/juv/adlt	5-15	174/437/179	Cat III, EA	TRPA 2002

Habitat Availability

The frequency distributions of habitat availability data from the Bypass reach were smoothed with 3-pt running means (Figure 19). The depth curve contained slight undulations in deeper water that produced spurious peaks in the U/A curves for several life stages. Consequently, the depth curve was "leveled" in deeper water by drawing a straight line across the tops of the small humps. This modified depth availability curve was then used in calculating U/A ratios for rainbow trout depth HSC. The availability data shows that velocities >4 fps and depths >7 ft were relatively rare in the Bypass reach.

The availability of 6 functional and 22 specific types of cover were assessed in the Bypass using two distance criteria (described below) to determine the presence or absence of escape cover (Figure 20). In the Bypass, functional cover was clearly dominated (60-70%) by the combination of velocity shelter and instream escape cover using both distance criteria. Instream escape cover without velocity shelter (but with or without overhead cover) occurred at 23-25% of availability points. Velocity shelter alone occurred at 14% of availability points using the 2 ft criteria, but at only 5% of locations using the 3 ft criteria. Locations without cover, with overhead (out-of-water) cover only, or with a combination of velocity shelter and overhead cover only, were rare in the Bypass (0-4%) according to both distance criteria. Among specific cover types (Figure 20), both distance criteria produced very similar frequency distributions dominated by boulder substrates (18-42%). Large cobbles and non-emergent aquatic vegetation accounted for 5-6% of availability observations, whereas all other specific cover types were either not observed or very rare (<5%). Availability points lacking any cover within 2 or 3 ft occurred at only 1-2% of locations, likely because the few areas that did not contain large substrate elements held beds of emergent or aquatic vegetation.

Rainbow Trout Fry (<5cm)

Almost 80% of rainbow trout fry were observed at velocities less than 0.5 fps and at depths less than 1.5 ft (Figure 21). Velocity HSC curves developed with running means from habitat use data and use/availability ratios (U/A) were essentially identical, with peak suitabilities at 0.25 fps. Suitabilities were low (<0.2) for all velocities over 0.75 fps. The NPTL curve gave maximum suitability for velocities from 0.13-0.49 fps, with intermediate suitabilities (0.5) at 0.09 fps and 0.74 fps. The NPTL appears to give higher suitability for velocities >0.5 fps than indicated by the use data. Binary curves described velocities from 0.17-0.46 fps as "optimal" (similar to the NPTL curve), and velocities from 0.11-0.65 fps as "suitable" (also similar to the NPTL values). By definition, approximately 50% of all fry observations fell outside of the "optimal" binary

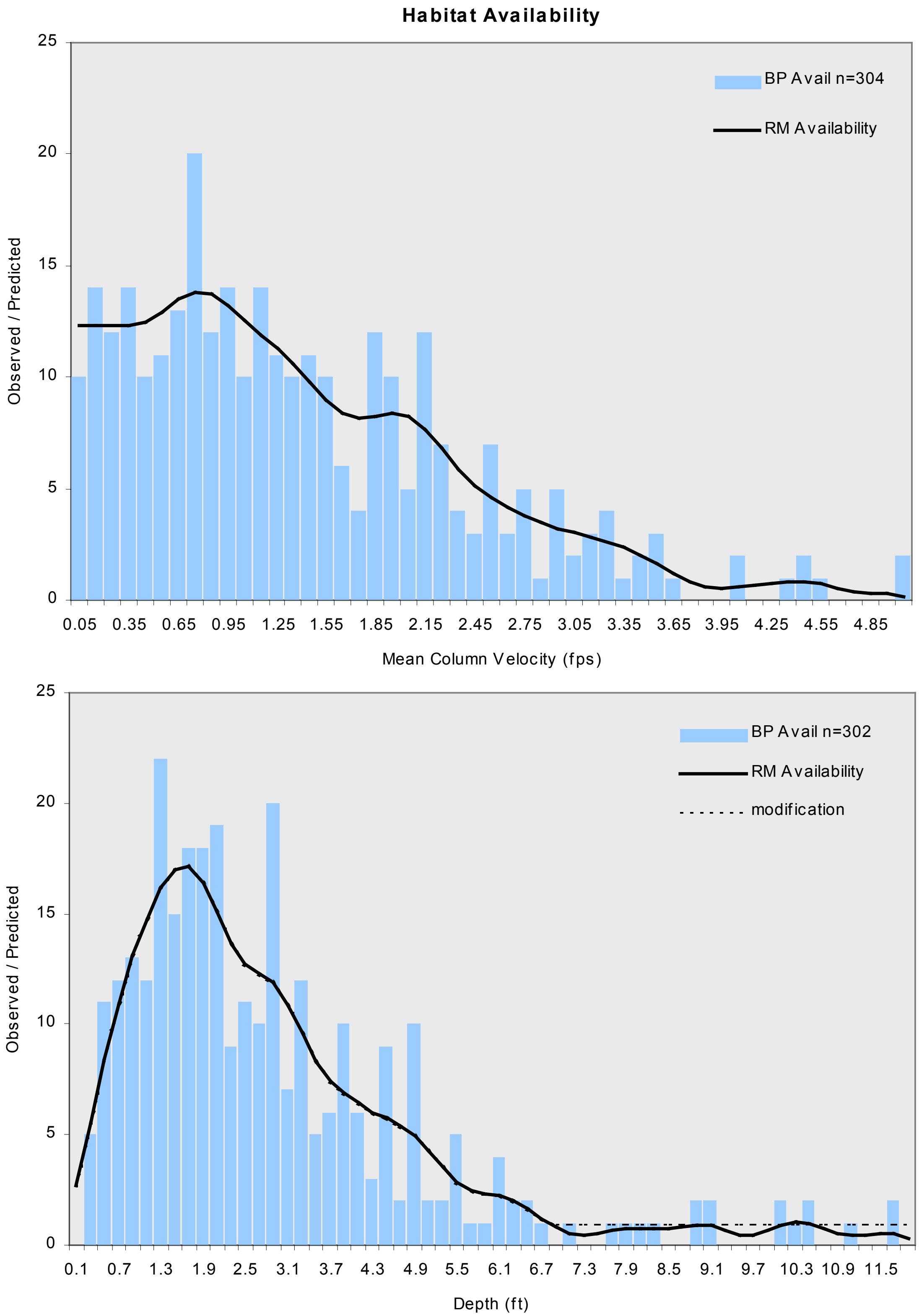


Figure 19. Habitat availability of velocities (upper graph) and depths (lower graph) within HSC observation areas in the Bypass reach. Lines are smoothed functions using 3-pt running means.

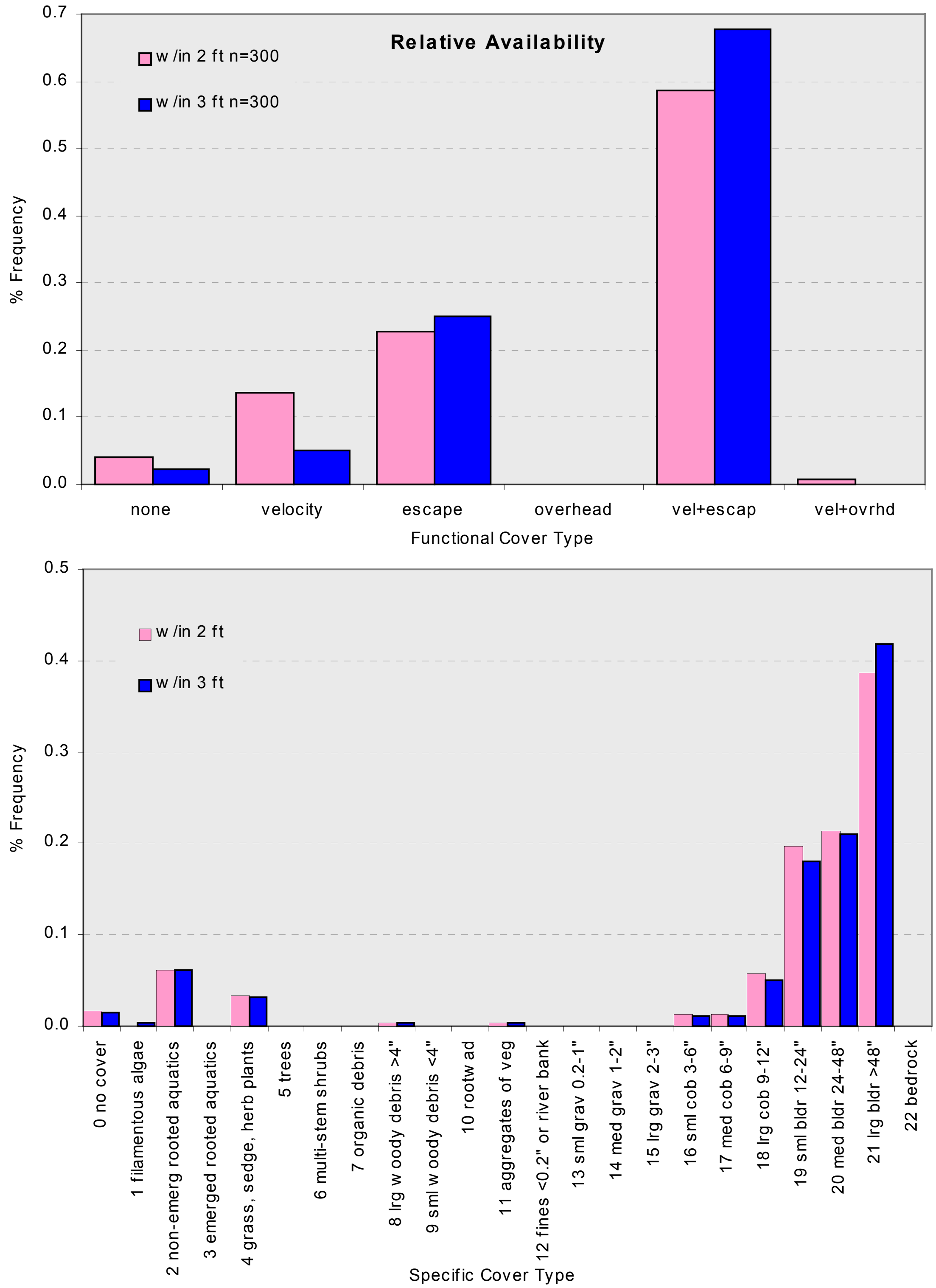


Figure 20. Availability of functional cover types (upper graph) and specific types of escape cover (lower graph) in the Bypass reach, using distance criteria of either two ft or three ft to define presence or absence of escape cover. See Tables 3 and 5 for cover definitions.

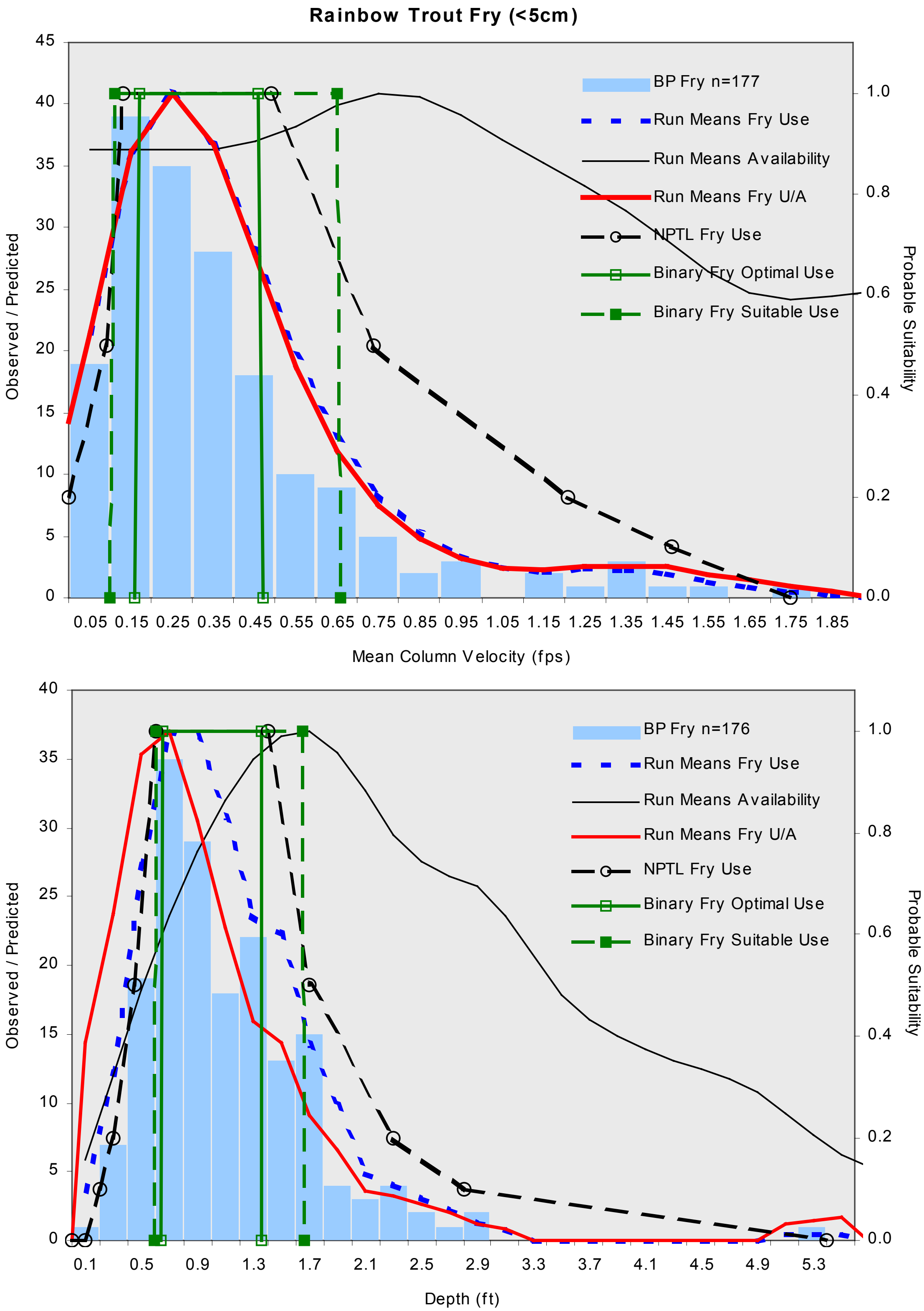


Figure 21. Frequency distribution of habitat use observations for rainbow trout fry, compared with normalized running means curves for habitat availability and HSC for habitat use and habitat use/availability, with habitat use HSC curves developed using NPTL and binary techniques.

curve, and 25% of observations were outside of the “suitable” curve (the NPTL curve points are also based on rank values, consequently many of the curve points are very close in value). In general, the NPTL and the binary curves both contained the peak of the running means curves, but were staggered into somewhat faster water.

For depth, the adjustment of the use curve by the availability data (i.e., the U/A curve) shifted the curve into shallower water (Figure 21). For example, the use curve peaked at depths from0.7-0.9 ft, whereas the U/A curve peaked at depths from 0.5-0.7 ft. Both curves gave low suitability (<0.2) for all depths greater than two feet. The NPTL curve and the binary “optimal” curve both gave maximum suitability for depths from approximately 0.60-1.40 ft. The NPTL and binary curves encompassed the peak of the running means use curve, but only the deeper half of the U/A curve peak.

In comparison to HSC from other locations, the Bypass U/A curve for velocity is narrower than most other curves, with the exception of the Battle curve (Figure 22). The Battle, East Sierras, and Raleigh curves all show higher suitability for near zero velocities, and the East Sierras, Bovee, and Pit curves give higher suitability for velocities >0.3 fps. For depth, the Bypass U/A curve falls in between the shallower Battle curve and the deeper Bovee curve. The remaining curves are shifted approximately ½ ft or more into deeper water. The wider NPTL curves appear more intermediate in relation to the other HSC curves than do the narrower running means curves.

The assessment of cover suitability was first determined by calculating distance criteria that determined if escape cover was deemed “present” or “absent”. A cumulative frequency distribution of the distance to escape cover for trout fry showed that over 90% of fry were found within two ft of instream escape cover (Figure 23). Consequently, the calculation of HSC suitability values for trout fry was based on the frequency of use observations for instream escape cover types within 2 ft of a fry focal position. By definition, velocity shelters were not subject to the distance criteria (since to be using a velocity shelter a fish was deemed to be “in” the shelter of the object), and overhead cover was defined as being directly above a focal position but within 18 in of the water surface.

Among the functional cover types fry were most often found in association (within 2 ft) of escape cover without a velocity shelter (but with or without overhead cover) (Figure 24). The tendency for fry to occur in the absence of velocity shelters may be due to two factors. First, most fry were observed adjacent to the bank within eddies formed by bankside boulders, but those observations were coded as having no velocity shelter because the lower Klamath definitions of functional cover types specifically excluded bank features as objects forming velocity shelters. Secondly, fry were most often observed in areas with very low velocities, and isolated velocity shelters were much more difficult to identify in the absence of current. Consequently, it is unlikely that the addition of velocity shelter to a location containing escape cover would lower it’s suitability, however such inconsistencies are common when evaluating habitat use data using parameters that are so subjective, or that occur with rarity (such as combinations of functional cover types or many of the 22 specific cover types). Although the application of use/availability ratios may help to account for differences in availability (see dots on Figure 24), the unstable nature of such ratios would be expected to produce many spurious values given the low frequencies of many cover types. The very small proportion of fry classified as using overhead cover is due to the fact that overhead cover was rarely found in the absence of escape cover, thus most observations containing overhead cover are incorporated into the two functional types containing escape cover (because the lower Klamath coding system specified ignoring overhead cover when escape cover was present).

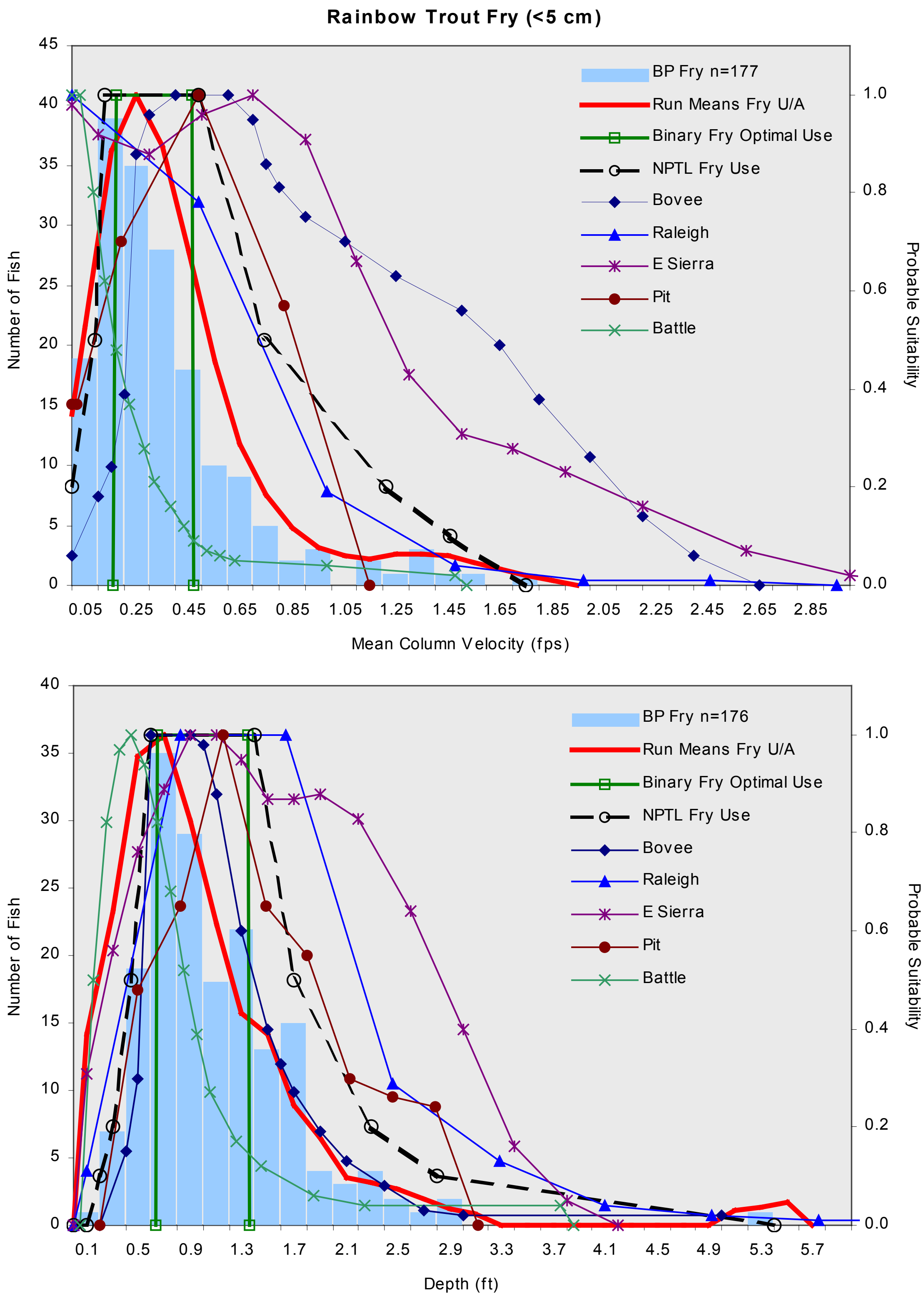


Figure 22. Site-specific HSC data and HSC curves for rainbow trout fry in the Bypass reach compared to HSC curves from other sources. See Table 9 for descriptions of other HSC.

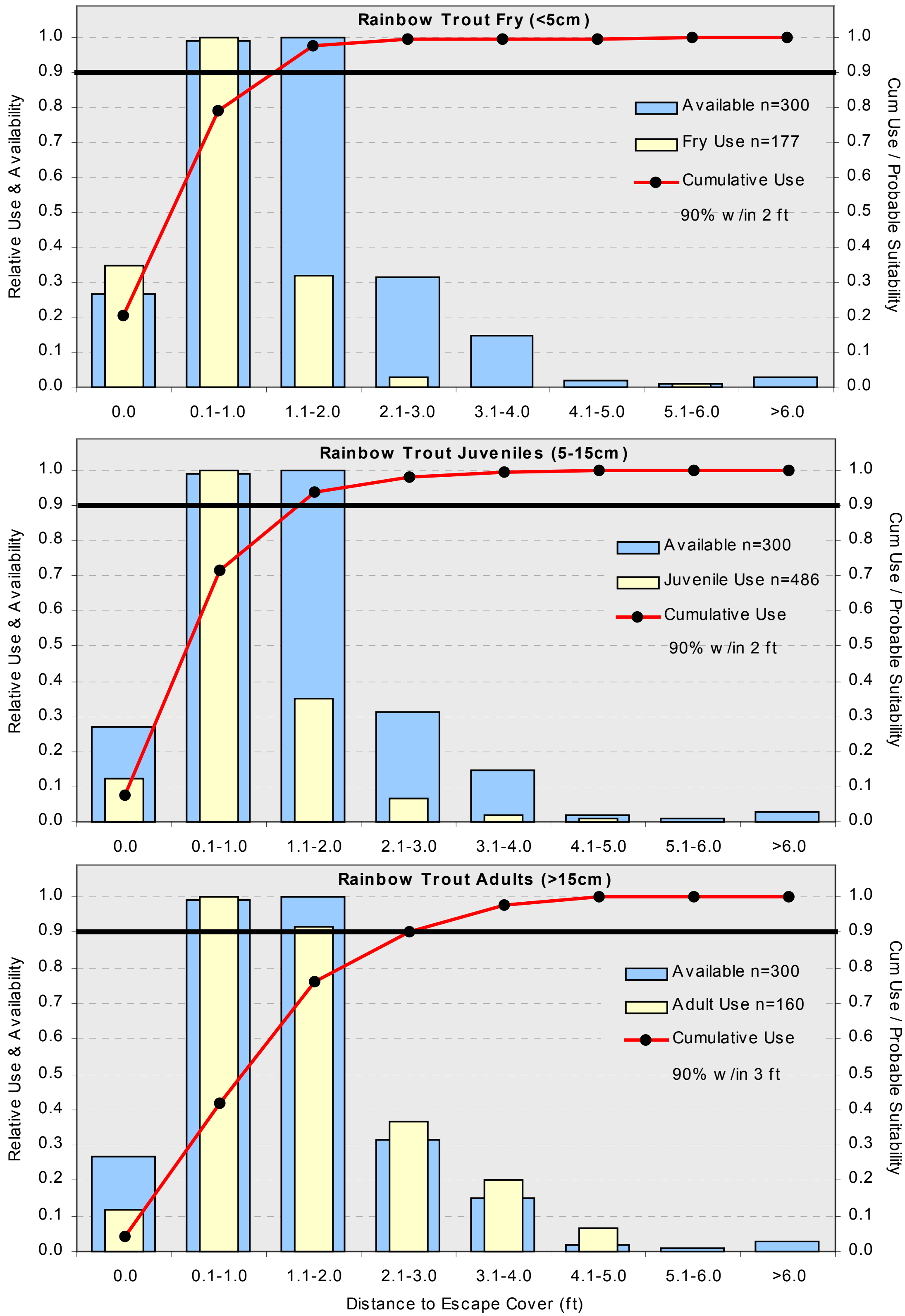
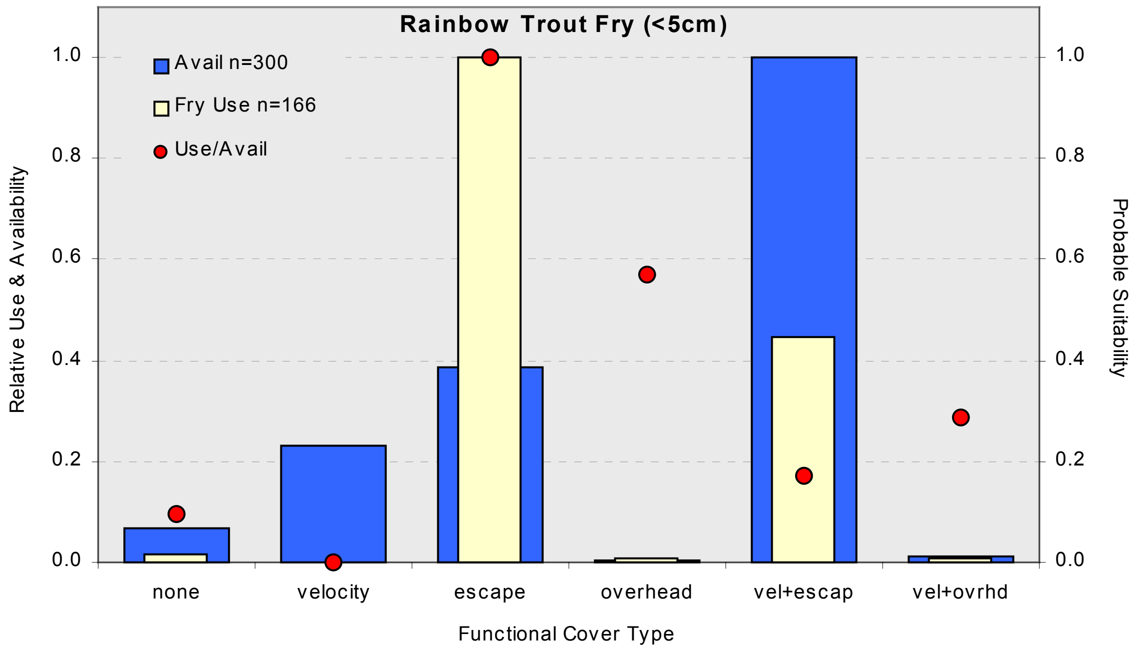


Figure 23. Distance to the nearest form of instream escape cover at fish focal or random habitat availability positions; curved line shows cumulative frequency of use data; straight horizontal line shows the 90% cutoff criteria.



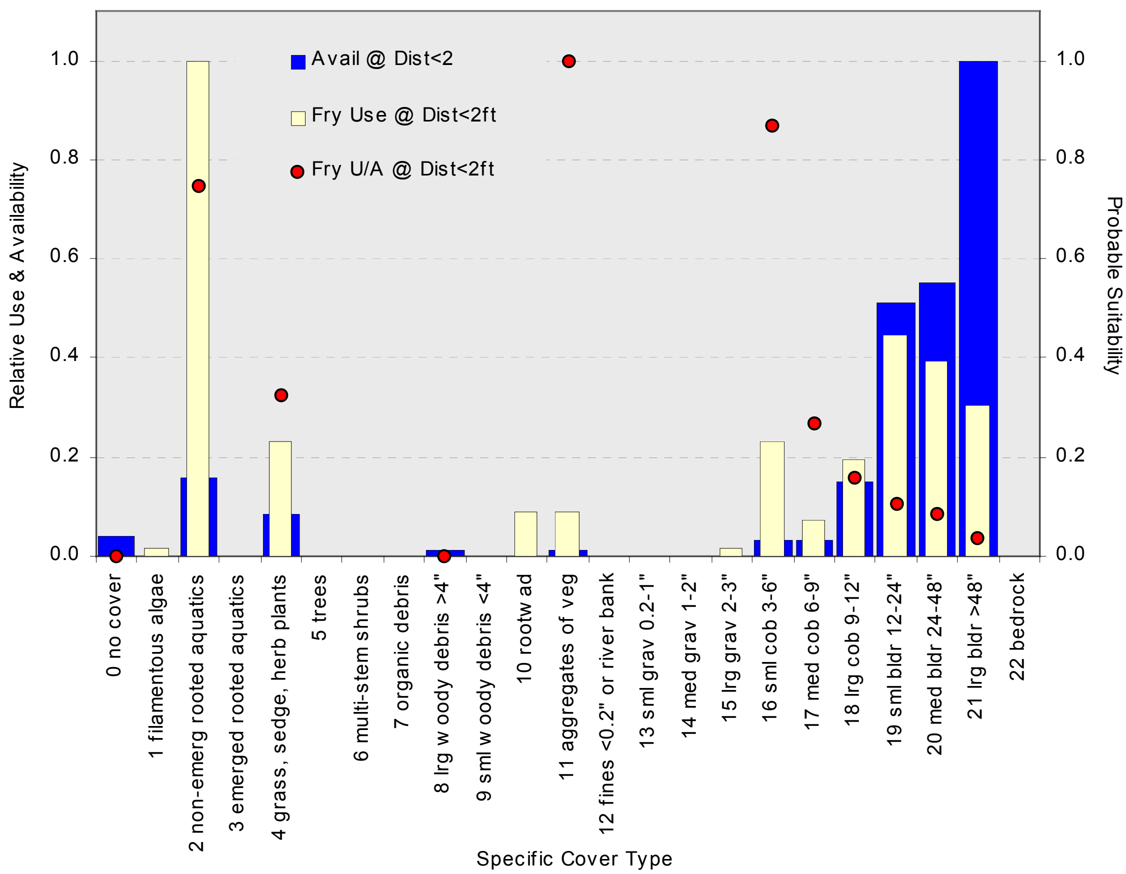


Figure 24. Normalized use and availability of functional cover types (upper graph) and specific types of escape cover (lower graph) by rainbow trout fry in the Bypass reach using a two ft criterion for escape cover. Circles are normalized use/availability ratios.

Most fry were observed in close proximity to aquatic vegetation, which was thus classified as the dominant type of escape cover (Figure 24). As previously stated, the very low velocity requirements of trout fry forced them to occupy margin areas where finer substrates and aquatic vegetation was most likely to be present. However, fry were also commonly associated with cobble and boulder substrate, and grass hanging into the water column.

Rainbow Trout Juveniles (5-15cm)

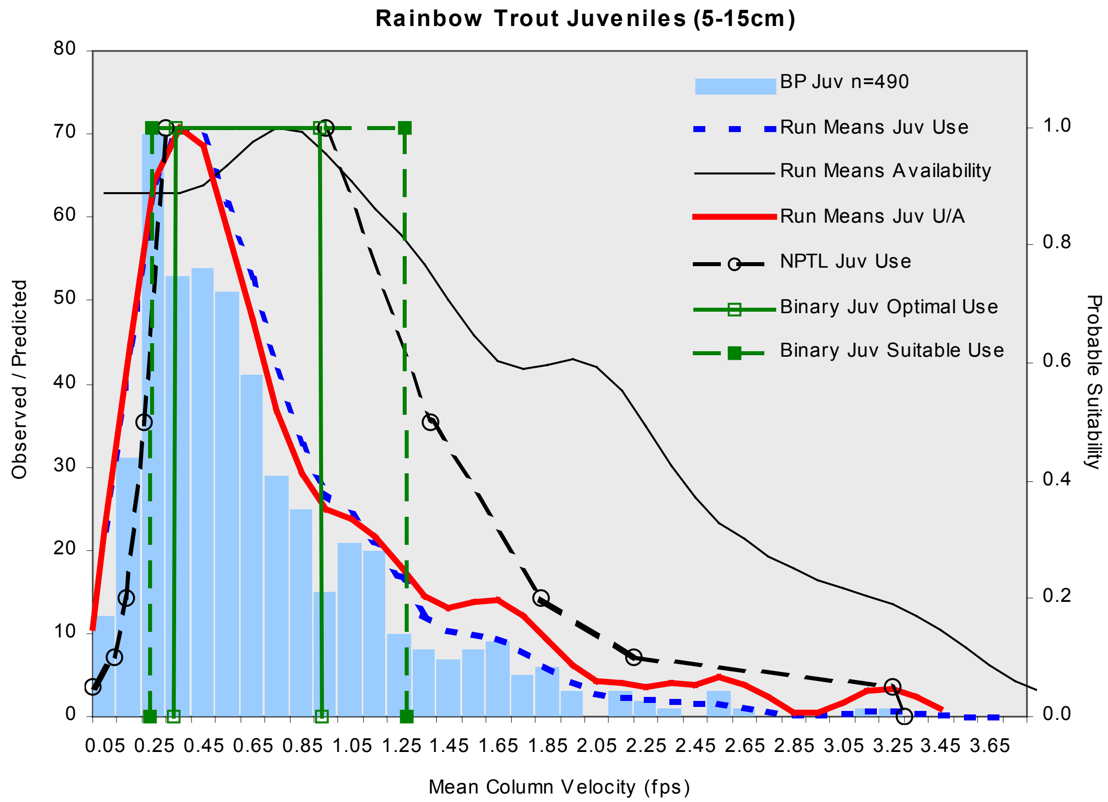
Juvenile rainbows utilized a wider range of velocities (most from 0.15-1.15 fps) and depths (0.7-2.1 ft) than did fry (Figure 25). Like for fry, the use and U/A curves appeared very similar, with no differences in the peak values of 0.35 fps for velocity and 1.3 ft for depth. Low suitabilities (<0.2) resulted for velocities >1.35 fps and for depths >3.0-3.5 ft. The NPTL curve is much wider than the running means curves and as such it appears to overemphasize the suitability of moderate velocities (e.g., 0.5-1.5 fps). The binary optimal curve produced a similar range of maximum suitability, as did the NPTL of approximately 0.30-0.95 fps. The NPTL and optimal binary curves captured only part of the running means peaks, whereas the depth curves peaked within the NPTL and optimal binary curve (both show maxima between approximately 1.0-2.0 ft). The NPTL appears to fit the depth use data better than the velocity data, due in part to the wider distribution of depth observations (i.e., the histogram is less peaked). The binary curves for suitable velocity and depth had considerably wider ranges (0.24-1.27 fps and 0.85-2.50 ft, respectively) than the optimal curves.

The Bypass U/A curve for velocity was narrower than most other HSC curves, although the peak value (at 0.35 fps) was similar to peaks for the Raleigh, SFAR, UNFFR, and NF Stan curves (Figure 26). The narrow Bypass curve was likely due in part to the small size of most juveniles (Figure 14), and perhaps also because water temperatures in the spring-fed Bypass were cooler than most other large rivers (Table 9). The Bypass U/A curve for depth peaked (at 1.30 ft) in deeper water than the East Sierras and Bovee curves, in close proximity to the Pit, LNFFR, and the SFAR curves, but shallower than the Raleigh, UNFFR, and the NF Stan curves. Like the velocity curve, the depth curve is relatively narrow in comparison to most of the other HSC curves. The wider NPTL curves appeared more similar to many of the other HSC curves, except for the fastest (e.g., the Pit, LNFFR, and UNFFR) and deepest (e.g., the Raleigh and NF Stan) curves.

Like fry, juvenile trout were most frequently found close to some form of escape cover, consequently the 90% cumulative frequency also produced a criteria value of 2 ft (Figure 23). When applied to the functional and specific cover type categories, juveniles were found to be near escape cover with velocity shelter, and to a lesser extent without velocity shelter (Figure 27). Unlike fry, juveniles were most often associated with large substrate elements (cobbles and boulders), although many juveniles were also seen among aquatic vegetation. Emergent grasses were observed at numerous juvenile focal positions, again reflecting the small size of most juveniles and their close association with the stream margin.

Rainbow Trout Adults (>15cm)

Most adult trout occupied positions with velocities from 0.65-2.05 fps and depths from 2.0-6.0 ft (Figure 28). Unlike fry and juveniles, few adults were observed in velocities less than 0.5 fps or in depths less than 2.0 ft. The use and U/A running means curves for velocity were fairly similar, except the U/A curve was shifted into slightly faster water, and it contained numerous and spurious undulations at the highest velocities due to the instability of the ratio methodology. Consequently, additional smoothing and a final curve modification was necessary to produce a



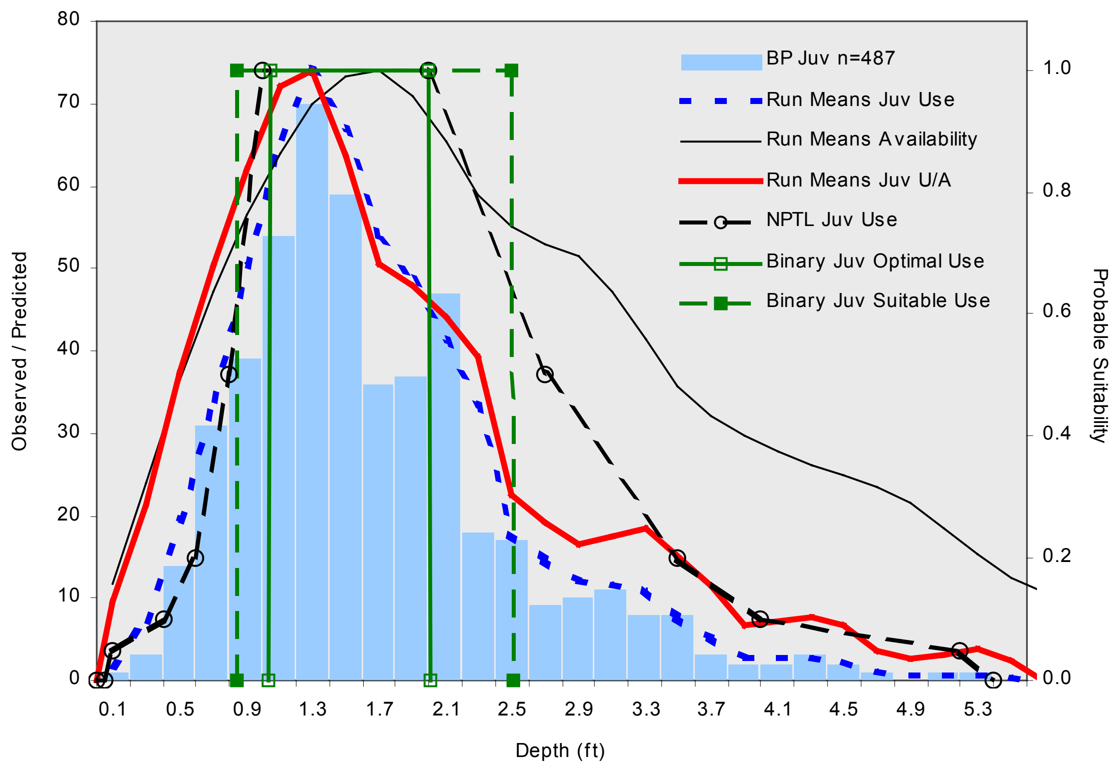
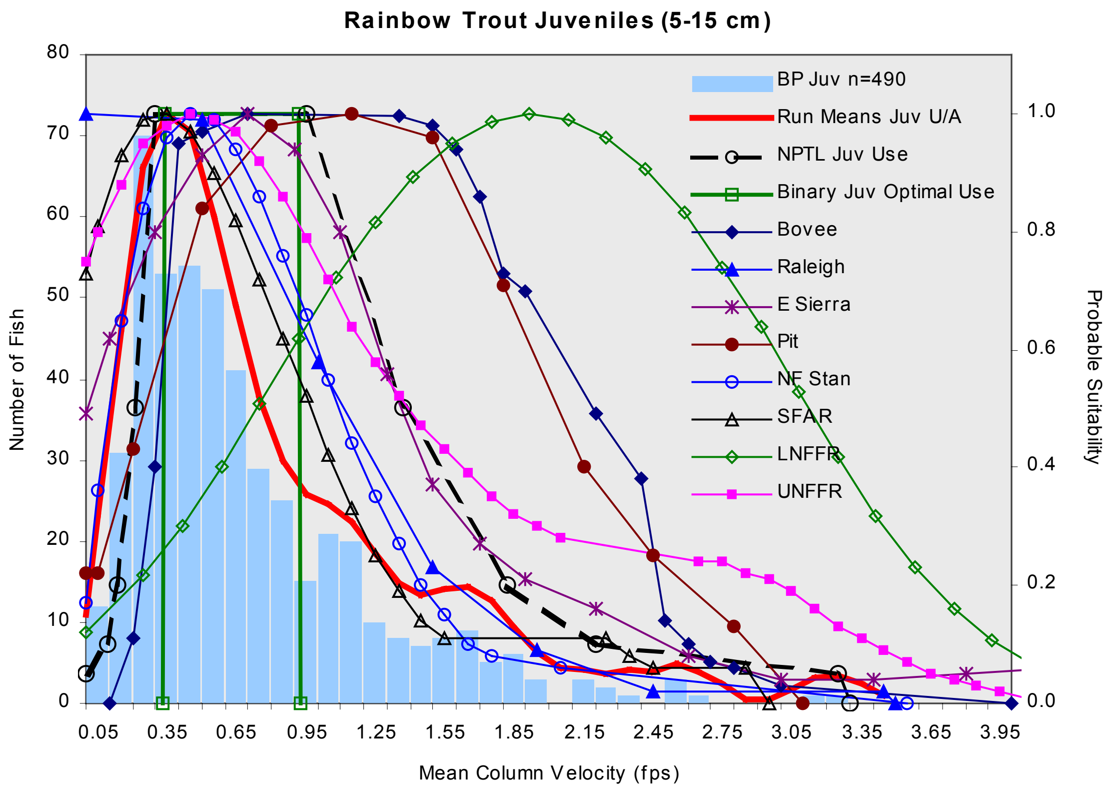


Figure 25. Frequency distribution of habitat use observations for rainbow trout juveniles, compared with normalized running means curves for habitat availability and HSC for habitat use and habitat use/availability, with habitat use HSC curves developed using NPTL and binary techniques.



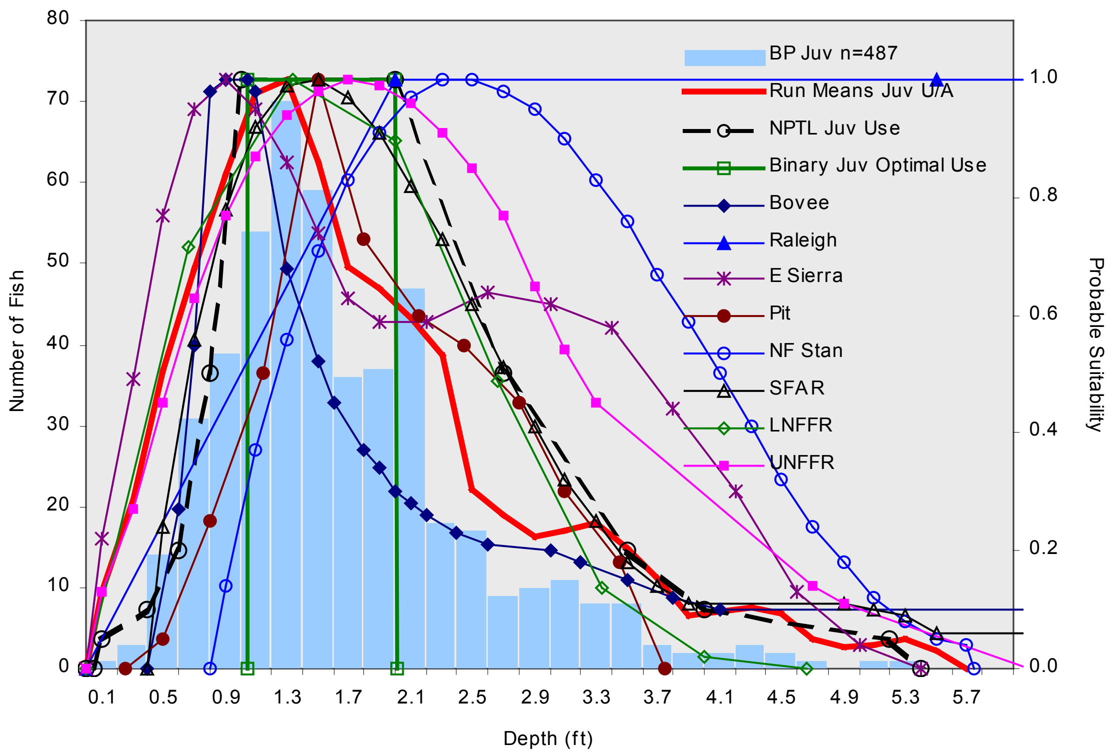


Figure 26. Site-specific HSC data and HSC curves for rainbow trout juveniles in the Bypass reach compared to HSC curves from other sources. See Table 9 for descriptions of other HSC.

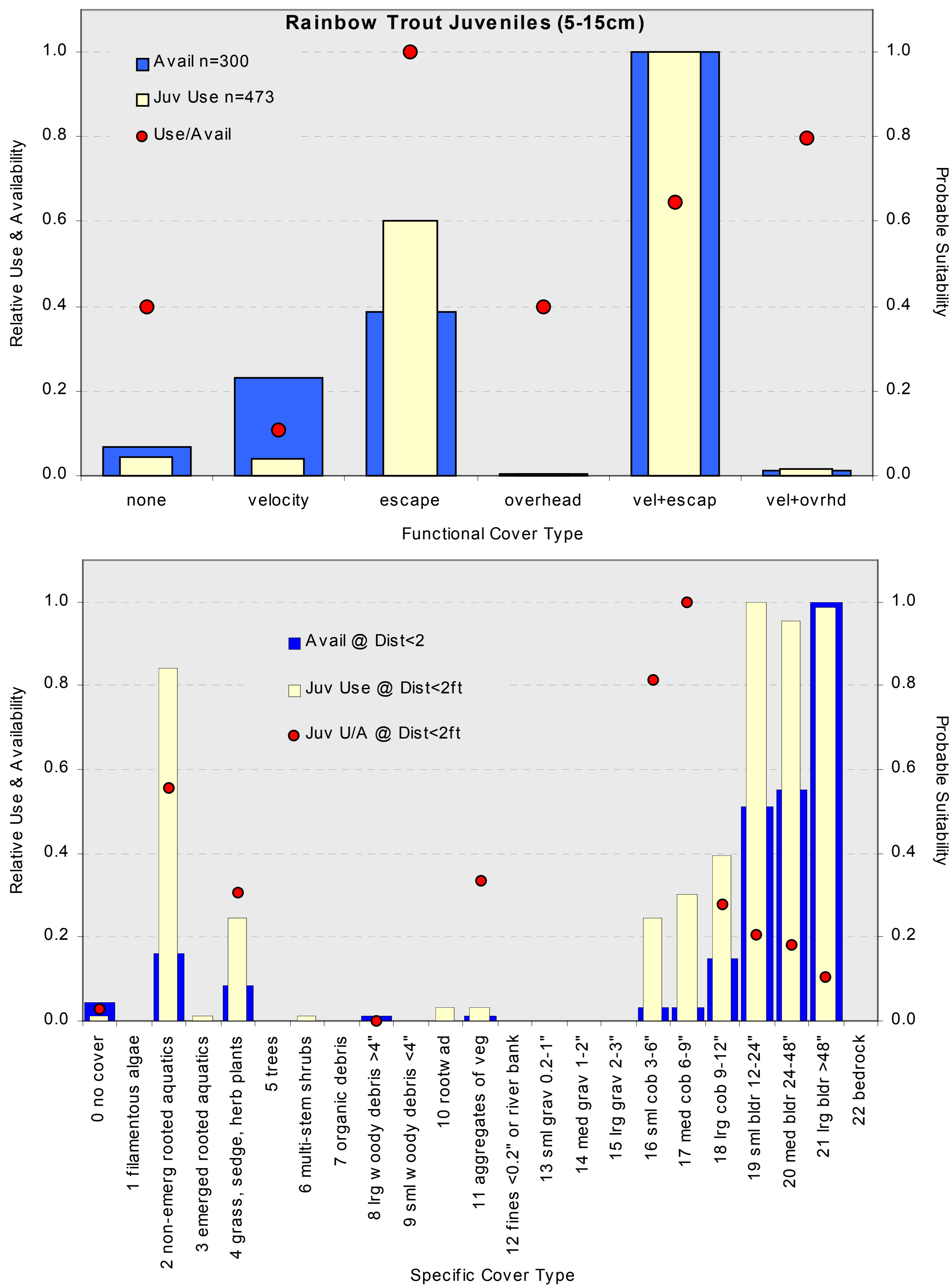
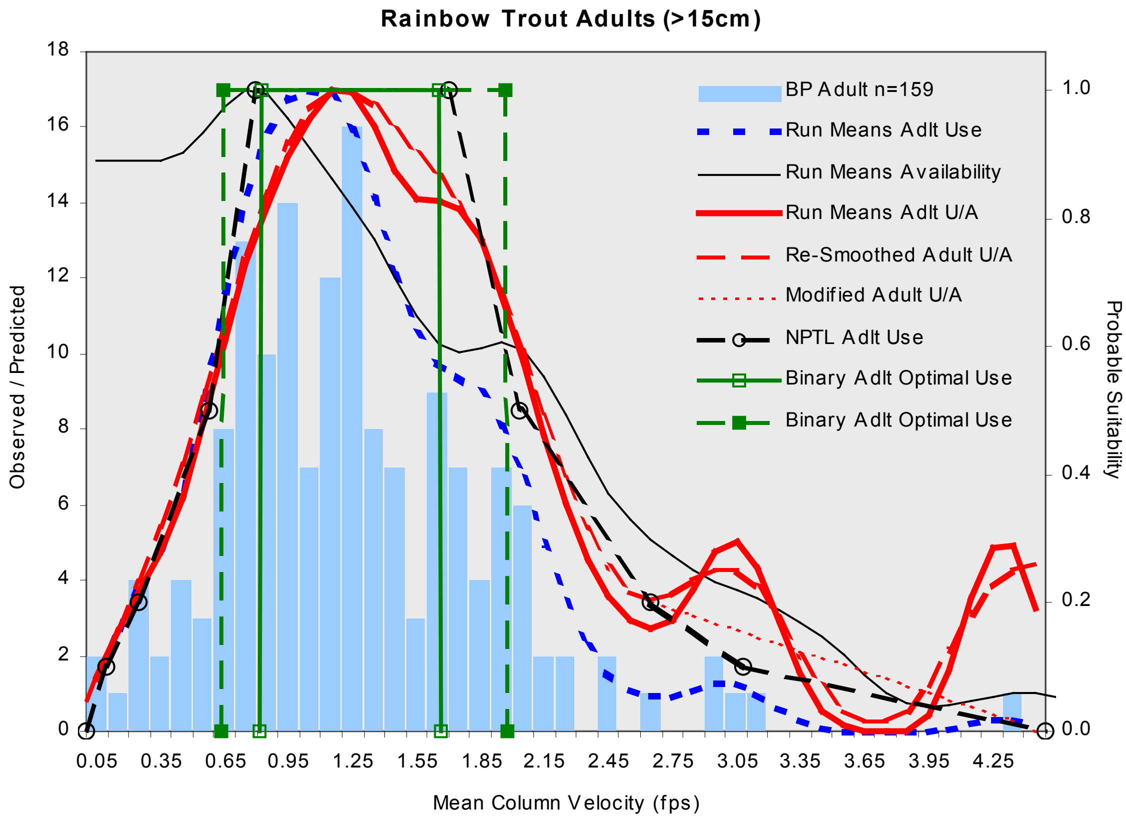


Figure 27. Normalized use and availability of functional cover types (upper graph) and specific types of escape cover (lower graph) by rainbow trout juveniles in the Bypass reach using a two ft criterion for escape cover. Circles are normalized use/availability ratios.



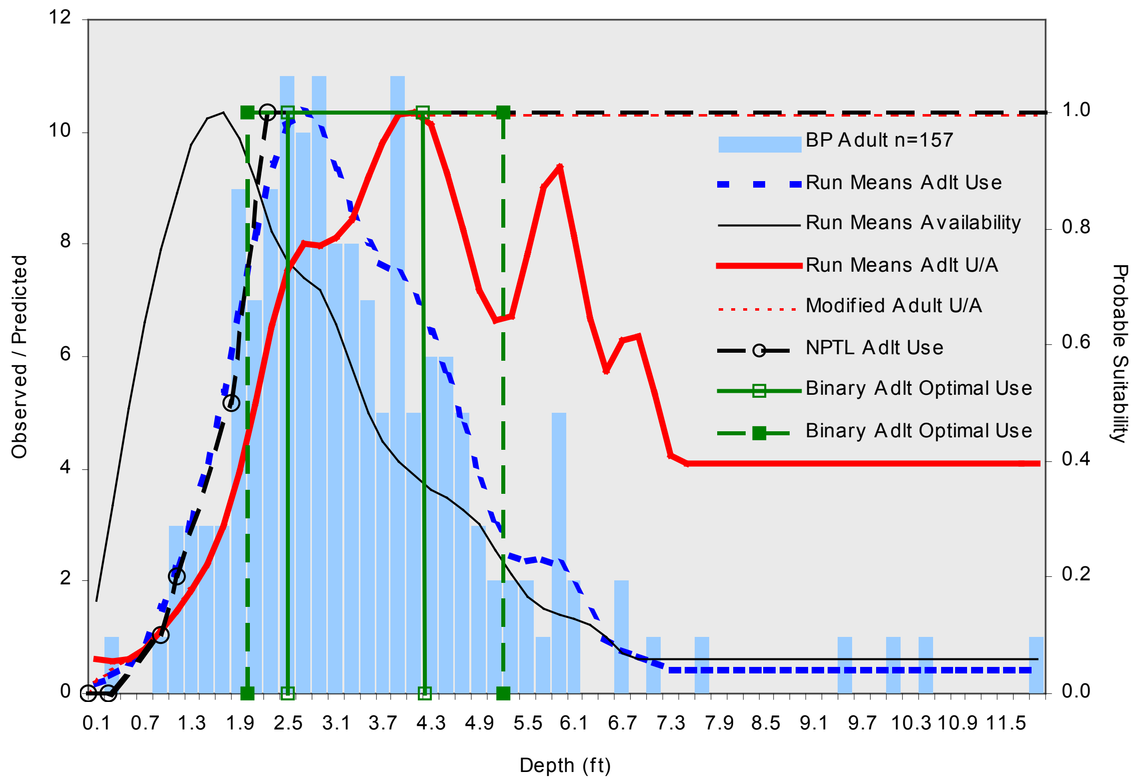


Figure 28. Frequency distribution of habitat use observations for rainbow trout adults, compared with normalized running means curves for habitat availability and HSC for habitat use and habitat use/availability (and modified U/A), with habitat use HSC curves developed using NPTL and binary techniques.

final U/A curve. The NPTL and the binary optimal curves both gave maximum suitabilities for velocities of approximately 0.8-1.7 fps, with a suitable binary range of 0.64-1.97 fps. The wider distribution of observed velocities resulted in a visually better fit with the NPTL than did the narrower distributions exhibited by fry and juveniles.

Similar smoothing problems existed with the adult depth curves, however the HSC Workgroup decision to maintain suitability at 1.0 from the initial peak into deeper water nullified the spurious undulations from the ratio calculations of the running means values. The U/A conversion moved the point of peak suitability from 2.7 ft (use curve) to 3.9 ft (U/A curve). Maximum suitability was reached in shallower depths of 2.0 ft, 2.25 ft, and 2.50 ft by the binary suitable, the NPTL, and the binary optimal curves, respectively. The NPTL and the optimal binary curves for both velocity and depth encompassed the peaks of the use and U/A running means curves.

The running means U/A curve and the NPTL curve showed peak suitability at a higher velocity than all of the other HSC curves except the LNFFR curve, and in general the site-specific curves appear very similar to the East Sierras and the Bovee curves (Figure 29). The U/A and NPTL curves also appear similar in form to several other HSC curves (e.g., NF Stan, SFAR, UNFFR, Pit) except they are shifted approximately 0.5 fps into faster water. The U/A depth curve is also one of the deepest curves shown with maximum suitability beginning at 3.9 ft, although the East Sierras, Pit, Bovee, and Raleigh curves also remain at 1.0 into deeper water. The NPTL curve peaks at a depth intermediate to most other HSC curves.

Adult trout were more often found at greater distances from instream escape cover than were fry and juveniles, however 90% of adults were found within 3 ft of cover (Figure 23). Using 3 ft to define the "presence" of escape cover, adult trout were almost always found in association with both escape cover and velocity shelter (Figure 30). Among the specific types of escape cover, adults were almost exclusively found in proximity to boulders, which were the most common type of escape cover available. Unlike fry and juveniles, adults were rarely observed near aquatic vegetation or emergent grasses, probably because adults were typically observed away from the stream margin (Figure 17).

Selection of Existing Habitat Suitability Curves

Data was insufficient to develop site-specific HSC curves for rainbow trout spawning and rearing in the Peaking reaches, for trout spawning in the Bypass reach, and for all life stages of suckers and anadromous species. Data were also insufficient to conduct formal transferability tests of collected data with non-local HSC curves. Consequently, the limited observations made for these species will be visually compared to HSC curves derived from other locations to assist in the selection of curves appropriate for use in the Upper Klamath project area. A description of HSC curves developed for anadromous species and the rationales in making them will be presented in a separate report.

Rainbow Trout Spawning

HSC data were collected on 66 trout redds during the spring of 2003. As stated previously, most redds were collected from three general areas (Figure 9): 1) within a side-channel immediately below the spillway; 2) a pool/run transition 3,500 ft below the spillway (habitat units 108/109); and 3) other mainstem areas (mostly just below the side-channel). Redd characteristics were notably different among the side-channel and the pool/run area, where the side-channel redds were shallow and fast and the pool/run redds were deep and slow (Figure 31). Redds from other mainstem areas were intermediate in both depth and velocity.

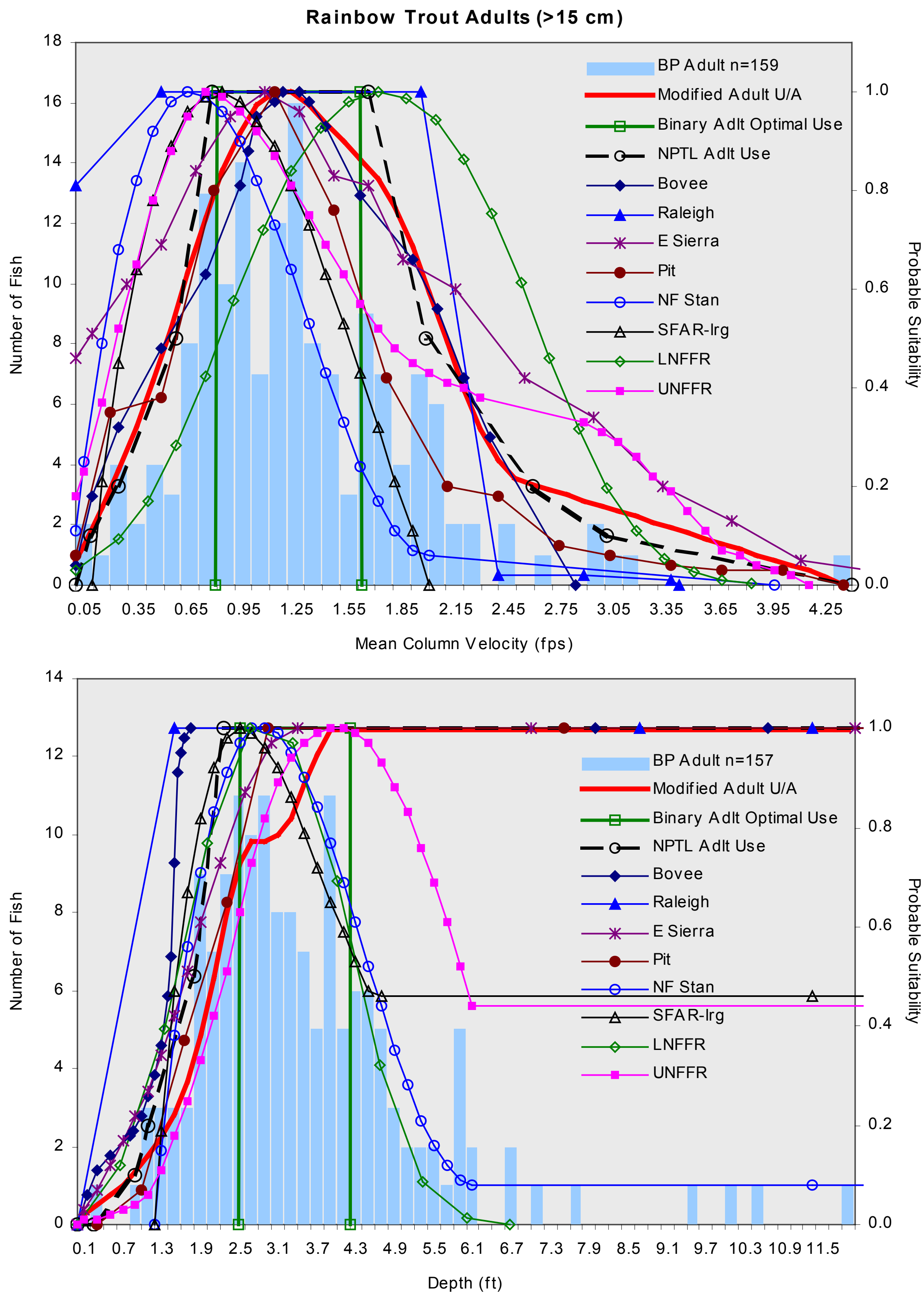


Figure 29. Site-specific HSC data and HSC curves for rainbow trout adults in the Bypass reach compared to HSC curves from other sources. See Table 9 for descriptions of other HSC.

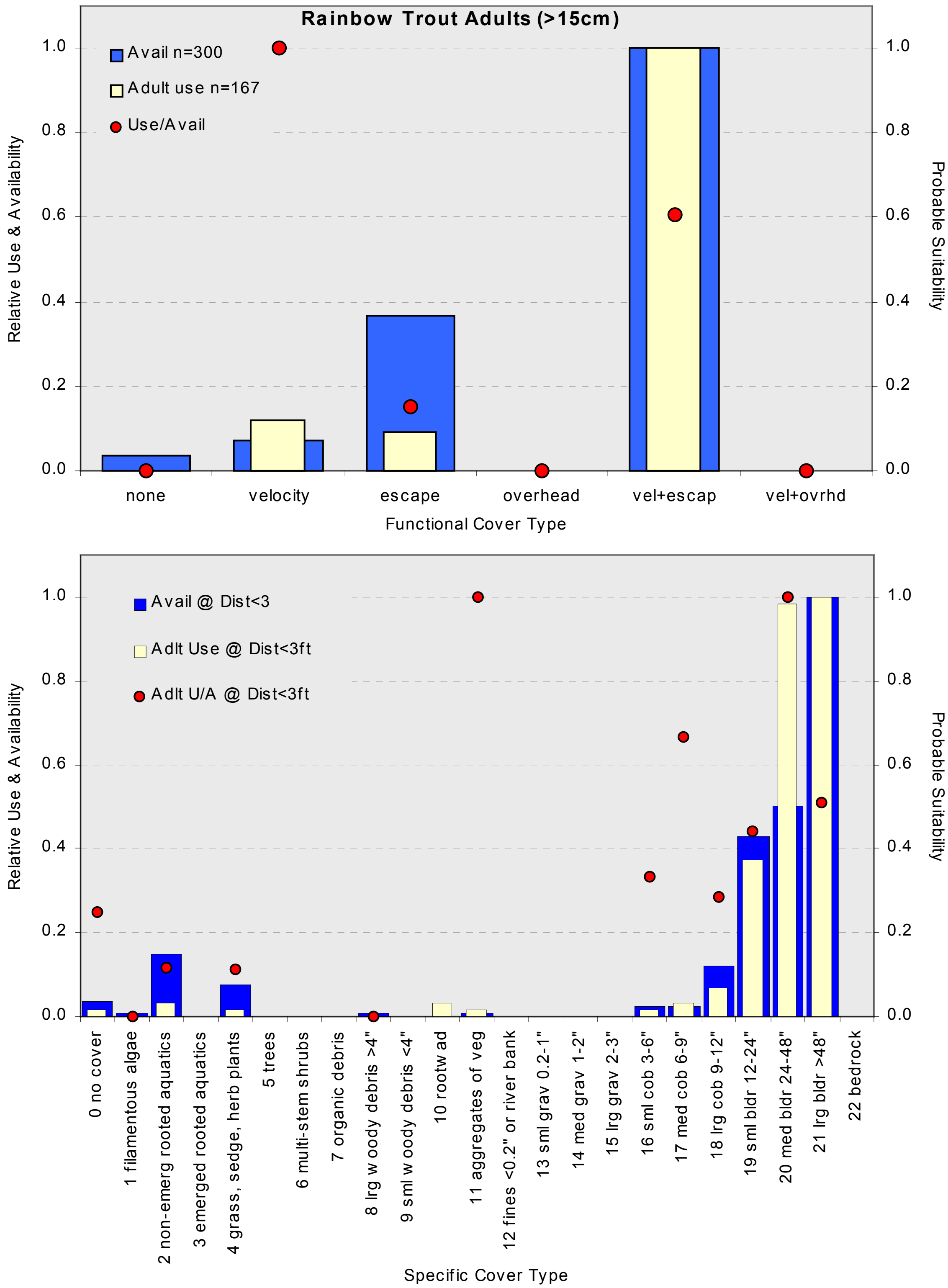


Figure 30. Normalized use and availability of functional cover types (upper graph) and specific types of escape cover (lower graph) by rainbow trout adults in the Bypass reach using a three ft criterion for escape cover. Circles are normalized use/availability ratios.

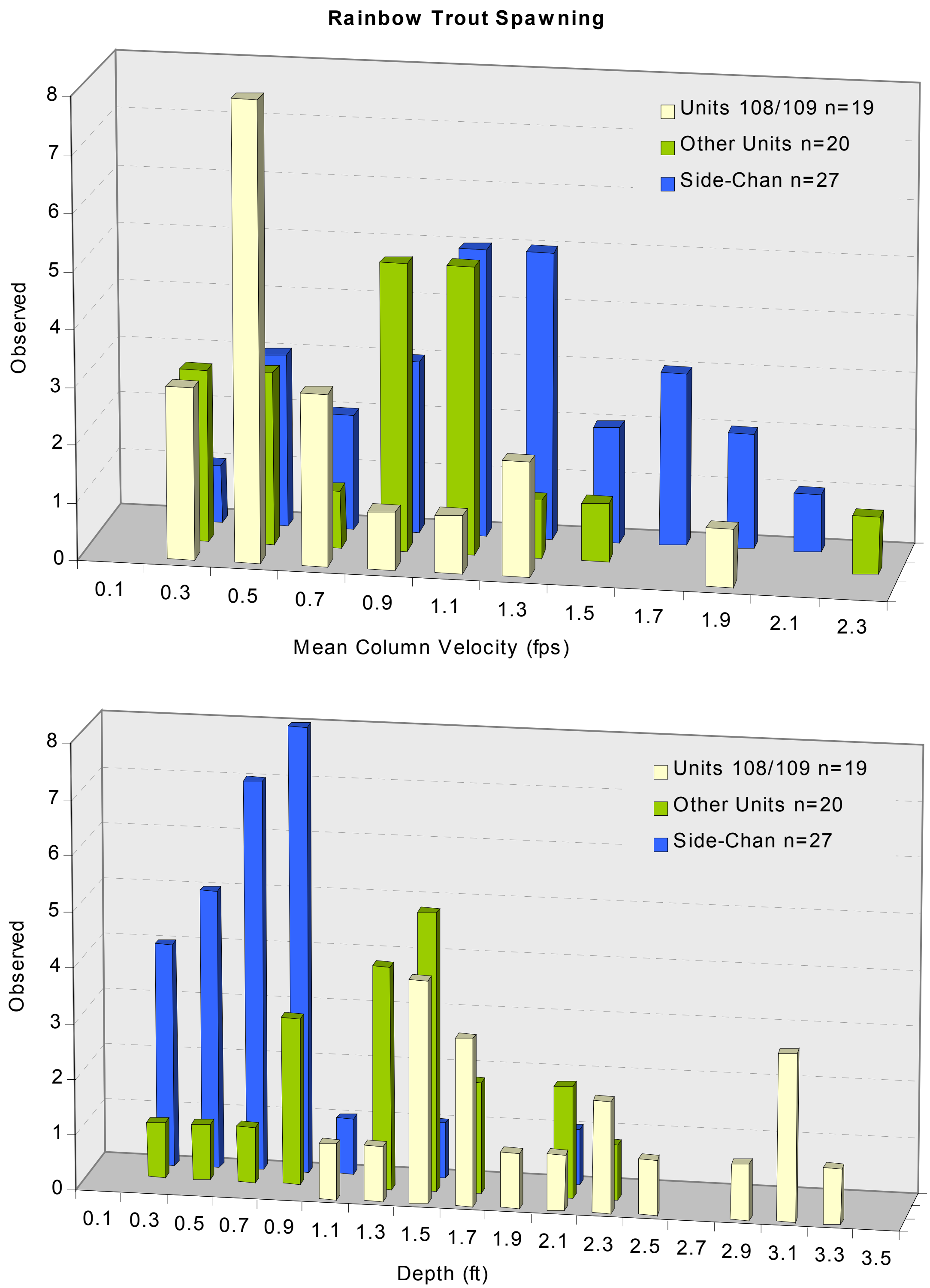


Figure 31. Comparison of velocities and depths at rainbow trout redds from three different areas of the Bypass reach.

When combined, all but two redds occurred at mean column velocities <2 fps, and only four redds were observed at depths >3 ft, however poor visibility made detection of redds in deeper and faster water very difficult. The bimodality of both distributions, due to the observations in the side-channel versus the pool/run units, is clearly evident (Figure 32). When the redd substrate data was organized in a semi-continuous manner (i.e., by ordering the dominant/subdominant size classes according to increasing size), a strong, unimodal distribution results with the dominant/ subdominant combinations of gravels having diameters of 0.2-2.0 in (Figure 33). Less than 20% of all redd observations contained dominant or subdominant particles that were smaller or larger in size.

The velocities measured over trout redds best matched the HSC curve from Roaring Creek, although curves from the NF Kings Basin and Butt Creek also appear similar to the observed data (Figure 34). All other HSC curves peak at velocities faster than those measured in the Bypass, including those from the side-channel. The relatively slow velocities utilized by spawning trout in the Bypass may be due to small size of many of the spawners (most were <15cm), and the small, "light" substrate particles found in the redds (most redds were constructed in volcanic materials, which were noticeably less dense than gravels more typical found in trout redds). The depths measured at Bypass redds were more similar to depths measured at other locations. Again the Roaring Creek HSC curve matched the site-specific observations well, but that curve (and several others) keeps suitability at 1.0 into deeper water, which is a characteristic that could not be confirmed in the Bypass (due to poor visibilities and limited gravel supply). Observed depths were deeper than those measured in the NF Kings Basin and in Butt Creek. In contrast, only the redds measured in the pool/run transition were deep enough to fit the East Sierras curve, which doesn't reach maximum suitability until 1.5 ft.

The only HSC curve that appears to match the observation data for both velocity and depth is the curve from Roaring Creek. However, because gravel substrates in the Bypass and Peaking reaches are very uncommon, and because PHABSIM transects were not specifically selected to traverse the few known spawning areas, spawning HSC were not utilized in this analysis.

<u>Rainbow Trout Rearing</u> (Peaking Reaches Only)

Diving in the Peaking reaches under low flow conditions did not produce sufficient observations to construct independent HSC curves for that reach (Table 7), and were also judged insufficient to justify pooling the Peaking data with the Bypass data. Despite the extremely low sample sizes (12 fry, 34 juveniles, and 13 adults), a visual comparison of the Bypass curves and other HSC curves with the Peaking observation data may be useful when selecting curves to represent the Peaking reaches (selection has not yet been made by the HSC Subgroup).

All of the 12 fry observed in the Peaking reaches occurred in velocities <1 fps, which is consistent with most of the HSC curves (Figure 35). In general, fry chose velocities faster than suggested by the Battle curve, and slower than suggested by the Bovee curve. For depth fry in the Peaking reaches were mostly found at depths from 0.5-1.5 ft, which is somewhat deeper than the Battle and the Bypass U/A curves, but consistent with the other HSC curves.

The observed velocity distribution of 34 juveniles in the Peaking reach is fairly consistent with many of the HSC curves, including the Bypass site-specific curves (Figure 36). Observed velocities were slower than suggested by the Pit, LNFFR, and the Bovee curves. Only one of the juveniles observed in the Peaking reach occurred in water greater than 2 ft, which suggests that some of the HSC curves (especially NF Stan and Raleigh) may overemphasize suitability for deeper water.

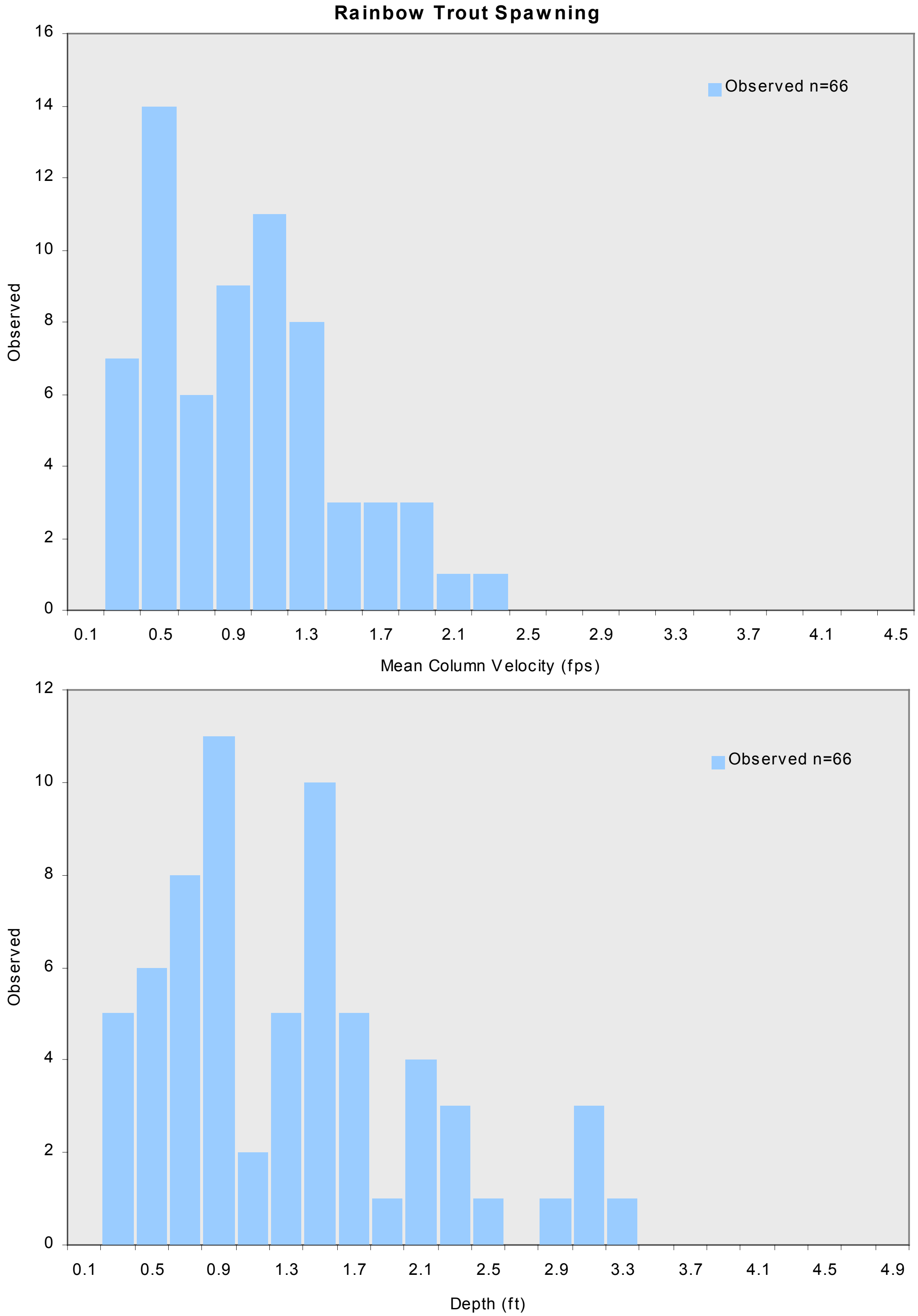


Figure 32. Frequency distributions of velocities and depths at rainbow trout redds from all areas (combined) of the Bypass reach.

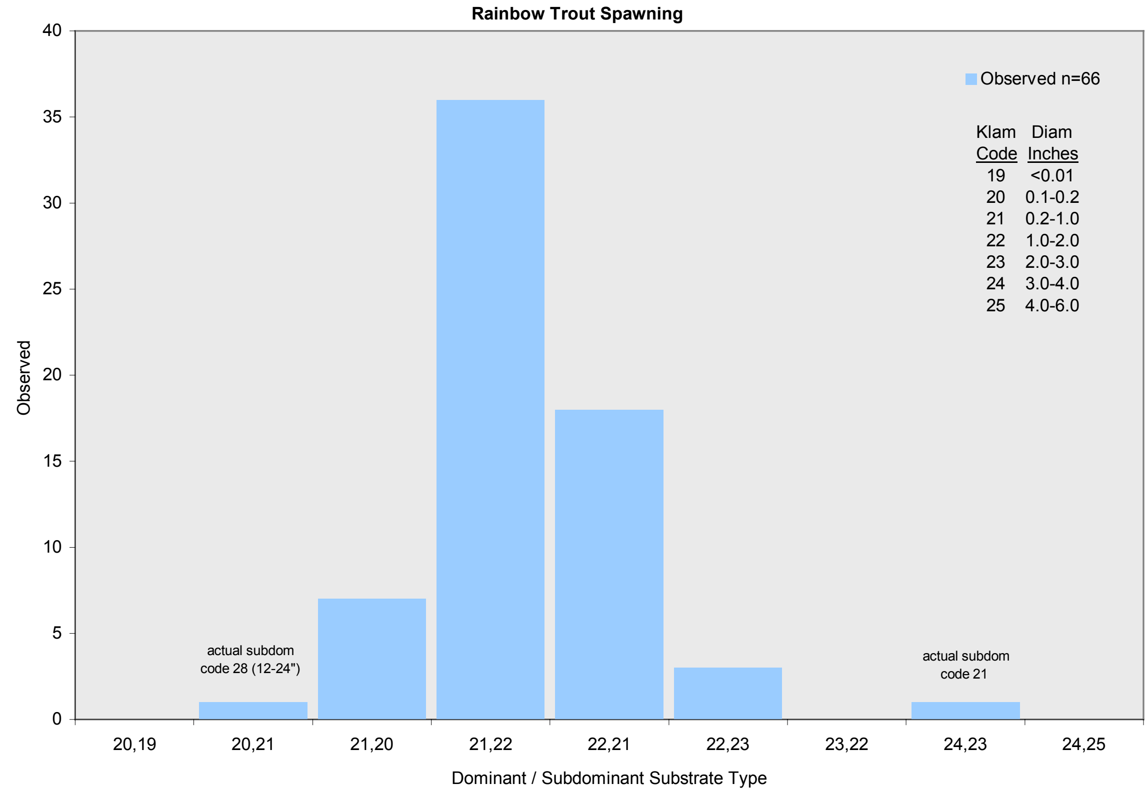


Figure 33. Frequency distribution of substrate types at rainbow trout redds in the Bypass reach (all areas combined).

The 13 adult trout observed in the Peaking reaches utilized both velocities and depths similar to those described by many of the HSC curves, and were well encompassed by the site-specific curves from the Bypass reach (Figure 37).

Suckers

Although HSC data was collected at observed positions of smallscale suckers, the use of HSC curves to describe habitat requirements for this species is questionable due to their bottom-dwelling and bottom-browsing behavior. Conventional PHABSIM analyses utilize mean column velocities when calculating WUA. However, suckers are benthic browsers rather than non-benthic, drift feeders (aka most salmonids), thus the relationship between mean column velocity and habitat suitability is poorly understood. Also, using PHABSIM estimates of bottom velocities would likely be highly unreliable given the abundance of large substrate elements in the project area. In sum, the use of PHABSIM to model sucker habitat, although sometimes applied, is contrary to the conventional application (and primary intention) towards position-holding, drift-feeding species.

Nevertheless, site-specific HSC data was collected for the rearing life stages of (presumably) smallscale suckers (Table 7). Because no data was found describing the spawning requirements for Klamath smallscale or largescale suckers, and because the limited data (e.g., Buettner and Scoppettone 1990, Perkins and Scoppettone 1996) and the highly restrictive spatial and temporal spawning characteristics exhibited by shortnose suckers (which appear to be limited to the lower ~½ mi of the CA Peaking reach from April to mid-May, Beak 1987) would prevent a confident

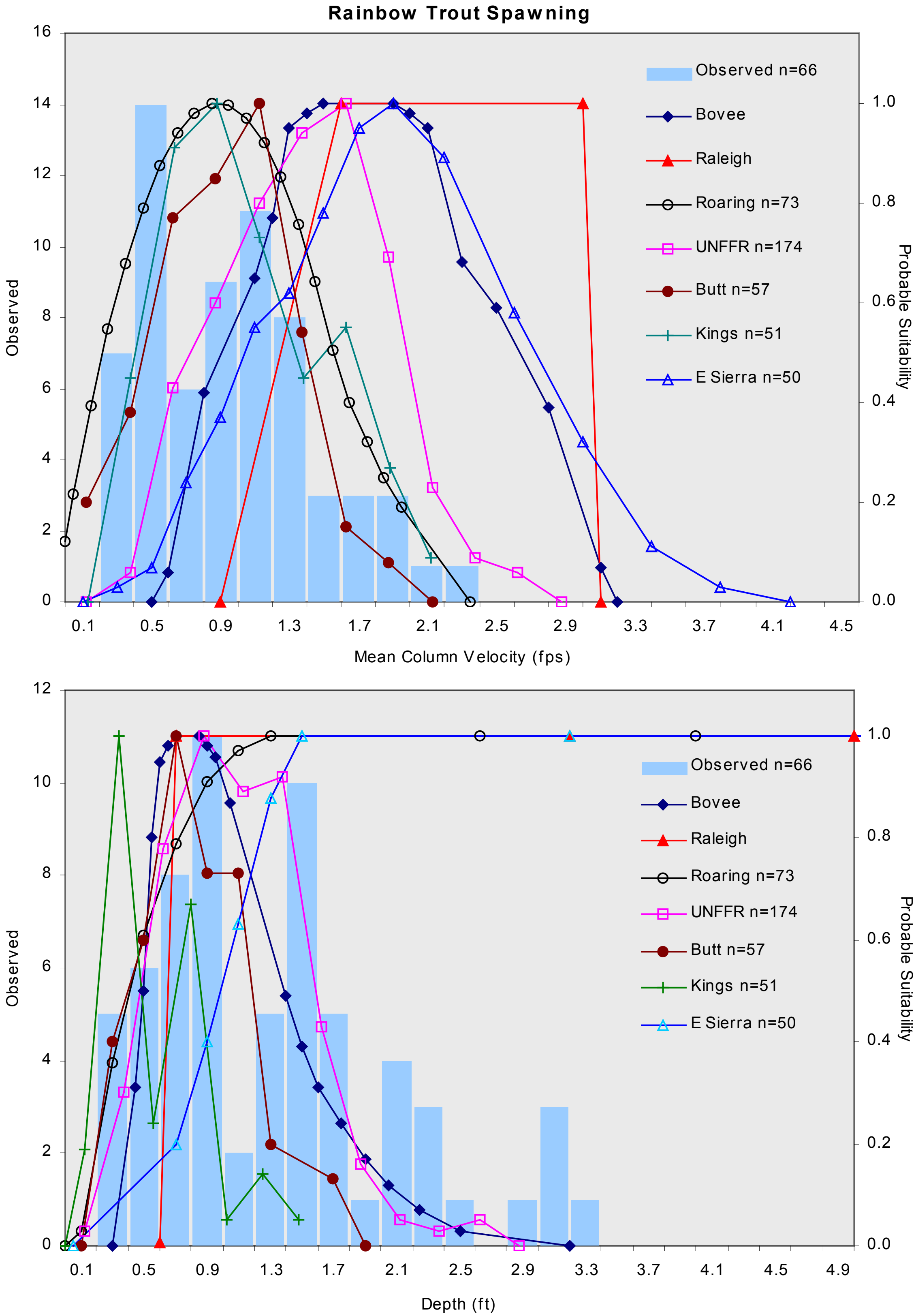
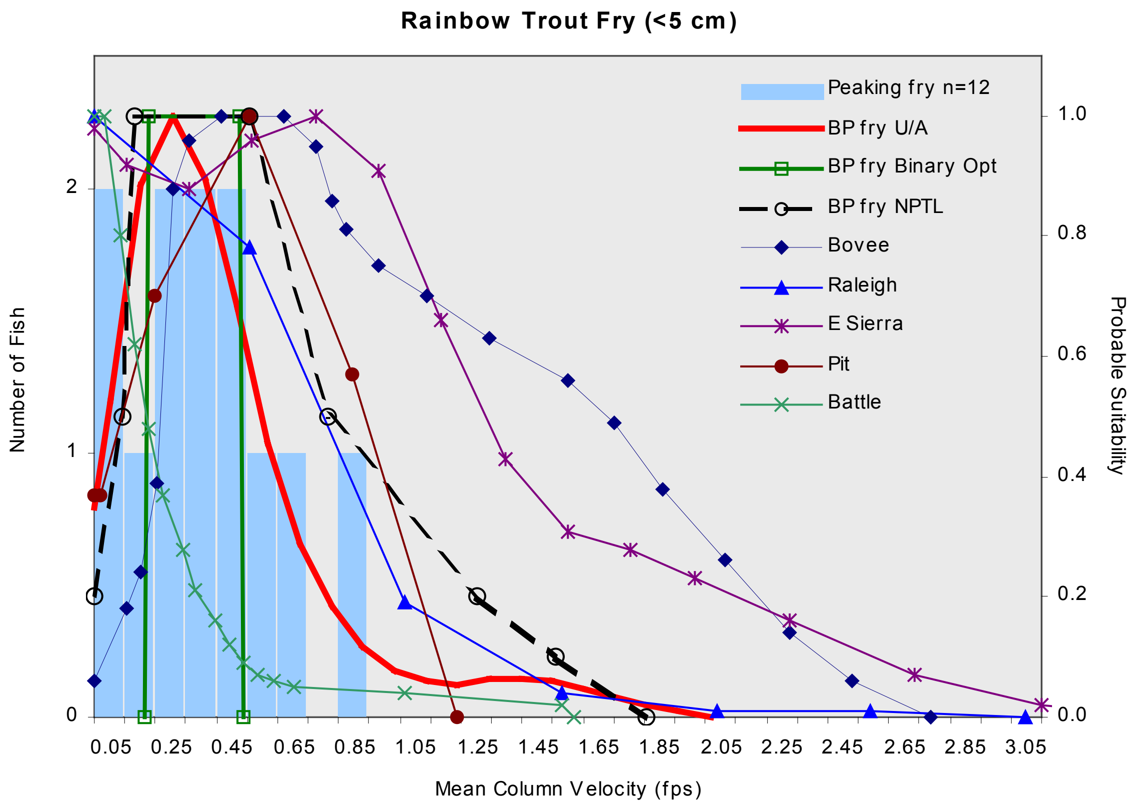


Figure 34. Observed velocities and depths at rainbow trout redds in the Bypass reach compared to HSC from other sources. See Table 9 for a description of other HSC.



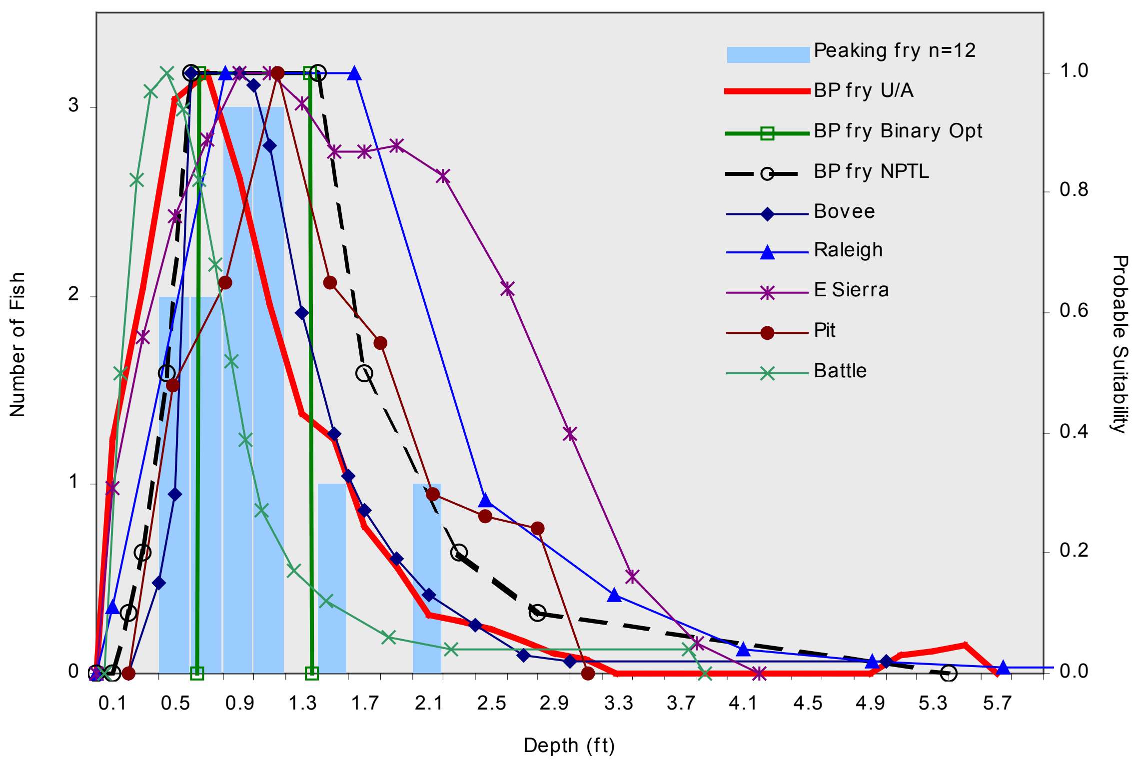


Figure 35. Frequency distribution of habitat use observations by rainbow trout fry in the Peaking reaches (OR and CA combined) compared to HSC curves from the Bypass reach and from other sources. See Table 9 for a description of other HSC.

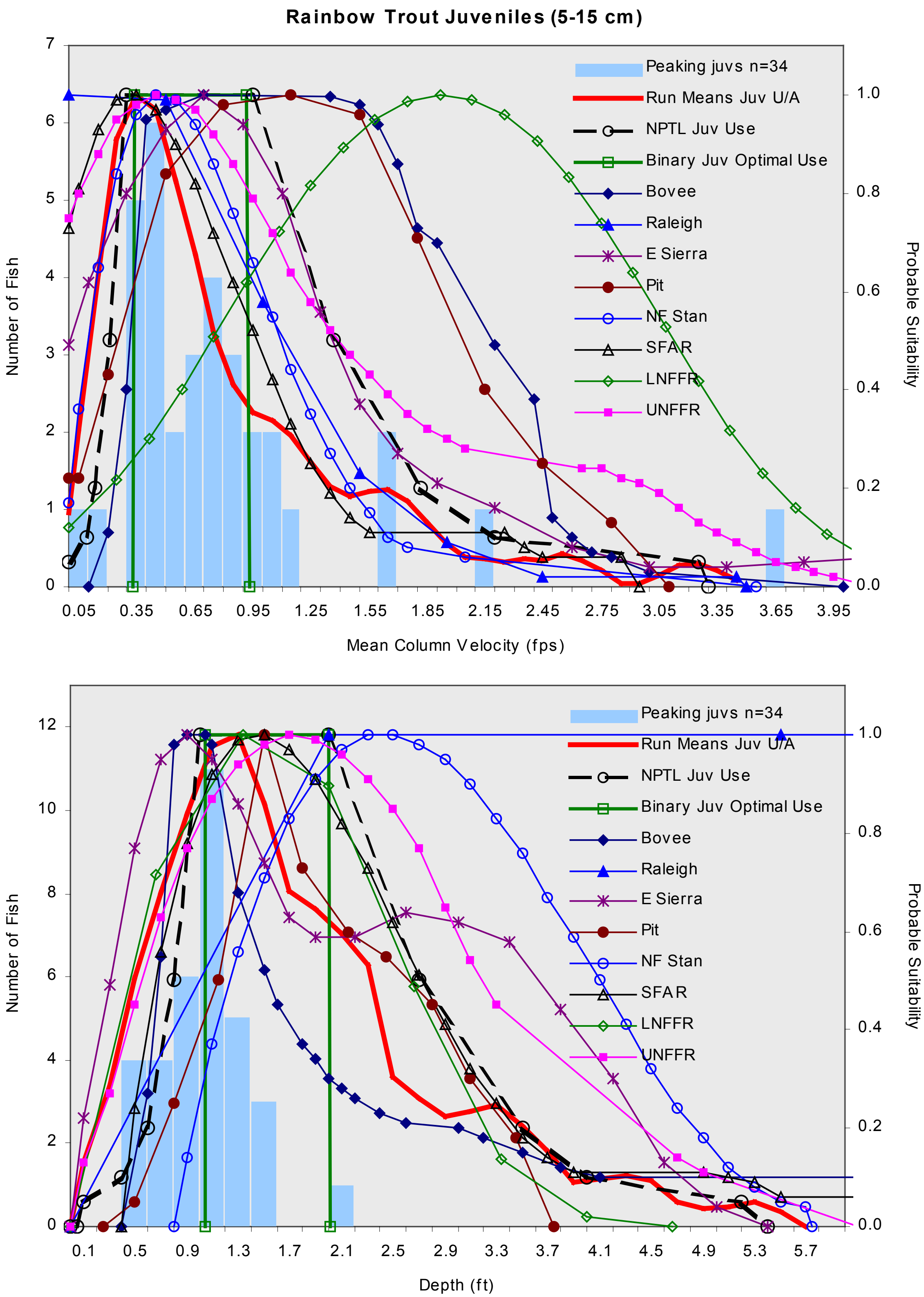


Figure 36. Frequency distributions of habitat use observations by rainbow trout juveniles in the Peaking reaches (OR and CA combined) compared to HSC curves from the Bypass reach and from other sources. See Table 9 for a description of other HSC.

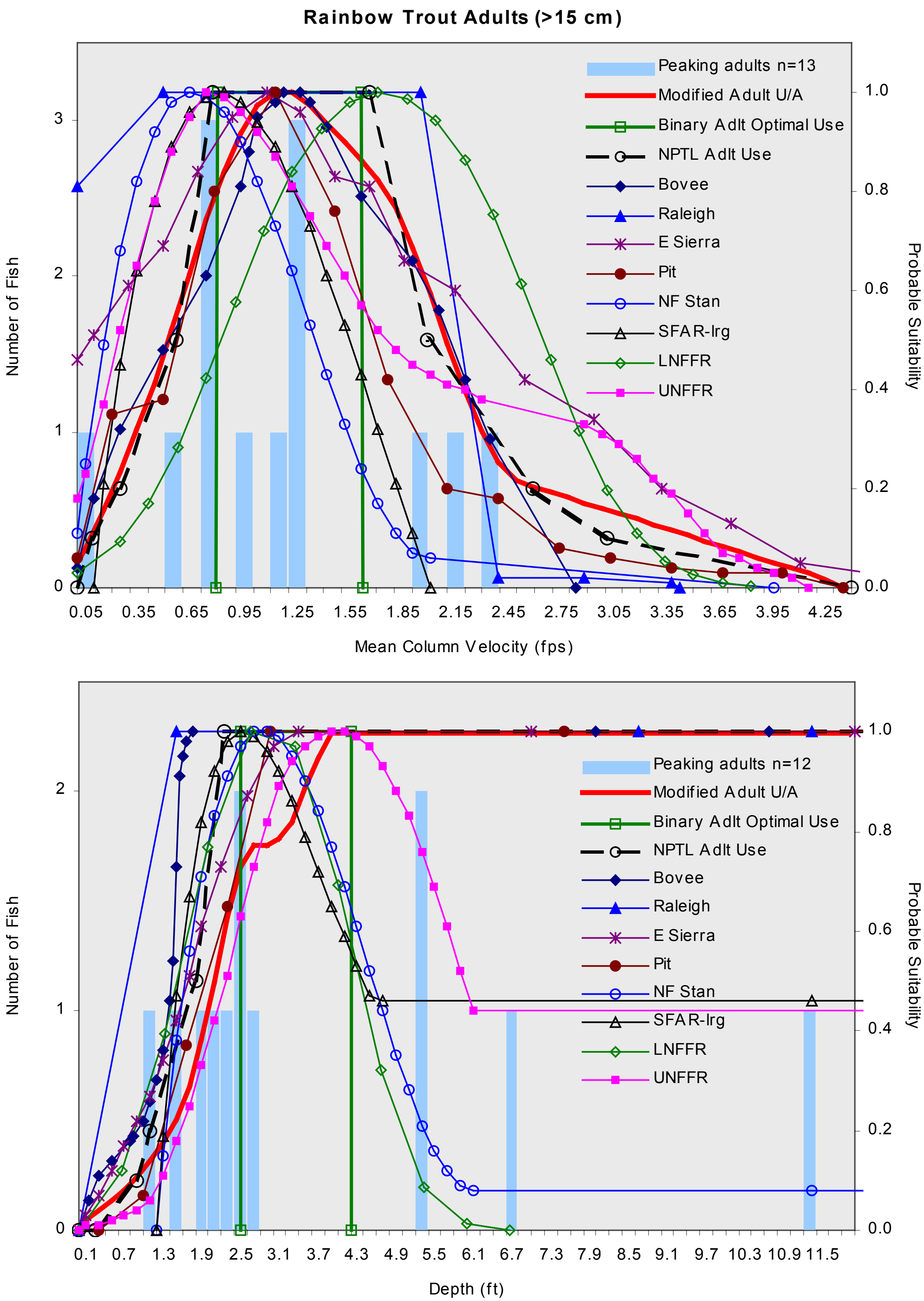


Figure 37. Frequency distributions of habitat use observations by rainbow trout adults in the Peaking reaches (OR and CA combined) compared to HSC curves from the Bypass reach and from other sources. See Table 9 for a description of other HSC.

analysis, HSC were not selected for spawning life-stages of suckers in the Upper Klamath project area.

Pre-survey dives made in the Bypass in June of 2002 suggested that suckers were relatively common, but HSC data collection in July through August produced only five observations of suckers (Table 7). Poor visibility conditions in the early summer of 2003 prevented the collection of HSC data until July, and no suckers were observed in 2003. Consequently, it is uncertain if suckers move into the Bypass reach during winter or spring months (presumably for spawning), but return to the peaking reaches prior to summer. Despite lesser effort, HSC data collection in the peaking reaches in the summer of 2003 produced 36 sucker observations, most of which were small juveniles 5-8cm in length (Figure 14, Table 7).

When sucker observations were combined across reaches, differences in habitat use by size class were obvious, despite the low sample sizes for fry (n=5) and adult (n=8) suckers (Figure 38). Adult suckers were observed in deeper (>2 ft), faster (>1 fps) water versus fry that were observed in shallow and slow water. Juveniles were found in intermediate depths and velocities.

Comparison of the juvenile observation data from the Upper Klamath project area with HSC developed for Sacramento suckers (*C. occidentalis*) in other rivers (Table 10) shows limited correspondence for velocities, but good agreement for depths with the Pit and Yosemite curves (Figure 39). Overall, the Pit HSC curve appears to best agrees with the site-specific depth and velocity observations for juvenile suckers. Sample sizes for fry and adults were insufficient to make confident comparisons, however HSC are available for rearing adult Sacramento suckers. A comparison of the eight adult smallscale observations with the Sacramento sucker curves again shows limited similarity in the velocity data, but good agreement in the depth data (Figure 40). The extremely low sample size for site-specific data prevents the selection of a “best HSC curve to represent adult suckers in the Upper Klamath project area.

Table 10. Source information for rainbow trout HSC curves from other locations.

Curve Name	Location	Season	Water Temps	Channel Characteristics Width	Flow	Slope	Lifestages	# HSC Points	Methods	Source
			(°F)	(ft)	(cfs)	(%)				
Yosemite	2 Yosemite streams	July-Aug	46-73		15-38	-	juv/adlt (juv 5-12cmSL)	116/399	Cat II, ?	Baltz & Moyle '84
LNFFR	Lower NF Feather (Poe,Cresta,Rock)	July-Aug	64-72	70-106	96-131	0.4-1.1	juv/adlt (>15cm)	88/76	Cat IV?, Presence-Absence	TRPA 2001
UNFFR	Upper NF Feather (Belden,Seneca)	June-Aug	57-72	~40-80	40-140	0.5-3+	adlt (>15cm)	89	equal-area, 4 methods: *(curve is composite of 5 methods)*	TRPA 2002
Pit	Pit River	-	-	~40-200	50-150	0.7-1.1	juv/adlt (?)	130/256	Cat III, reweighted to equalize effort	Baltz & Vondracek 1985

Other Species

Site-specific HSC curves have not been developed for sculpin or chubs in the Upper Klamath project area, however data was collected for 84 sculpins and for 25 chubs (Table 7). The benthic and cryptic nature of sculpin make the development and application of sculpin HSC of questionable utility, as previously described for suckers. Also, the application of a quantitative transferability tests (Thomas and Bovee 1993, Groshens and Orth 1994) for sculpin would also be significantly hampered by the difficulty of accurately identifying “unoccupied” locations due to the species cryptic appearance and hiding behavior. Because individuals may have been present, but not seen, at random measurement points, a location thus defined as “unoccupied” may have been in fact “occupied” by fish hiding beneath substrate elements. This is in contrast to most fish

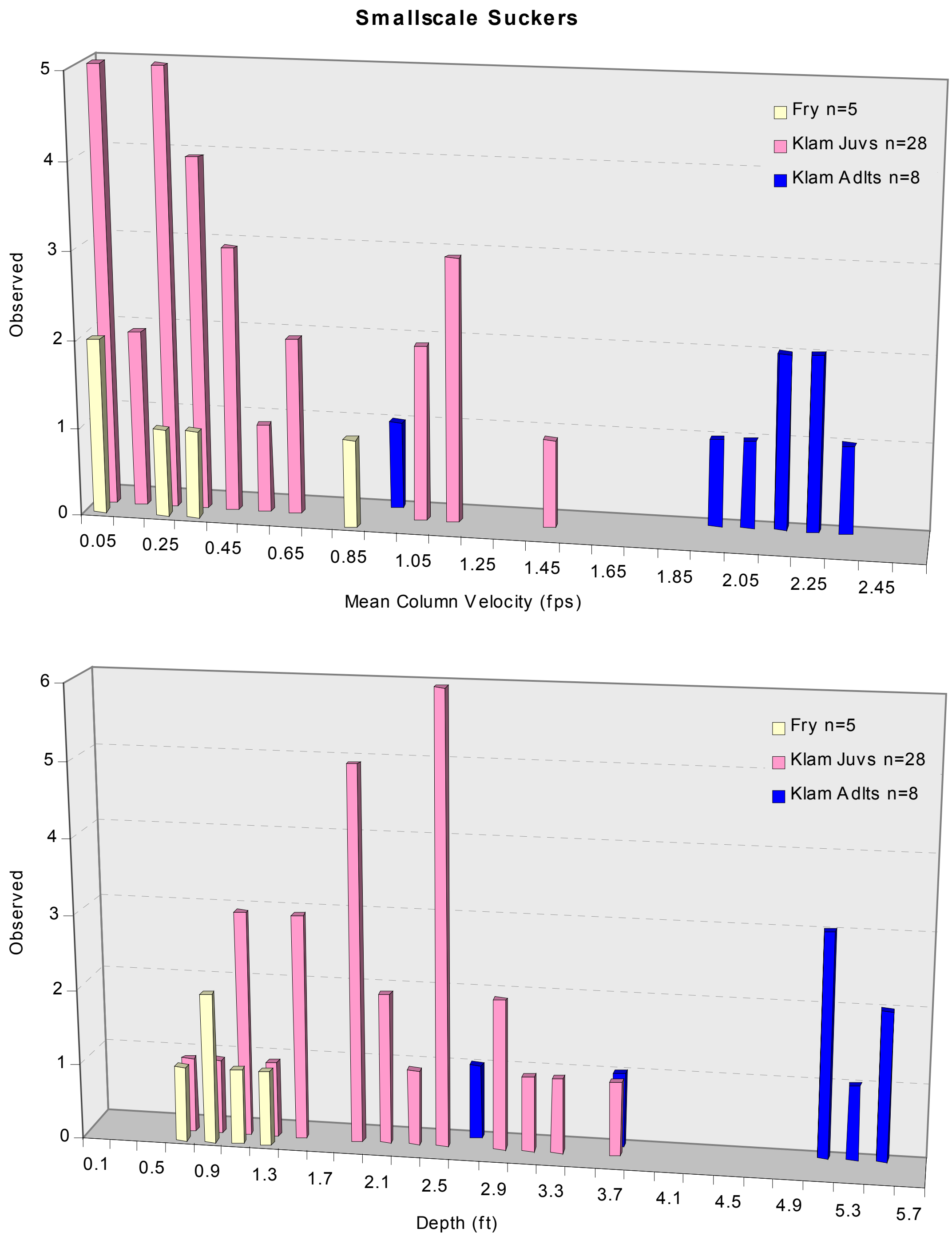
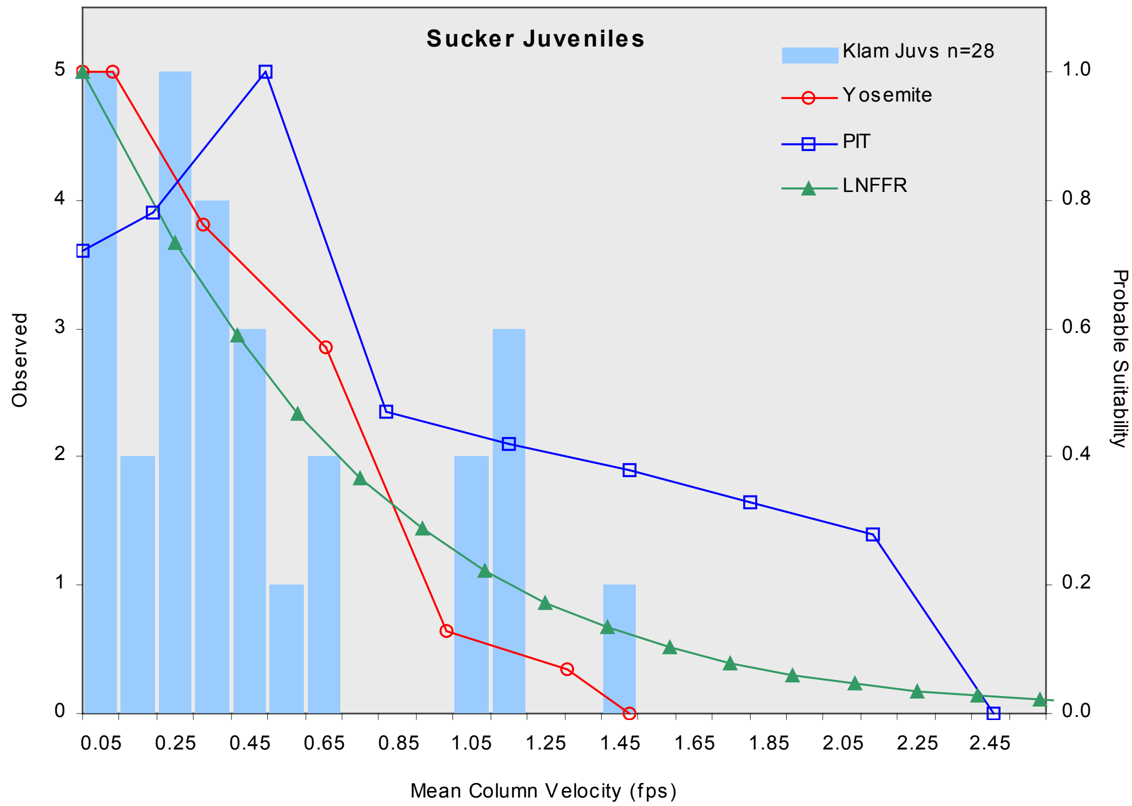


Figure 38. Comparison of habitat use observations for smallscale suckers according to size class, all reaches combined.



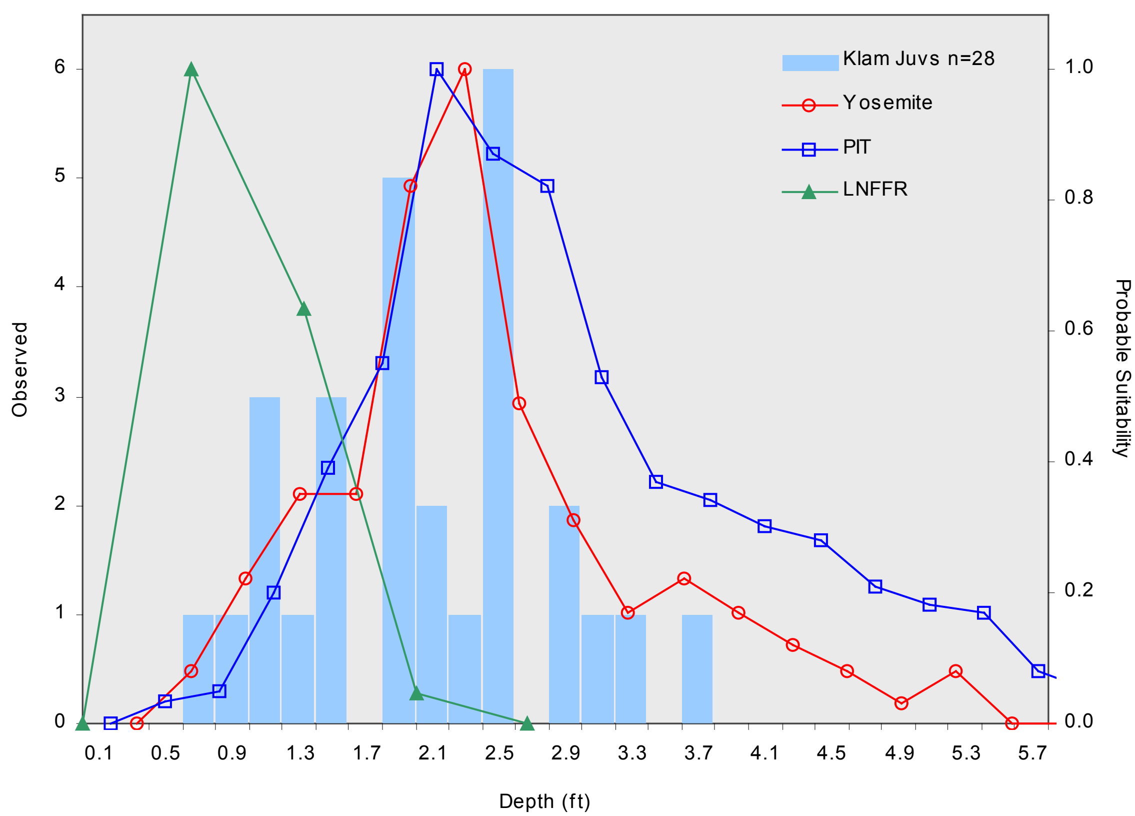


Figure 39. Comparison of habitat use observations for juvenile smallscale suckers with HSC curves from other sources. See Table 10 for descriptions of other HSC.

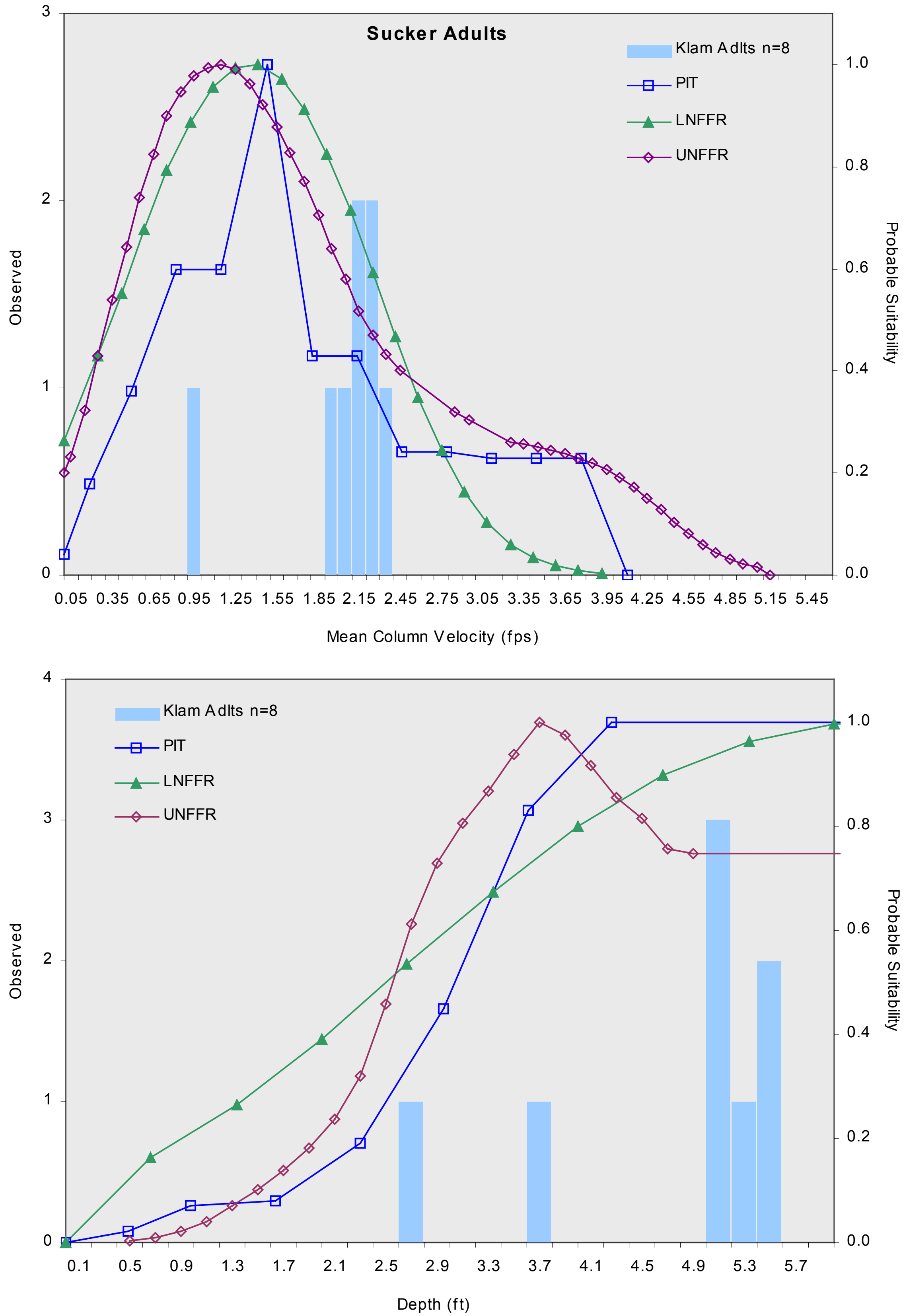


Figure 40. Comparison of habitat use observations for adult smallscale suckers with HSC curves from other sources. See Table 10 for descriptions of other HSC.

inhabiting the water column where occupied and unoccupied locations are more clearly recognized. In a similar light, the use of HSC curves to describe habitat requirements of chubs, which are largely pool dwelling and frequently roam in large schools, is contrary to the conventional application of HSC towards position-holding, drift-feeding species.

Nevertheless, the velocities and depths at which sculpins and chubs were observed are shown in Figure 41 and Figure 42, respectively. Most sculpin were found in velocities <1 fps, and at depths from 1-3 ft. Surprisingly, the frequency distributions for mean column and focal velocities appeared very similar, which is consistent with the relatively slow velocities selected by this species of sculpin. All but three chubs were seen in slow velocities (<1 fps) and shallow depths ≤3 ft. In general, the largest chubs were observed in the deepest and fastest water.

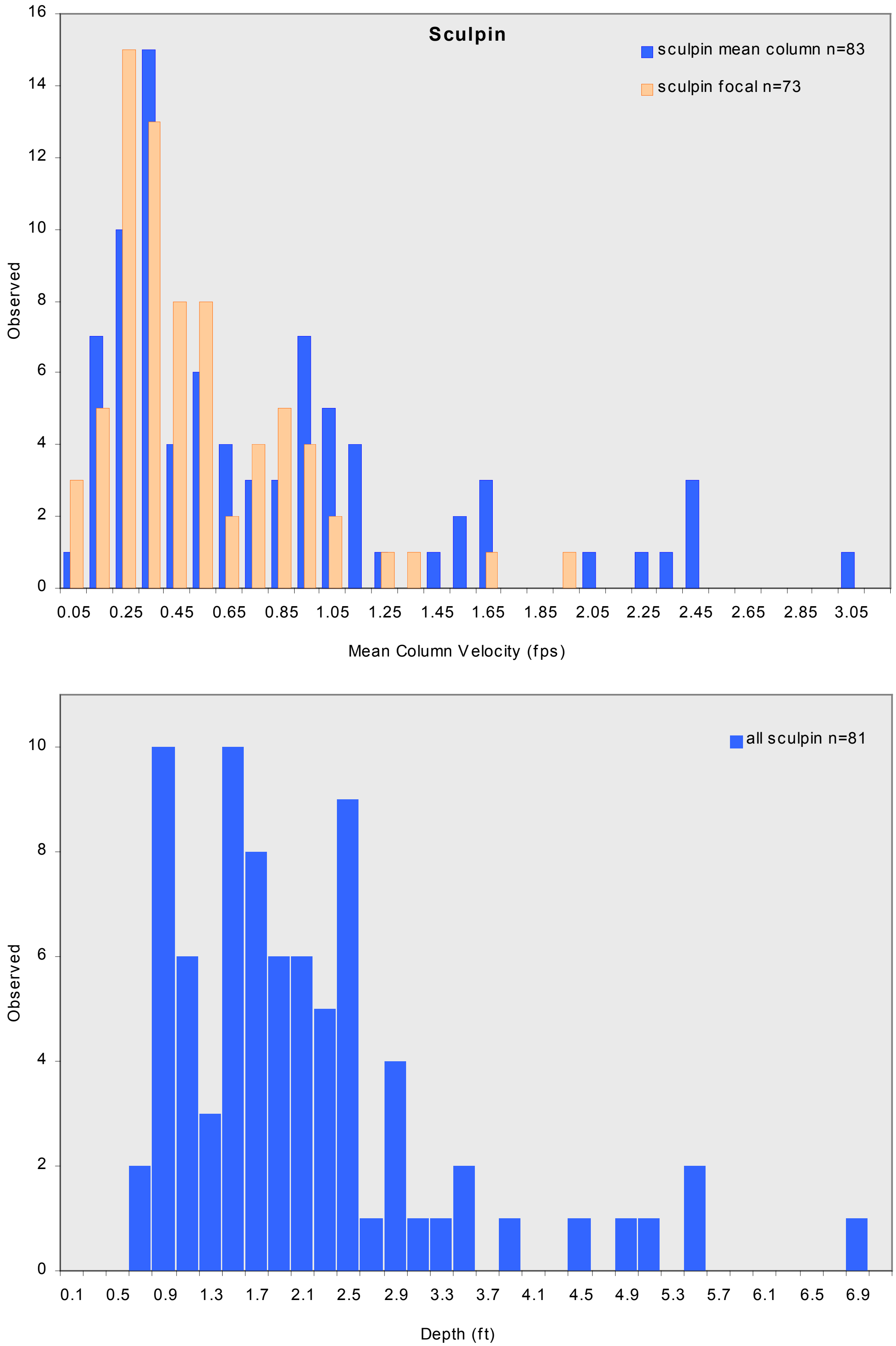


Figure 41. Frequency distributions of habitat use observations for sculpins in the upper Klamath River project area (all reaches combined).

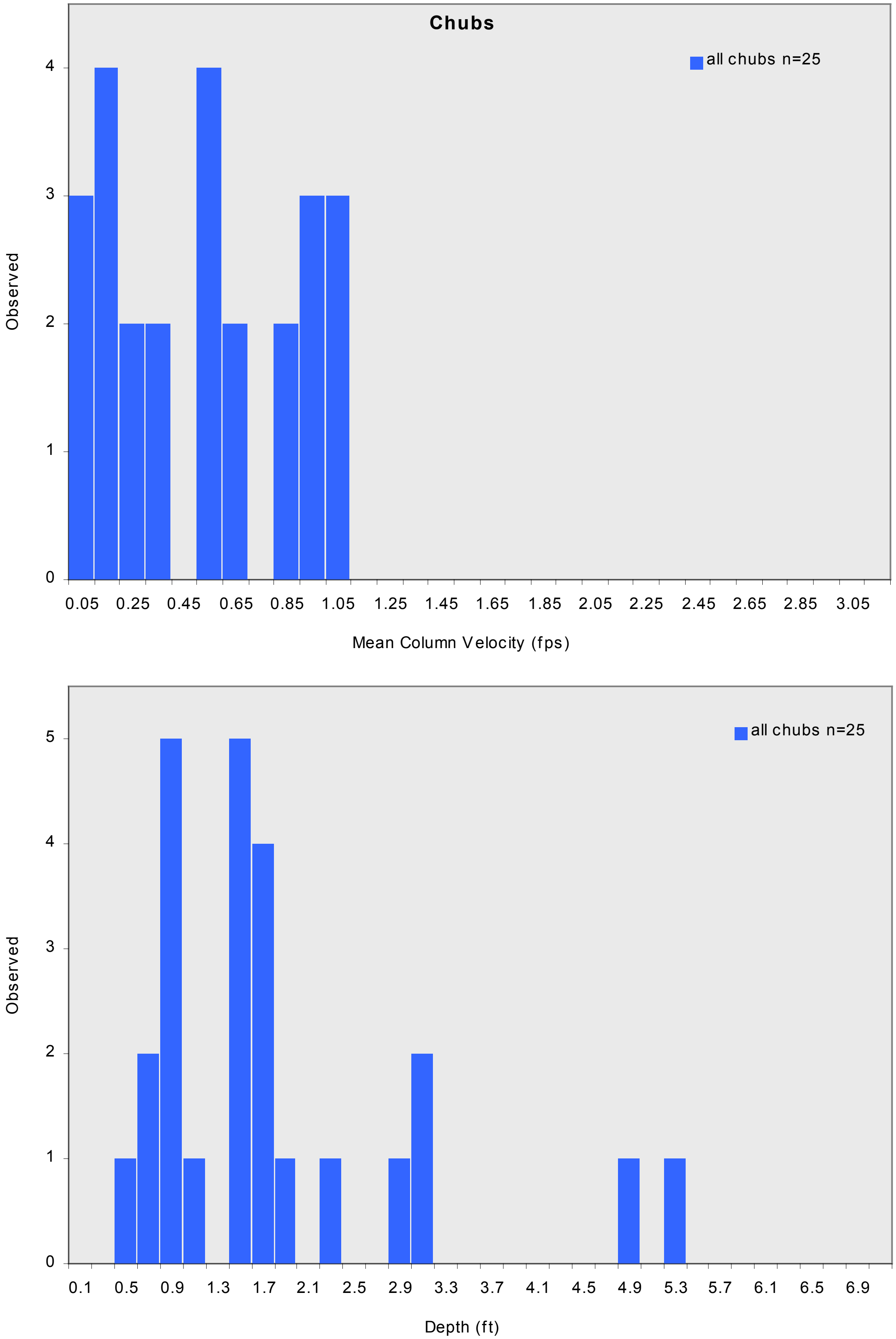


Figure 42. Frequency distributions of habitat use observations for chubs in the upper Klamath River project area (all reaches combined).

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Appendix A. Habitat Suitability Criteria (HSC) data collected in the Upper Klamath River, California and Oregon, 2002 and 2003. Data abbreviations are Reach: BP=Bypass, CA=California Peaking, OR=Oregon Peaking; Habitat Unit Type: DP=deep pool (subscripts h,b,t=head, body, tail), SP=shallow pool, RN=run, RF=riffle, PW=pocketwater, SC=side channel; Transect #: XS=cross-sectional transect, LB/RB=left/right bank transects; Species=CHB=chub, CRAP=crappie, LMP=lamprey, RBT=rainbow trout, SCP=sculpin, SKR=sucker; Fish sizes are cm FL; Fish Heights are relative depth (I.e., 0.0=surface, 1.0=bottom); Fish Activity: D=disturbed (no HSC data collected), F=feeding, H=holding, R=roaming, S=sleeping; depths, velocities, and distances are in ft or fps; see report for substrate and cover codes. Shear data is available upon request.

Rec			Seg-	Habitat Unit		Trans	Mark		#	Fish	Focal	Fish		Mean	Focal	Dist to		Substrate		Velocity Cover		Escape Cover		OVH	Turb
#	Year	Reach	ment	#	Type	#	#	Spec	Fish	Size	Ht	Activ	Depth	Veloc	Veloc	Bank	Dom	SubDom	Bovee	Type	Dist	Type	Dist	Cover	Cover
1	2002	BP	low	11	SP	XS 25	67	SCP	1	6	1.0	H	5.40	1.00	0.86	12.0	29	28	7.0	0	0.0	29	1.0	0	0
2	2002	BP	low	11	SP	XS 25	17	RBT	1	20	0.6	H	7.00	2.03	2.11	27.0	29	28	7.0	0	0.0	29	3.0	0	1
3	2002	BP	low	11	SP	XS 25	12	RBT	1	17	0.6	F	6.70	1.44	1.39	13.0	19	28	4.0	29	2.0	29	2.0	0	1
4	2002	BP	low	11	SP	XS 25	52	RBT	1	17	0.9	F	6.60	1.65	0.81	14.0	27	28	6.4	29	3.0	29	3.0	0	1
5	2002	BP	low	11	SP	XS 25	13	RBT	1	25	0.9	H	4.80	1.55	0.85	10.0	29	0	7.0	29	4.0	29	2.0	0	1
6	2002	BP	low	11	SP	LB 25	67	SCP	1	4	1.0	H	0.95	0.34	0.24	2.0	29	28	7.0	29	2.0	28	0.5	0	0
7	2002	BP	low	11	SP	LB 25	46	RBT	1	6	0.6	F	1.40	0.34	0.34	2.0	28	27	6.9	29	2.0	28	0.5	0	0
8	2002	BP	low	11	SP	LB 25	3	RBT	1	7	0.5	F	1.40	0.36	0.34	1.5	27	28	6.6	28	1.0	28	0.5	0	0
9	2002	BP	low	11	SP	LB 25	20	RBT	1	5	0.4	F	1.60	0.34	0.38	2.0	29	28	6.8	28	1.5	28	0.5	0	0
10	2002	BP	low	11	SP	LB 25	44	SCP	1	5	1.0	R	1.60	0.35	0.28	2.0	29	28	7.0	29	0.5	28	0.5	0	0
11	2002	BP	low	11	SP	LB 25	39	RBT	1	4	0.8	H	1.20	0.32	0.28	2.5	28	0	7.0	0	0.0	28	0.5	0	0
12	2002	BP	low	11	SP	LB 25	62	RBT	1	5	0.8	H	2.10	0.24	0.07	2.5	27	28	6.4	0	0.0	2	1.0	0	0
13	2002	BP	low	11	SP	LB 25	8	RBT	1	3	0.6	R	1.70	0.04	0.04	3.0	28	2	7.0	0	0.0	2	0.5	0	0
14	2002	BP	low	11	SP	LB 25	48	RBT	1	7	0.8	H	1.20	0.21	0.13	2.0	28	2	7.0	0	0.0	2	0.5	0	0
15	2002	BP	low	11	SP	LB 25	74	RBT	1	6	0.5	R	0.90	0.14	0.23	3.0	29	2	7.0	0	0.0	2	1.0	0	0
16	2002	BP	low	11	SP	LB 25	58	RBT	1	4	0.6	H	1.65	0.11		5.0	2	19	1.0	0	0.0	2	0.0	0	0
17	2002	BP	low	11	SP	LB 25	10	RBT	1	3	0.2	F	1.50	0.10	0.10	3.0	2	19	1.0	0	0.0	2	0.0	0	0
18	2002	BP	low	11	SP	LB 25	1	RBT	1	4	0.6	H	1.40	0.11		2.0	2	19	1.0	0	0.0	2	0.0	0	0
19	2002	BP	low	11	SP	RB 25	38	RBT	1	4	0.2	H	1.20	0.76	0.69	1.0	30	25	6.8	0	0.0	4	0.0	4	0
20	2002	BP	low	11	SP	RB 25	15	RBT	1	7	0.4	H	0.85	0.76	0.56	1.0	30	25	6.8	0	0.0	4	0.0	4	0
21	2002	BP	low	11	SP	RB 25	61	RBT	1	6	0.9	H	1.70	0.32	0.15	1.0	29	28	7.0	0	0.0	29	1.0	4	0
22	2002	BP	low	11	SP	RB 25	6	RBT	1	5		D													
23	2002	BP	low	11	SP	RB 25	36	SCP	1	7	1.0	H	1.60	0.82	0.56	2.0	29	28	7.0	0	0.0	29	1.0	4	0
24	2002	BP	low	11	SP	XS 61	24	RBT	1	12	0.5	H	4.40	1.35	1.25	14.0	29	27	6.3	30	3.0	30	3.0	0	0
25	2002	BP	low	11	SP	XS 61	61	SCP	1	8	1.0	H	1.85	0.96	0.88	4.0	25	23	5.6	28	1.0	28	1.0	0	0
26	2002	BP	low	11	SP	LB 61	12	RBT	1	3	0.2	H	1.60	0.09	0.09	3.0	2	3	3.7	0	0.0	2	0.0	0	0
27	2002	BP	low	11	SP	LB 61	67	SKR	1	7	0.8	R	1.90	0.28	0.41	5.0	26	25	6.0	2	1.0	2	1.0	0	0
28	2002	BP	low	11	SP	LB 61	17	CHB	1	11	0.8	R	2.25	0.93	0.84	5.0	19	26	6.0	2	2.5	2	2.5	0	0
29	2002	BP	low	11	SP	LB 61	56	SCP	1	7	1.0	H	2.40	0.68	0.44	4.5	27	26	6.0	2	1.5	2	1.5	0	0
30	2002	BP	low	11	SP	LB 61	15	SKR	1	15	0.8	F	2.40	0.69	0.65	5.0	26	27	6.0	0	0.0	2	2.0	0	0
31	2002	BP	low	11	SP	LB 61	39	RBT	1	4	0.6	F	1.00	0.32	0.32	1.0	26	19	6.0	0	0.0	2	1.0	4	0
32	2002	BP	low	11	SP	LB 61	3	RBT	1	6	0.8	F	1.80	1.25	0.76	4.0	26	25	6.0	27	1.0	27	1.0	0	0
33	2002	BP	low	11	SP	LB 61	67	RBT	1	7	0.8	H	1.40	0.81	0.87	2.0	23	22	5.3	28	2.0	28	2.0	4	0
34	2002	BP	low	11	SP	LB 61	74	RBT	1	7	0.8	R	2.00	1.45	1.01	3.0	25	26	6.0	0	0.0	28	1.0	0	0
35	2002	BP	low	11	SP	RB 61	68	RBT	1	5	0.8	H	2.95	0.20	0.17	4.0	28	19	7.0	0	0.0	2	0.5	0	0
36	2002	BP	low	11	SP	RB 61	33	RBT	1	3	0.8	H	1.00	0.17	0.07	1.0	28	19	7.0	0	0.0	2	1.0	0	0
37	2002	BP	low	11	SP	RB 61	43	RBT	1	4	0.4	H	1.50	0.00	0.07	3.0	27	19	6.0	0	0.0	2	0.5	0	0
38	2002	BP	low	11	SP	RB 61	61	CHB	1	8	0.9	H	1.70	0.00	0.00	5.0	28	19	7.0	0	0.0	2	0.5	0	0

Appendix A. (continued)

Rec			Seg-	Habitat Unit		Trans	Mark		#	Fish	Focal	Fish		Mean	Focal	Dist to	Substrate			Velocity Cover		Escape Cover		OVH	Turb
#	Year	Reach	ment	#	Type	#	#	Spec	Fish	Size	Ht	Activ	Depth	Veloc	Veloc	Bank	Dom	SubDom	Bovee	Type	Dist	Type	Dist	Cover	Cover
39	2002	BP	low	11	SP	RB 61	68	CHB	1	8	0.8	R	2.90	0.60	0.54	4.0	28	29	7.0	0	0.0	30	0.5	0	0
40	2002	BP	low	11	SP	RB 61	85	RBT	1	6	0.8	H	3.00	0.33	0.18	4.0	28	0	7.0	0	0.0	2	0.0	0	0
41	2002	BP	low	11	SP	RB 61	100	RBT	1	6	0.6	H	2.30	0.17	0.17	4.0	29	28	7.0	30	1.5	29	0.5	0	0
42	2002	BP	low	11	SP	RB 61	9	RBT	2	5		D													
43	2002	BP	low	11	SP	XS 97	52	RBT	1	18	0.8	F	4.20	1.18	1.02	18.0	29	30	6.8	30	0.5	30	0.5	0	1
44	2002	BP	low	11	SP	XS 97	59	RBT	1	19	0.8	H	3.70	1.24	1.70	13.0	29	30	6.9	30	0.5	30	0.5	0	1
45	2002	BP	low	11	SP	XS 97	47	RBT	1	16	0.6	H	3.90	1.52	2.24	16.0	29	28	7.0	30	4.0	30	2.0	0	0
46	2002	BP	low	11	SP	XS 97	60	RBT	1	17	0.8	H	3.50	0.76	0.97	13.0	29	28	7.0	30	4.0	30	2.0	0	0
47	2002	BP	low	11	SP	XS 97	48	SCP	1	7	1.0	H	4.40	0.72	0.43	13.0	29	28	6.8	30	2.0	27	0.5	0	0
48	2002	BP	low	11	SP	XS 97	47	RBT	1	25		D													
49	2002	BP	low	11	SP	LB 97	26	RBT	1	4	0.6	R	1.70	0.50	0.50	2.5	27	19	6.0	0	0.0	2	0.0	4	0
50	2002	BP	low	11	SP	LB 97	33	RBT	1	5	0.8	R	1.60	0.60	0.42	3.5	26	27	6.0	0	0.0	2	0.5	0	0
51	2002	BP	low	11	SP	LB 97	89	RBT	1	5	0.8	R	1.70	0.77	0.73	3.0	26	27	6.0	0	0.0	2	1.0	0	0
52	2002	BP	low	11	SP	LB 97	20	RBT	1	8	0.8	R	2.30	1.07	0.56	3.5	27	28	6.3	0	0.0	28	0.5	0	0
53	2002	BP	low	11	SP	LB 97	12	SCP	1	8	1.0	F	1.90	0.97	0.76	2.5	26	27	6.1	0	0.0	27	0.5	0	0
54	2002	BP	low	11	SP	LB 97	43	RBT	1	5	0.8	F	1.70	0.72	0.61	3.0	26	27	6.1	0	0.0	28	1.0	0	0
55	2002	BP	low	11	SP	LB 97	67	RBT	1	5	0.8	R	1.35	0.28	0.32	1.5	26	19	6.0	0	0.0	28	1.0	4	0
56	2002	BP	low	11	SP	LB 97	38	RBT	1	6	0.6	R	2.25	1.06	1.06	4.5	27	28	6.1	0	0.0	27	0.5	0	0
57	2002	BP	low	11	SP	LB 97	30	RBT	1	7	0.8	F	3.00	1.27	0.87	5.0	27	28	6.4	0	0.0	28	0.5	0	0
58	2002	BP	low	11	SP	LB 97	37	RBT	1	7	0.8	R	1.70	1.44	0.97	4.0	27	26	6.0	0	0.0	27	0.0	0	0
59	2002	BP	low	11	SP	LB 97	19	RBT	1	5	0.8	R	1.40	0.66	0.53	3.0	26	25	6.0	0	0.0	27	1.0	0	0
60	2002	BP	low	11	SP	LB 97	13	RBT	1	5	0.8	R	1.35	1.02	0.80	3.0	26	28	6.4	0	0.0	28	0.5	0	0
61	2002	BP	low	11	SP	LB 97	15	RBT	1	6	0.6	R	1.85	0.93	0.93	3.0	27	26	6.0	0	0.0	27	0.5	0	0
62	2002	BP	low	11	SP	LB 97	36	RBT	1	6	0.8	R	1.80	1.06	0.70	3.0	27	25	6.2	0	0.0	27	0.5	0	0
63	2002	BP	low	11	SP	LB 97	61	RBT	1	6	0.8	R	1.60	1.08	0.76	5.0	27	25	6.2	0	0.0	27	0.5	0	0
64	2002	BP	low	11	SP	LB 97	85	RBT	1	6	0.8	R	1.20	0.68	0.60	3.5	27	26	6.2	0	0.0	27	0.5	0	0
65	2002	BP	low	11	SP	LB 97	9	SCP	1	10	0.9	H	1.50	1.17	0.55	5.0	25	27	6.3	0	0.0	28	1.0	0	0
66	2002	BP	low	11	SP	LB 97	68	RBT	1	6	0.8	R	1.30	0.66	0.52	3.0	26	27	6.1	0	0.0	27	0.5	0	0
67	2002	BP	low	11	SP	LB 97	61	RBT	1	5	0.8	H	1.10	0.48	0.42	2.5	26	27	6.2	0	0.0	28	0.5	0	0
68	2002	BP	low	11	SP	LB 97	100	RBT	1	4	0.8	F	0.90	0.26	0.23	2.0	27	26	6.1	0	0.0	2	0.5	2	0
69	2002	BP	low	11	SP	RB 97	17	RBT	1	4	0.8	F	1.00	0.46	0.45	6.0	28	0	7.0	29	3.0	28	0.5	0	0
70	2002	BP	low	11	SP	RB 97	74	RBT	1	3	0.6	R	1.30	0.10	0.10	6.0	28	27	6.7	28	1.0	29	2.0	0	0
71	2002	BP	low	11	SP	RB 97	6	RBT	1	5	0.8	H	1.05	0.39	0.34	6.0	28	0	7.0	29	3.0	28	0.0	0	0
72	2002	BP	low	11	SP	RB 97	3	RBT	1	7	0.8	R	1.40	0.33	0.32	6.0	28	27	6.8	29	2.0	29	2.0	0	0
73	2002	BP	low	11	SP	RB 97	56	RBT	1	3	0.4	R	1.05	0.31	0.27	6.0	29	28	6.8	29	1.0	29	1.0	0	0
74	2002	BP	low	11	SP	RB 97	67	RBT	1	4	0.2	H	1.60	0.26	0.24	1.0	26	28	6.3	0	0.0	28	0.5	0	0
75	2002	BP	low	11	SP	RB 97	39	RBT	1	4	0.9	H	0.40	0.33	0.38	4.0	29	0	7.0	0	0.0	29	1.5	0	0
76	2002	BP	low	11	SP	RB 97	68	RBT	1	22	0.6	F	3.30	1.39	1.42	8.0	28	27	6.9	29	2.0	29	2.0	0	1
77	2002	BP	low	11	SP	RB 97	40	SCP	1	3	1.0	H	1.90	0.12	0.22	5.0	27	28	6.4	28	0.5	28	2.5	4	0
78	2002	BP	low	11	SP	RB 97	29	RBT	1	5	0.9	R		0.51	0.39	4.0	28	27	6.8	0	0.0	28	1.0	0	0
79	2002	BP	low	11	SP	RB 97	8	SCP	1	5	1.0	H	3.20	0.29	0.20	1.0	28	27	6.7	0	0.0	28	0.0	0	0
80	2002	BP	low	11	SP	RB 97	61	RBT	1	4	0.8	R	2.20	0.65	0.48	2.0	28	27	6.8	0	0.0	28	0.5	0	0
81	2002	BP	low	11	SP	RB 97	44	RBT	1	12	0.8	R	2.10	0.83	0.52	4.0	28	27	6.8	0	0.0	2	0.5	0	0
82	2002	BP	low	21	RN	XS 38	17	RBT	1	22	0.8	F	4.00	1.83	0.54	10.0	27	30	6.4	29	1.5	29	2.0	0	1

Appendix A. (continued)

Rec #	Year	Reach	Seg-ment	Habitat Unit #	Habitat Unit Type	Trans #	Mark #	Spec	# Fish	Fish Size	Focal Ht	Fish Activ	Depth	Mean Veloc	Focal Veloc	Dist to Bank	Substrate Dom	Substrate SubDom	Substrate Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
83	2002	BP	low	21	RN	XS 38	28	RBT	1	16	0.8	R	6.10	2.20	1.01	12.0	30	28	7.0	30	2.0	30	2.0	0	1
84	2002	BP	low	21	RN	LB 38	39	RBT	1	6	0.8	H	2.50	0.46	0.39	2.0	26	25	6.0	29	1.0	29	1.0	4	0
85	2002	BP	low	21	RN	LB 38	33	RBT	1	6	0.6	R	2.10	0.34	0.34	2.0	30	27	7.0	30	2.0	30	2.0	0	0
86	2002	BP	low	21	RN	LB 38	8	RBT	1	11	0.8	R	3.10	1.47	1.01	7.0	26	27	6.4	29	1.0	29	1.0	0	0
87	2002	BP	low	21	RN	LB 38	12	RBT	1	6	0.6	F	3.00	0.61	0.68	5.0	29	0	7.0	30	0.0	30	0.0	0	0
88	2002	BP	low	21	RN	RB 38	35	RBT	1	6	0.8	R	1.50	0.52	0.56	2.5	30	2	7.0	30	1.0	30	1.0	4	0
89	2002	BP	low	21	RN	RB 38	46	RBT	1	7	0.8	H	4.00	0.62	0.44		29	2	7.0	30	2.5	30	2.5		
90	2002	BP	low	21	RN	XS 80	61	RBT	1	22	0.8	H	5.20	1.36	1.18	11.0	19	28	7.0	30	2.0	30	2.0	0	1
91	2002	BP	low	21	RN	XS 80	67	RBT	1	22		D													
92	2002	BP	low	21	RN	XS 80	64	RBT	1	20		D													
93	2002	BP	low	21	RN	XS 80	7	RBT	1	28	0.8	H	4.30	2.28	1.31	21.0	28	26	6.6	30	1.0	29	0.5	0	2
94	2002	BP	low	21	RN	LB 80	6	RBT	1	4	0.6	H	0.40	1.21	1.21	4.0	30	29	7.0	30	1.5	30	1.5	0	1
95	2002	BP	low	21	RN	LB 80	33	RBT	1	4	0.8	H	0.60	0.30	0.32	1.0	28	0	7.0	0	0.0	28	0.0	4	0
96	2002	BP	low	21	RN	LB 80	12	RBT	1	8	0.8	H	0.70	0.99	1.46	1.0	28	29	7.0	28	1.0		0.5	4	1
97	2002	BP	low	21	RN	LB 80	68	RBT	1	5	0.8	H	0.50	0.75	0.51	1.0	28	0	7.0	28	0.5	4	0.5	4	1
98	2002	BP	low	21	RN	LB 80	106	RBT	1	10	0.8	H	1.50	0.48	0.52	1.0	19	0	3.6	0	0.0	12	0.5	4	1
99	2002	BP	low	21	RN	RB 80	30	RBT	1	6	0.9	H	1.10	0.87	0.89	1.0	30	27	6.8	0	0.0	30	1.0	4	0
100	2002	BP	low	21	RN	RB 80	55	RBT	1	7	0.4	H	2.20	0.27	0.22	4.0	29	30	7.0	30	2.0	2	0.5	4	1
101	2002	BP	low	21	RN	RB 80	39	RBT	1	30	0.6	H	4.00	0.99	0.80	7.0	29	28	7.0	30	3.0	30	2.0	0	1
102	2002	BP	low	21	RN	RB 80	17	RBT	1	15	0.8	H	4.30	0.83	0.56	12.0	28	27	6.6	30	2.0	30	2.0	0	1
103	2002	BP	low	21	RN	RB 80	38	RBT	1	20	0.8	H	3.20	0.83	1.17		28	27	6.8	30	2.0	30	2.0	0	1
104	2002	BP	low	21	RN	RB 80	51	RBT	1	11	0.4	F	2.80	1.06	0.85		27	30	6.3	29	1.0	29	1.0		
105	2002	BP	low	26	PW	LB 1	44	RBT	1	10	0.8	H	0.90	0.20		1.0	28	27	6.6	0	0.0	4	0.5	4	1
106	2002	BP	low	26	PW	LB 1	61	SCP	1	3	1.0	R	0.90	0.48	0.38	1.0	29	0	7.0	0	0.0	30	0.5	4	1
107	2002	BP	low	26	PW	LB 1	38	SCP	1	4	1.0	H	1.50	0.41	0.37	3.0	29	26	6.6	0	0.0	29	0.5	0	0
108	2002	BP	low	26	PW	LB 1	67	RBT	1	8	0.8	H	2.00	1.01	0.30	1.0	26	20	5.8	29	0.5	29	0.5	4	1
109	2002	BP	low	26	PW	RB 1	68	RBT	1	8	0.6	F	3.10	0.59	0.58	4.0	30	20	7.0	30	1.0	30	1.0	0	1
110	2002	BP	low	26	PW	RB 1	26	RBT	1	17	0.8	H	2.90	0.70	0.34	7.0	20	23	4.4	30	2.0	30	1.5	0	1
111	2002	BP	low	26	PW	RB 1	43	SKR	1	15	1.0	H	3.65	1.45	0.83	7.0	30	0	7.0	30	1.0	30	1.0	0	1
112	2002	BP	low	26	PW	RB 1	85	RBT	1	7	0.6	H	1.90	0.29	0.29	2.0	29	19	7.0	0	0.0	2	0.5	0	0
113	2002	BP	low	26	PW	RB 1	63	RBT	1	5	0.6	F	1.80	0.29	0.29	1.0	29	19	7.0	0	0.0	2	0.5	4	0
114	2002	BP	low	26	PW	RB 1	33	RBT	1	7	0.8	H	2.70	0.51	0.55	3.5	30	19	7.0	0	0.0	2	0.5	0	0
115	2002	BP	low	26	PW	RB 1	46	RBT	1	6	0.8	H	2.50	0.51	0.58	3.0	30	2	7.0	0	0.0	2	0.5	0	0
116	2002	BP	low	26	PW	RB 1	35	RBT	1	5	0.8	F	2.70	0.44	0.48	3.0	30	19	7.0	0	0.0	2	1.0	0	0
117	2002	BP	low	26	PW	RB 1	39	RBT	1	5	0.6	H	2.50	0.73	0.73	3.0	30	2	7.0	0	0.0	2	1.0	0	0
118	2002	BP	low	26	PW	RB 1	6	RBT	1	6	0.8	H	3.20	0.93	0.77	2.5	29	19	7.0	30	2.0	29	0.5	0	0
119	2002	BP	low	26	PW	RB 1	13	RBT	1	7	0.8	H	3.15	1.10	0.71	4.0	29	20	7.0	30	2.0	29	0.5	0	0
120	2002	BP	low	30	RF	LB11	43	RBT	1	6	0.8	H	1.00	0.77	0.73	0.5	22	30	4.6	30	1.0	30	1.0	4	0
121	2002	BP	low	30	RF	LB11	15	RBT	1	5	0.6	F	1.10	0.18	0.18	1.0	29	27	6.5	30	1.5	30	1.5	4	0
122	2002	BP	low	30	RF	LB11	46	RBT	1	4	0.6	H	0.70	0.20	0.20	0.5	20	27	4.0	0	0.0	13	0.5	4	0
123	2002	BP	low	30	RF	LB11	68	RBT	1	7	0.8	H	0.80	0.41	0.33	1.0	20	27	4.0	0	0.0	4	0.5	4	0
124	2002	BP	low	30	RF	LB11	12	RBT	1	8	0.8	H	1.10	0.34	0.34	3.0	20	28	4.0	13	0.5	13	0.5	4	0
125	2002	BP	low	30	RF	XS1	67	RBT	1	20	0.6	R	2.40	1.21	1.21	20.0	28	29	7.0	29	1.0	29	1.0	0	2
126	2002	BP	low	30	RF	XS1	6	SCP	1	10	1.0	H	1.50	0.66	0.67	24.0	29	0	7.0	30	1.5	30	1.5	0	0

Appendix A. (continued)

Rec			Seg-	Habitat Unit		Trans	Mark		#	Fish	Focal	Fish		Mean	Focal	Dist to	Substrate			Velocity Cover		Escape Cover		OVH	Turb
#	Year	Reach	ment	#	Type	#	#	Spec	Fish	Size	Ht	Activ	Depth	Veloc	Veloc	Bank	Dom	SubDom	Bovee	Type	Dist	Type	Dist	Cover	Cover
127	2002	BP	low	30	RF	XS1	56	RBT	1	25	0.8	R	1.50	0.94	0.81	32.0	22	20	5.5	29	1.0	30	1.0	0	0
128	2002	BP	low	30	RF	XS1	61	RBT	1	20	0.8	H	3.00	1.01	0.68	36.0	25	27	6.5	30	1.0	30	1.0	0	1
129	2002	BP	low	30	RF	XS1	13	RBT	1	17	0.6	F	3.25	0.87	0.80	40.0	30	28	7.0	29	1.0	29	1.0	0	1
130	2002	BP	low	30	RF	XS1	33	RBT	1	15	0.6	F	3.30	0.72	0.74	42.0	28	30	7.0	29	2.0	29	2.0	0	1
131	2002	BP	low	30	RF	XS1	17	RBT	1	20	0.6	F	2.60	0.98	1.03	40.0	30	0	7.0	28	2.0	28	3.0	0	1
132	2002	BP	low	30	RF	RB11	67	RBT	1	6	0.8	H	1.60	1.18	1.47	0.5	29	21	5.4	30	1.0	30	1.0	0	1
133	2002	BP	low	30	RF	RB11	68	RBT	1	16	0.9	H	2.20	1.65	1.48	0.5	29	21	7.0	30	0.5	30	0.5	4	2
134	2002	BP	low	38	RN	LB26	17	RBT	1	20	1.0	H	3.30	0.44	0.34	7.0	30	29	7.0	30	0.0	30	0.0	0	0
135	2002	BP	low	38	RN	LB26	47	SCP	1	7	1.0	H	2.40	0.38	0.54	6.0	30	0	7.0	30	1.0	30	1.0	0	1
136	2002	BP	low	38	RN	LB26	63	RBT	1	8	0.8	H	3.50	0.75	0.12	5.0	21	20	4.5	30	0.5	30	0.5	0	1
137	2002	BP	low	38	RN	LB26	43	RBT	1	11	0.8	H	3.10	0.43	0.24	3.0	20	2	4.0	30	0.5	30	0.5	0	1
138	2002	BP	low	38	RN	RB26	33	RBT	1	5	0.8	H	2.00	0.29	0.24	4.0	29	20	7.0	30	1.0	30	1.0	0	0
139	2002	BP	low	38	RN	RB26	38	SCP	1	9	1.0	R	2.30	0.39	0.26	5.0	29	20	7.0	30	1.0	30	1.0	0	0
140	2002	BP	low	38	RN	RB26	1	RBT	1	3	0.8	R	1.60	0.14	0.11	2.0	19	15	3.0	30	1.0	30	1.0	0	0
141	2002	BP	low	38	RN	RB26	12	RBT	1	5	0.6	F	2.10	0.28	0.28	3.0	20	19	4.0	30	2.0	30	2.0	0	0
142	2002	BP	low	38	RN	RB26	37	RBT	1	5	0.8	H	1.00	0.35	0.34	2.0	27	19	6.6	29	0.5	29	0.5	0	0
143	2002	BP	low	56	RF	LB14	7	RBT	1	5	0.6	H	0.70	0.85	0.85	3.0	24	25	5.4	25	1.0	26	0.5	0	1
144	2002	BP	low	56	RF	LB14	54	RBT	1	7	0.8	H	0.70	0.76	0.54	3.0	24	25	5.2	26	1.0	26	1.0	0	1
145	2002	BP	low	56	RF	LB14	17	RBT	1	3	0.6	H	0.65	0.35	0.35	1.0	25	24	5.6	0	0.0	26	0.5	4	0
146	2002	BP	low	56	RF	LB14	63	RBT	1	6	0.8	H	0.60	0.19	0.18	1.0	25	19	6.0	0	0.0	26	0.5	4	0
147	2002	BP	low	56	RF	LB14	59	RBT	1	4	0.8	H	0.80	0.33	0.23	1.5	26	24	5.5	0	0.0	25	0.0	4	0
148	2002	BP	low	56	RF	LB14	56	RBT	1	4	0.6	H	0.70	0.00	0.00	1.0	19	20	3.7	0	0.0	4	0.5	4	0
149	2002	BP	low	56	RF	LB14	64	RBT	1	4	0.4	H	0.90	0.41	0.33	1.5	25	24	5.6	0	0.0	28	0.0	0	0
150	2002	BP	low	56	RF	LB14	62	SCP	1	7	1.0	H	1.00	0.57	0.49	0.5	25	24	5.5	0	0.0	25	0.0	0	0
151	2002	BP	low	56	RF	LB14	48	RBT	1	4	0.2	H	1.10	0.61	0.57	1.0	20	23	4.2	0	0.0	2	0.5	0	0
152	2002	BP	low	56	RF	LB14	43	RBT	1	3	0.2	H	1.20	0.23	0.24	1.0	23	25	5.3	0	0.0	2	0.0	4	0
153	2002	BP	low	56	RF	LB14	39	RBT	1	6	0.8	F	1.00	0.67	0.36	2.0	24	21	5.3	0	0.0	2	1.0	0	0
154	2002	BP	low	56	RF	LB14	67	RBT	1	6	0.8	H	0.90	0.75	0.32	4.0	23	21	4.9	0	0.0	2	1.5	0	0
155	2002	BP	low	56	RF	LB14	68	RBT	1	3	0.1	F	0.70	0.13	0.21	2.0	25	19	6.0	0	0.0	2	0.0	0	0
156	2002	BP	low	56	RF	LB14	30	RBT	1	4	0.9	H	0.60	1.13	0.85	4.0	24	20	4.7	0	0.0	2	2.0	0	0
157	2002	BP	low	56	RF	LB14	79	RBT	1	5	0.9	H	0.80	0.86	0.07	1.0	25	21	5.7	0	0.0	4	1.0	4	0
158	2002	BP	low	56	RF	LB14	46	RBT	1	3	0.6	H	0.40	0.35	0.35	4.0	19	23	4.1	0	0.0	2	0.5	0	0
159	2002	BP	low	56	RF	LB14	55	RBT	1	5	0.8	H	0.50	0.47	0.59	4.0	20	21	4.2	0	0.0	4	0.5	0	0
160	2002	BP	low	56	RF	LB14	39	RBT	1	7	0.8	H	0.70	0.43	0.49	1.0	20	21	4.3	0	0.0	4	0.5	0	0
161	2002	BP	low	56	RF	XS14	43	RBT	1	8	0.9	H	0.90	0.92	0.61	25.0	28	0	7.0	28	2.0	28	1.0	0	1
162	2002	BP	low	56	RF	XS14	55	RBT	1	9	0.9	H	1.20	0.53	0.34	25.0	21	26	5.6	27	1.0	27	1.0	0	0
163	2002	BP	low	56	RF	XS14	7	RBT	1			D													
164	2002	BP	low	56	RF	XS14	62	RBT	1			D													
165	2002	BP	low	56	RF	XS14	56	RBT	1	22	0.8	F	1.10	0.93	0.97	37.0	28	27	6.7	28	1.0	28	1.0	0	1
166	2002	BP	low	56	RF	RB14	51	RBT	1	5	0.8	H	1.00	0.23	0.18	4.0	29	28	7.0	0	0.0	28	0.5	0	0
167	2002	BP	low	56	RF	RB14	46	RBT	1	26	0.8	H	1.20	0.25	0.17	3.0	28	29	7.0	0	0.0	30	1.0	0	0
168	2002	BP	low	56	RF	RB14	54	RBT	1	8	0.9	H	1.50	1.01	1.40	4.0	29	28	7.0	30	2.0	29	1.5	0	1
169	2002	BP	low	56	RF	RB14	17	RBT	1	7	0.9	H	1.50	0.92	1.16	4.0	29	28	7.0	30	2.0	29	1.5	0	1
170	2002	BP	low	56	RF	RB14	48	RBT	1	6	0.9	H	0.70	0.45	0.43	2.0	29	0	7.0	0	0.0	28	2.0	0	0

Appendix A. (continued)

Rec			Seg-	Habitat Unit		Trans	Mark		#	Fish	Focal	Fish		Mean	Focal	Dist to		Substrate		Velocity Cover		Escape Cover		OVH	Turb
#	Year	Reach	ment	#	Type	#	#	Spec	Fish	Size	Ht	Activ	Depth	Veloc	Veloc	Bank	Dom	SubDom	Bovee	Type	Dist	Type	Dist	Cover	Cover
171	2002	BP	low	56	RF	RB14	64	RBT	1	4	0.2	H	1.10	0.61	0.58	3.0	29	0	7.0	0	0.0	29	1.0	0	0
172	2002	BP	low	56	RF	RB14	59	RBT	1	4	0.2	H	1.20	0.50	0.45	2.5	29	28	7.0	0	0.0	28	0.5	0	0
173	2002	BP	low	56	RF	RB14	34	RBT	1	5	0.6	H	1.30	0.37	0.37	2.5	29	28	7.0	0	0.0	28	0.5	0	0
174	2002	BP	low	56	RF	RB14	53	RBT	1	5	0.8	H	1.15	0.40	0.39	2.0	29	0	7.0	0	0.0	28	0.5	0	0
175	2002	BP	low	56	RF	RB14	63	RBT	1	5	0.8	F	1.20	0.32	0.27	2.0	29	0	7.0	0	0.0	29	0.5	0	0
176	2002	BP	low	53	RF	XS7	43	RBT	1	18	0.8	F	3.70	1.99	1.52	12.0	30	29	7.0	29	1.0	30	2.0	0	1
177	2002	BP	low	53	RF	XS7	48	RBT	1	22	0.8	R	3.80	2.00	1.67	12.0	29	28	7.0	29	2.0	30	4.0	0	1
178	2002	BP	low	53	RF	XS7	56	RBT	1	17	0.6	R	3.10	2.96	3.58	20.0	28	27	6.8	28	1.0	0	0.0	0	2
179	2002	BP	low	53	RF	XS7	55	RBT	1	13	0.6	R	1.75	1.83	1.83	12.0	28	26	6.5	29	1.5	29	1.5	0	1
180	2002	BP	low	53	RF	RB7	53	RBT	1	8	0.8	H	1.00	2.32	2.30	3.0	26	22	5.7	27	1.0	27	0.5	4	1
181	2002	BP	low	53	RF	RB7	7	RBT	1	6	0.8	H	1.10	1.53	1.51	6.0	26	22	5.7	27	1.0	29	2.0	4	1
182	2002	BP	low	53	RF	RB7	62	RBT	1	6	0.8	F	0.70	0.34	0.18	1.0	25	24	5.5	25	0.5	25	0.5	4	1
183	2002	BP	low	53	RF	RB7	64	RBT	1	6	0.6	H	1.00	0.73	0.73	2.0	26	25	6.0	27	3.0	30	3.0	4	1
184	2002	BP	low	53	RF	RB7	67	RBT	1	7	0.6	F	1.00	1.50	1.50	3.0	30	26	7.0	28	1.0	28	1.5	4	1
185	2002	BP	low	53	RF	RB7	63	RBT	1	5	0.8	H	1.10	0.68	0.67	1.0	27	26	6.6	28	3.0	4	2.0	4	0
186	2002	BP	low	40	RF	RB23	45	RBT	1	12	0.8	H	2.60	0.59	0.71	8.0	28	19	6.8	28	2.0	28	2.0	0	0
187	2002	BP	low	40	RF	RB23	30	RBT	1	9	0.6	H	2.20	0.23	0.23	5.0	19	2	4.2	0	0.0	29	1.0	0	0
188	2002	BP	low	40	RF	RB23	13	RBT	1	3	0.4	F	1.60	0.13	0.10	3.0	30	15	7.0	0	0.0	30	2.0	0	0
189	2002	BP	low	40	RF	RB23	100	RBT	1	4	0.8	H	1.70	0.11	0.07	4.0	19	2	3.0	30	1.0	2	1.0	0	0
190	2002	BP	low	58	DPh	RB11	8	CHB	1	10	0.6	R	4.80	0.16	0.15	6.0	29	30	7.0	29	2.0	29	1.0	0	0
191	2002	BP	low	58	DPh	RB11	13	RBT	1	25	0.8	H	1.90	0.06	0.00	2.0	19	30	3.0	0	0.0	12	1.0	4	0
192	2002	BP	low	76	RF	LB29	100	RBT	1	8	0.8	H	2.00	1.25	0.72	3.0	27	22	5.8	29	1.0	29	1.0	0	0
193	2002	BP	low	76	RF	LB29	43	RBT	1	5	0.6	H	0.70	0.38	0.38	1.0	28	26	6.9	28	0.0	28	1.0	0	0
194	2002	BP	low	76	RF	LB29	39	RBT	1	20	0.8	H	2.90	3.19	2.11	6.0	29	22	7.0	29	3.0	29	3.0	0	2
195	2002	BP	low	76	RF	LB29	47	RBT	1	10	0.8	H	1.20	1.67	1.12	3.0	30	26	6.7	0	0.0	27	1.0	0	1
196	2002	BP	low	76	RF	LB29	30	RBT	1	9	0.8	H	1.00	1.76	2.12	4.0	23	29	5.4	29	0.0	29	1.0	0	2
197	2002	BP	low	73	RF	LB23	28	RBT	1	8	0.6	F	1.10	0.49	0.49	1.0	27	22	5.4	27	1.0	7	1.0	4	1
198	2002	BP	low	73	RF	LB23	38	RBT	1	11	0.8	H	1.70	0.68	0.42	1.0	20	21	4.5	27	1.0	27	1.0	4	1
199	2002	BP	low	73	RF	LB23	67	RBT	1	10	0.8	H	1.20	0.19	0.12	1.5	21	25	5.6	30	1.0	30	1.0	0	0
200	2002	BP	low	73	RF	LB23	60	RBT	1	5	0.2	F	0.30	0.23	0.23	1.0	30	0	7.0	30	1.0	30	1.0	4	0
201	2002	BP	low	73	RF	LB23	54	RBT	1	9	0.8	H	0.85	0.21	0.25	1.0	29	20	7.0	30	1.0	30	1.0	0	1
202	2002	BP	low	73	RF	LB23	43	RBT	1	5	0.8	H	1.05	0.48	0.73	1.0	22	21	5.3	29	1.0	27	0.5	0	1
203	2002	BP	low	73	RF	LB23	61	RBT	1	7	0.8	H	1.40	0.62	0.66	2.0	21	25	5.5	27	0.5	27	0.5	0	1
204	2002	BP	low	73	RF	LB23	44	RBT	1	7	0.8	H	1.20	1.07	0.88	3.0	30	0	7.0	30	1.5	30	1.5	0	1
205	2002	BP	low	73	RF	RB23	30	RBT	1	7	0.8	H	2.00	0.88	0.43	5.0	29	19	7.0	29	0.5	30	2.0	0	1
206	2002	BP	low	73	RF	RB23	100	RBT	1	6		D													
207	2002	BP	low	73	RF	RB23	47	RBT	1	7	0.6	H	1.20	0.42	0.42	1.0	28	27	6.6	0	0.0	30	1.0	4	0
208	2002	BP	low	73	RF	RB23	39	RBT	1	6	0.9	H	1.10	3.25		1.0	30	28	7.0	29	1.0	30	0.5	4	1
209	2002	BP	low	73	RF	RB23	61	RBT	1	6		D													
210	2002	BP	low	73	RF	RB23	37	RBT	1	9	0.8	H	2.00	1.60	0.31	1.0	30	28	7.0	30	1.5	30	1.5	4	1
211	2002	BP	low	33	PW	XS39	46	SKR	1	40	1.0	S	3.60	1.95	0.43	21.0	21	29	4.8	29	0.0	28	1.5	0	1
212	2002	BP	low	33	PW	XS39	56	RBT	1	25	0.8	H	2.90	1.77	1.20	17.0	28	26	6.6	28	0.0	30	5.0	0	2
213	2002	BP	low	33	PW	XS39	31	RBT	1	30	0.8	H	4.10	0.84	0.61	31.0	28	20	7.0	29	2.5	29	2.0	0	1
214	2002	BP	low	33	PW	XS39	39	RBT	1	20	0.8	H	3.90	0.65	0.65	31.0	21	27	5.3	30	0.0	30	4.0	0	2

Appendix A. (continued)

Rec			Seg-	Habitat Unit		Trans	Mark		#	Fish	Focal	Fish		Mean	Focal	Dist to	Substrate			Velocity Cover		Escape Cover		OVH	Turb
#	Year	Reach	ment	#	Type	#	#	Spec	Fish	Size	Ht	Activ	Depth	Veloc	Veloc	Bank	Dom	SubDom	Bovee	Type	Dist	Type	Dist	Cover	Cover
215	2002	BP	low	33	PW	XS39	1	RBT	1	20	0.9	R	5.90	0.95	0.99	22.0	29	22	7.0	29	4.0	30	5.0	0	1
216	2002	BP	low	33	PW	XS39	48	RBT	1	25	0.8	R	5.90	1.07	0.88	30.0	23	28	4.9	29	2.0	30	5.0	0	2
217	2002	BP	low	33	PW	XS39	10	SCP	1	6	1.0	R	3.40	0.92	1.29	12.0	30	26	6.8	30	1.0	29	0.5	0	1
218	2002	BP	low	33	PW	XS39	17	SCP	1	7	1.0	R	2.90	0.68	0.36	10.0	30	29	6.8	0	0.0	29	0.5	0	1
219	2002	BP	low	33	PW	LB39	31	SCP	1	9	1.0	H	2.45	1.18	0.56	5.0	27	26	6.7	0	0.0	27	1.0	0	0
220	2002	BP	low	33	PW	LB39	39	RBT	1	5	0.8	F	1.85	0.19	0.23	0.2	25	23	5.9	0	0.0	26	2.0	0	0
221	2002	BP	low	33	PW	LB39	43	RBT	1	5	0.7	R	1.40	0.26	0.26	2.0	26	27	6.6	0	0.0	30	1.0	4	0
222	2002	BP	low	33	PW	LB39	24	RBT	1	5	0.6	F	1.80	0.09	0.09	3.0	26	2	6.0	0	0.0	26	1.0	0	0
223	2002	BP	low	33	PW	LB39	8	RBT	1	5	0.6	F	1.10	0.24	0.24	3.0	26	25	6.0	0	0.0	28	2.0	4	0
224	2002	BP	low	33	PW	LB39	56	RBT	1	7	0.6	F	1.25	0.15	0.15	2.0	26	25	6.0	0	0.0	28	1.5	4	0
225	2002	BP	low	33	PW	LB39	33	RBT	1	6	0.8	F	1.40	0.24	0.27	4.0	26	25	6.0	0	0.0	26	1.0	4	0
226	2002	BP	low	33	PW	LB39	1	RBT	1	7	0.6	H	1.45	0.21	0.21	3.0	26	2	6.0	0	0.0	0	0.0	0	0
227	2002	BP	low	33	PW	LB39	31	SCP	1	7	1.0	H	1.60	0.17		3.0	27	26	6.2	30	2.0	30	2.0	4	0
228	2002	BP	low	33	PW	LB39	6	SCP	1	4	1.0	H	1.70	0.14	0.06	2.0	28	26	6.1	0	0.0	26	1.0	0	0
229	2002	BP	low	33	PW	LB39	41	RBT	1	5	0.8	H	1.10	0.31	0.29	3.0	23	19	4.8	0	0.0	27	2.0	4	0
230	2002	BP	low	33	PW	RB39	47	RBT	1	7	0.8	H	0.75	0.28	0.16	2.5	27	19	6.4	0	0.0	27	0.5	5	0
231	2002	BP	low	33	PW	RB39	59	RBT	1			D													
232	2002	BP	low	33	PW	RB39	8	RBT	1	5	0.9	H	0.80	1.36	1.20	1.0	26	23	5.6	0	0.0	26	0.5	1	0
233	2002	BP	low	33	PW	RB39	45	RBT	1	6	0.8	H	0.85	0.34	0.30	0.5	28	20	7.0	0	0.0	29	1.5	4	0
234	2002	BP	low	33	PW	RB39	68	RBT	1	4	0.8	H	0.60	0.36	0.39	0.5	27	26	6.0	0	0.0	27	1.0	4	0
235	2002	BP	low	33	PW	RB39	100	RBT	1	8	0.8	H	1.80	1.10	0.83	3.0	25	20	5.5	0	0.0	28	3.0	0	0
236	2002	BP	low	33	PW	RB39	38	RBT	1	8	0.8	H	1.80	1.15	0.89	3.0	28	20	6.0	0	0.0	28	3.0	0	0
237	2002	BP	low	33	PW	RB39	13	RBT	1	6	0.8	F	1.65	0.98	0.68	2.5	28	21	7.0	0	0.0	28	4.0	0	0
238	2002	BP	low	33	PW	RB39	61	RBT	1	6	0.7	H	2.00	0.80	0.79	2.0	28	20	7.0	0	0.0	28	3.0	0	0
239	2002	BP	low	33	PW	RB39	85	RBT	1	8	0.9	F	1.70	0.89	0.72	2.5	28	20	7.0	0	0.0	30	4.5	0	0
240	2002	BP	low	33	PW	RB39	74	RBT	1	8	0.6	H	1.50	0.27	0.27	1.5	29	30	7.0	0	0.0	29	0.5	0	0
241	2002	BP	low	33	PW	RB39	24	RBT	1	6	0.8	H	1.80	0.32	0.44	1.5	2	27	7.0	0	0.0	28	2.0	0	1
242	2002	BP	low	33	PW	RB39	58	RBT	1	6	0.8	H	1.00	0.74	0.61	2.0	26	21	5.7	27	0.5	29	2.0	0	1
243	2002	BP	low	33	PW	RB39	62	RBT	1	9	0.9	H	1.40	0.49	0.49	3.0	25	21	5.6	0	0.0	29	0.5	0	1
244	2002	BP	low	33	PW	RB39	36	RBT	1	4	0.6	F	0.60	0.29	0.29	1.0	29	19	7.0	0	0.0	27	2.0	4	0
245	2002	BP	low	33	PW	RB39	67	RBT	1	3	0.9	F	0.40	0.05	0.05	1.0	29	19	7.0	0	0.0	27	2.5	4	0
246	2002	BP	low	33	PW	LB106	43	SCP	1	4	1.0	H	2.40	0.97	0.33	2.0	29	28	6.7	30	1.0	29	3.0	0	1
247	2002	BP	low	33	PW	LB106	12	SCP	1	9	1.0	H	3.00	1.65	1.08	1.0	30	29	6.3	29	1.0	29	1.0	0	1
248	2002	BP	low	33	PW	LB106	9	RBT	1	16	0.6	R	3.50	1.83	1.92	10.0	30	0	7.0	30	1.0	30	1.0	0	1
249	2002	BP	low	33	PW	LB106	39	RBT	1	9	0.9	F	1.30	0.65	0.28	4.0	30	0	7.0	0	0.0	30	2.0	0	0
250	2002	BP	low	33	PW	LB106	46	RBT	1	5	0.9	F	1.00	0.59	0.60	5.0	30	0	7.0	0	0.0	30	1.0	0	1
251	2002	BP	low	33	PW	LB106	44	SCP	1	4	1.0	H	1.10	0.28	0.43	4.0	30	0	7.0	0	0.0	30	2.0	0	0
252	2002	BP	low	33	PW	LB106	67	RBT	1	4	0.2	F	0.80	0.50	0.51	2.0	30	0	7.0	0	0.0	30	1.5	4	0
253	2002	BP	low	33	PW	LB106	36	SCP	1	8	1.0	H	2.20	0.32		2.0	30	28	7.0	0	0.0	28	0.5	0	0
254	2002	BP	low	33	PW	XS106	6	RBT	1	25	0.8	H		2.42	1.22	16.0	30	29	6.8	0	0.0	29	1.0	0	0
255	2002	BP	low	33	PW	XS106	85	RBT	1	20	0.9	H	3.55	0.94	0.81	23.0	28	27	6.9	30	3.0	30	3.0	0	0
256	2002	BP	low	33	PW	XS106	29	RBT	1	22	0.9	H	3.45	0.44	0.54	16.0	28	19	7.0	0	0.0	2	1.0	0	0
257	2002	BP	low	33	PW	RB106	48	RBT	1	6	0.8	H	1.75	0.40	0.07	1.0	28	26	6.2	0	0.0	30	1.0	0	0
258	2002	BP	low	33	PW	RB106	56	RBT	1	5	0.9	H	1.55	0.57	0.16	2.0	28	27	6.8	0	0.0	2	0.5	0	0

Appendix A. (continued)

Rec #	Year	Reach	Seg-ment	Habitat Unit #	Habitat Unit Type	Trans #	Mark #	Spec	# Fish	Fish Size	Focal Ht	Fish Activ	Depth	Mean Veloc	Focal Veloc	Dist to Bank	Substrate Dom	Substrate SubDom	Substrate Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
259	2002	BP	low	33	PW	RB106	17	RBT	1	6	0.8	H	1.40	0.48	0.25		26	27	6.2	0	0.0	28	1.0	0	0
260	2002	BP	low	33	PW	RB106	3	RBT	1	6	0.6	H	1.90	0.42	0.42	1.0	27	29	6.4	0	0.0	30	1.0	5	0
261	2002	BP	low	33	PW	RB106	67	RBT	1	8		D													
262	2002	BP	low	33	PW	RB106	10	RBT	1	6	0.8	H	2.20	0.25	0.23	1.5	19	15	3.0	0	0.0	30	0.5	4	0
263	2002	BP	low	33	PW	RB106	58	SCP	1	8	1.0	H	1.30	0.37	0.38		30	29	7.0	0	0.0	30	1.0	0	0
264	2002	BP	low	33	PW	LB173	85	CHB	1	8	0.8	F	3.10	0.31	0.36	2.0	29	28	7.0	0	0.0	29	2.0	4	0
265	2002	BP	low	33	PW	LB173	9	SCP	1	9	1.0	H	2.85	0.27	0.35	2.0	29	28	7.0	0	0.0	29	2.5	4	0
266	2002	BP	low	33	PW	LB173	29	RBT	1	7	0.9	H	4.30	0.75	0.40	5.0	28	27	6.5	0	0.0	30	2.0	0	
267	2002	BP	low	33	PW	LB173	31	RBT	1	4	0.9	H	1.30	0.22	0.19	2.0	29	0	7.0	0	0.0	29	1.0	4	0
268	2002	BP	low	33	PW	LB173	33	SCP	1	3	1.0	H	1.50	0.31	0.17	1.0	29	0	7.0	0	0.0	29	1.0	4	0
269	2002	BP	low	33	PW	LB173	61	RBT	1	4	0.9	H	1.20	0.07	0.06	1.0	29	0	7.0	0	0.0	29	1.0	4	0
270	2002	BP	low	33	PW	LB173	24	RBT	1	4	0.2	H	2.90	0.26	0.33	1.0	30	29	7.0	0	0.0	29	2.0	4	0
271	2002	BP	low	33	PW	LB173	31	SCP	1	7	1.0	H	2.80	0.51	0.71	2.0	26	25	6.0	0	0.0	30	1.5	4	0
272	2002	BP	low	33	PW	LB173	32	RBT	1	4	0.2	R													
273	2002	BP	low	33	PW	LB173	61	RBT	1	5	0.8	F	2.15	0.81	0.66	6.0	30	0	7.0	0	0.0	29	2.0	0	0
274	2002	BP	low	33	PW	LB173	39	RBT	1	5	0.9	F	1.90	0.60	0.55	5.0	30	0	7.0	0	0.0	30	1.0	0	0
275	2002	BP	low	33	PW	LB173	69	RBT	1	5	0.9	F	2.00	0.56	0.55		30	0	7.0	0	0.0	30	1.0	0	0
276	2002	BP	low	33	PW	LB173	100	RBT	1	5	0.8	F	1.80	0.33	0.32		30	0	7.0	0	0.0	30	2.5	0	0
277	2002	BP	low	33	PW	LB173	68	RBT	1	8	0.6	F	2.10	0.67	0.67	6.0	30	0	7.0	0	0.0	30	2.0	0	0
278	2002	BP	low	33	PW	LB173	8	RBT	1	4	0.8	H	1.50	0.34	0.30	3.0	30	0	7.0	0	0.0	30	2.0	0	0
279	2002	BP	low	33	PW	LB173	6	SCP	1	3	1.0	H	1.65	0.37	0.23	4.0	30	0	7.0	0	0.0	30	2.0	0	0
280	2002	BP	low	33	PW	LB173	45	RBT	1	5	0.8	H	0.80	0.21	0.25		30	0	7.0	0	0.0	30	1.0	4	0
281	2002	BP	low	33	PW	XS173	56	RBT	1	20	0.9	H		1.18	0.81	28.0	30	29	6.9	30	0.5	30	0.5	0	0
282	2002	BP	low	33	PW	XS173	67	RBT	1	22	0.8	R	4.40	2.93	1.87		28	20	7.0	0	0.0	29	3.0	0	0
283	2002	BP	low	33	PW	XS173	29	RBT	1	16	0.8	H	4.70	1.18	0.83		28	26	6.7	30	8.0	29	1.0	0	0
284	2002	BP	low	33	PW	XS173	20	RBT	1	6	0.8	H	1.40	0.42	0.58	7.0	30	29	7.0	30	0.5	30	2.0	0	0
285	2002	BP	low	33	PW	RB173	3	RBT	1	5	0.8	H	1.60	0.99	0.67	1.0	28	24	6.5	0	0.0	30	2.0	0	0
286	2002	BP	low	33	PW	RB173	17	RBT	1	5	0.5	H	0.90	0.67	0.67	1.0	27	28	6.3	0	0.0	13	0.0	0	0
287	2002	BP	low	33	PW	RB173	8	SCP	1	3	1.0	H	1.10	0.99	0.63	1.0	28	26	6.6	0	0.0	29	2.0	0	0
288	2002	BP	low	33	PW	RB173	58	RBT	1	3	0.2	H	1.30	0.10	0.12	0.5	28	27	6.7	0	0.0	4	0.0	4	0
289	2002	BP	low	33	PW	RB173	39	RBT	1	2	0.1	H	1.30	0.11		0.5	28	27	6.7	0	0.0	4	0.0	4	0
290	2002	BP	low	33	PW	RB173	46	RBT	1	4	0.5	H	1.50	0.22	0.22	1.0	26	19	6.0	0	0.0	2	0.0	4	0
291	2002	BP	low	33	PW	RB173	44	RBT	1	3	0.2	F	0.40	1.57	1.57	0.5	28	0	7.0	0	0.0	28	0.5	4	0
292	2002	BP	low	33	PW	RB173	67	RBT	1	5	0.8	H	0.50	0.93	1.23	0.5	28	26	6.8	0	0.0	13	0.5	4	0
293	2002	BP	low	33	PW	RB173	62	SCP	1	5	1.0	H	0.95	1.09	0.94	1.0	26	25	6.0	0	0.0	26	0.5	4	0
294	2002	BP	low	33	PW	RB173	74	RBT	1	6	0.9	H	1.50	0.43	0.76	3.0	26	20	5.8	0	0.0	2	0.5	0	0
295	2002	BP	low	33	PW	RB173	36	RBT	1	5	0.5	F	1.20	0.12	0.26	1.0	26	28	6.4	0	0.0	2	0.5	0	0
296	2002	BP	low	33	PW	RB173	12	RBT	1	4	0.6	H	1.10	0.36	0.36	1.0	28	26	6.6	0	0.0	13	0.5	0	0
297	2002	BP	low	33	PW	RB173	43	RBT	1	4	0.6	F	1.20	0.31	0.31	2.0	19	23	4.4	0	0.0	13	0.5	0	0
298	2002	BP	low	33	PW	RB173	15	RBT	1	25	0.5	R	0.90	0.42	0.42	3.0	29	28	6.1	0	0.0	13	0.5	4	0
299	2002	BP	low	33	PW	RB173	68	RBT	1	2	0.1	H	2.00	0.35		3.0	27	28	6.4	0	0.0	28	0.5	30	0
300	2002	BP	low	33	PW	RB173	48	RBT	1	5	0.5	F	1.30	0.12	0.44	3.0	29	0	7.0	0	0.0	2	0.5	0	0
301	2002	BP	low	33	PW	RB173	10	RBT	1	4	0.6	R	2.10	0.29	0.29	5.0	2	29	1.0	0	0.0	2	0.0	0	0
302	2002	BP	low	75	SP	LB24	39	RBT	1	11	0.8	H	1.50	0.57	0.62	1.0	30	0	7.0	0	0.0	27	1.0	4	0

Appendix A. (continued)

Rec #	Year	Reach	Seg-ment	Habitat Unit #	Habitat Unit Type	Trans #	Mark #	Spec	# Fish	Fish Size	Focal Ht	Fish Activ	Depth	Mean Veloc	Focal Veloc	Dist to Bank	Substrate Dom	Substrate SubDom	Substrate Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
303	2002	BP	low	75	SP	LB24	33	RBT	1	5	0.6	H	1.20	0.19	0.19	1.0	21	25	5.2	0	0.0	29	0.5	0	0
304	2002	BP	low	75	SP	LB24	12	RBT	1	5	0.8	H	1.30	0.18	0.18	2.0	25	23	5.3	0	0.0	29	1.0	0	0
305	2002	BP	low	75	SP	LB24	33	RBT	1	4	0.8	H	1.20	0.20	0.22	1.0	21	2	5.0	0	0.0	28	1.5	0	0
306	2002	BP	low	75	SP	LB24	3	RBT	1	5	0.8	H	1.50	0.34	0.55	1.0	22	25	5.4	28	0.5	28	0.5	4	0
307	2002	BP	low	75	SP	LB24	30	RBT	1	4	0.8	H	1.25	0.24	0.31	1.0	21	2	5.0	0	0.0	28	2.0	4	0
308	2002	BP	low	75	SP	LB24	1	RBT	1	3	0.6	H	1.20	0.22	0.22	1.5	25	23	5.3	0	0.0	29	1.0	0	0
309	2002	BP	low	75	SP	LB24	36	RBT	1	6	0.8	H	1.30	0.24	0.30	0.5	27	0	6.0	0	0.0	27	1.0	4	0
310	2002	BP	low	75	SP	LB24	47	RBT	1	8	0.8	H	1.10	1.16	0.99	3.0	30	0	7.0	0	0.0	27	2.5	0	1
311	2002	BP	low	75	SP	LB24	48	RBT	1	7	0.6	F	2.05	0.78	0.78	4.0	29	0	7.0	30	2.0	30	2.0	0	0
312	2002	BP	low	75	SP	LB24	29	RBT	1	14	0.8	H	2.80	0.41	0.38	9.0	30	29	7.0	0	0.0	2	2.0	0	0
313	2002	BP	low	75	SP	LB24	36	SCP	1	13	1.0	H	2.50	0.32	0.18	8.5	29	0	7.0	28	1.0	2	1.5	0	0
314	2002	BP	low	75	SP	LB24	38	RBT	1	7	0.8	H	0.90	0.69	0.62	2.0	30	0	7.0	29	2.0	29	2.0	0	0
315	2002	BP	low	75	SP	LB24	46	RBT	1	8	0.8	H	2.10	0.57	0.32	4.0	23	28	5.3	0	0.0	30	1.0	0	0
316	2002	BP	low	75	SP	LB24	52	RBT	1	6	0.6	H	1.30	0.22	0.22	2.0	25	27	6.2	0	0.0	28	1.5	0	0
317	2002	BP	low	75	SP	LB24	37	RBT	1	5	0.6	H	0.90	0.20	0.20	1.0	22	23	5.5	0	0.0	29	1.0	0	0
318	2002	BP	low	75	SP	LB24	61	RBT	1	20	0.8	F	2.70	2.46	2.67	3.0	26	25	6.4	30	1.0	30	1.0	0	1
319	2002	BP	low	69	RF	LB15	33	RBT	1	5	0.9	H	0.60	0.13	0.17	2.0	26	27	5.8	2	1.5	26	0.5	4	0
320	2002	BP	low	69	RF	LB15	68	RBT	1	5	0.8	F	0.80	0.32	0.26	2.0	26	2	5.8	27	0.5	2	0.0	0	0
321	2002	BP	low	69	RF	LB15	43	RBT	1	12	0.8	H	1.00	0.33	0.27	2.5	27	26	6.2	27	0.5	27	0.5	0	0
322	2002	BP	low	69	RF	RB15	104	RBT	1	15	0.8	H	1.90	2.12	2.00	7.0	30	28	7.0	30	1.0	29	2.0	0	1
323	2002	BP	low	69	RF	RB15	63	RBT	1	5	0.8	H	0.50	1.01	0.88	3.0	30	28	7.0	30	1.0	30	1.0	5	0
324	2002	BP	low	69	RF	RB15	26	RBT	1	12	0.8	H	2.00	1.63	0.83	5.0	30	28	7.0	30	1.5	30	1.0	4	1
325	2002	BP	low	69	RF	XS1	47	RBT	1	10	0.8	H	1.00	0.68	0.53	18.0	28	27	6.6	29	1.5	28	1.0	0	1
326	2002	BP	low	69	RF	XS1	13	RBT	1	25	0.9	H	4.50	4.38	1.63	21.0	30	28	7.0	30	0.5	30	0.5	0	1
327	2002	BP	low	58	DPt	XS34	63	RBT	1	4	0.8	H	0.90	0.89	0.77	12.0	19	21	4.4	0	0.0	2	1.0	0	0
328	2002	BP	low	58	DPt	XS34	67	RBT	1	5	0.6	R	1.00	1.57	1.57	22.0	25	26	5.9	0	0.0	26	1.5	0	0
329	2002	BP	low	58	DPt	XS34	44	RBT	1	9	0.8	H	3.20	1.63	1.31	35.0	30	27	6.7	0	0.0	28	1.0	0	0
330	2002	BP	low	58	DPt	XS34	74	RBT	1	7	0.8	F	2.60	1.12	0.51	40.0	26	27	5.8	0	0.0	30	1.0	0	0
331	2002	BP	low	58	DPt	XS34	43	RBT	1	15	0.8	R	3.50	1.38	0.98	50.0	28	27	6.9	0	0.0	29	4.0	0	0
332	2002	BP	low	58	DPt	XS34	51	RBT	1	15	0.6	R	3.60	1.37	1.37	39.0	28	27	6.9	0	0.0	29	3.0	0	0
333	2002	BP	low	58	DPt	LB34	7	RBT	1	4	0.8	H	0.70	1.72	1.90	6.0	20	22	4.5	27	0.5	27	0.5	0	0
334	2002	BP	low	58	DPt	LB34	33	RBT	1	2	0.6	H	0.65	0.19	0.19	2.0	19	22	3.2	0	0.0	29	2.0		0
335	2002	BP	low	58	DPt	LB34	6	RBT	1	3	0.6	F	0.70	0.17	0.17	3.0	20	22	4.4	29	2.0	29	1.5		0
336	2002	BP	low	58	DPt	LB34	67	RBT	1	2	0.8	H	0.70	0.07	0.08	2.0	22	19	3.3	0	0.0	29	1.5		0
337	2002	BP	low	58	DPt	LB34	12	RBT	1	4	0.2	F	0.85	0.38	0.22	1.0	20	22	4.3	30	1.0	30	1.0	13	0
338	2002	BP	low	58	DPt	LB34	39	RBT	1	2	0.6	H	1.10	0.35	0.35		20	27	4.0	0	0.0	4	0.0	4	0
339	2002	BP	low	58	DPt	LB34	36	RBT	1	4	0.8	F	0.90	0.44	0.34	1.0	25	20	6.0	27	1.5	27	1.5	4	0
340	2002	BP	low	58	DPt	LB34	8	RBT	1	4	0.6	F	1.40	0.49	0.49	4.0	22	21	5.0	0	0.0		6.0	0	0
341	2002	BP	low	58	DPt	LB34	52	RBT	1	5	0.8	F	1.20	0.74	0.55	6.0	22	20	4.8	0	0.0	2	2.0	0	0
342	2002	BP	low	58	DPt	LB34	7	RBT	1	5	0.6	F	1.10	0.53	0.53	4.0	22	20	4.6	0	0.0	2	5.0	0	0
343	2002	BP	low	58	DPt	LB34	38	RBT	1	2	0.6	F	0.80	0.40	0.40	4.0	19	2	3.0	0	0.0	2	2.5	0	0
344	2002	BP	low	58	DPt	LB34	48	RBT	1	5	0.8	F	1.30	0.28	0.18	4.0	20	19	4.0	27	1.0	28	2.0	0	0
345	2002	BP	low	58	DPt	LB34	61	RBT	1	4	0.8	R	1.50	0.35	0.31	3.0	20	22	4.4	27	1.0	28	1.5	0	0
346	2002	BP	low	58	DPt	LB34	100	RBT	1	3	0.8	H	0.70	0.33	0.33	7.0	19	2	3.0	0	0.0	2	1.5	0	0

Appendix A. (continued)

Rec #	Year	Reach	Seg-ment	Habitat Unit #	Habitat Unit Type	Trans #	Mark #	Spec	# Fish	Fish Size	Focal Ht	Fish Activ	Depth	Mean Veloc	Focal Veloc	Dist to Bank	Substrate Dom	Substrate SubDom	Substrate Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
347	2002	BP	low	58	DPt	LB34	37	RBT	1	2	0.8	H	0.65	0.45	0.26	4.5	19	2	3.0	0	0.0	2	1.0	0	0
348	2002	BP	low	58	DPt	LB34	47	RBT	1	4	0.8	F	0.70	0.69	0.50	5.0	19	2	3.3	0	0.0	2	1.5	0	0
349	2002	BP	low	58	DPt	LB34	46	RBT	1	5	0.8	H	0.90	0.81	0.62	6.0	19	21	4.5	0	0.0	2	3.0	0	0
350	2002	BP	low	58	DPt	LB34	43	RBT	1	2	0.6	F	0.90	0.42	0.42	3.0	19	2	4.0	0	0.0	2	0.5	0	0
351	2002	BP	low	58	DPt	LB34	38	RBT	1	3	0.6	F	0.90	0.92	0.92	3.0	20	22	4.3	0	0.0	2	1.0	0	0
352	2002	BP	low	58	DPt	LB34	51	RBT	1	7	0.8	H	1.00	0.46	0.54	2.5	22	20	4.6	0	0.0	2	1.0	0	0
353	2002	BP	low	58	DPt	LB34	74	RBT	1	2	0.2	H	0.90	0.33	0.25	5.0	20	2	4.0	0	0.0	2	0.0	4	0
354	2002	BP	low	58	DPt	RB34	43	RBT	1	6	0.6	H	4.50	0.84	0.81	5.0	29	0	7.0	30	1.0	30	1.0	0	0
355	2002	BP	low	58	DPt	RB34	67	RBT	1	5	0.8	H	0.60	0.42	0.61	1.0	29	28	7.0	30	2.0	2	1.0	0	0
356	2002	BP	low	58	DPb	LB10	38	RBT	1	3	0.2	F	0.60	0.36	0.39	1.0	19	24	4.2	12	1.0	12	1.0	4	0
357	2002	BP	low	58	DPb	LB10	26	RBT	1	6	0.8	F	0.65	1.17	0.81	4.0	19	24	4.7	12	4.0	12	4.0	0	0
358	2002	BP	low	58	DPb	LB10	106	RBT	1	4	0.6	F	0.60	0.54	0.54	1.0	19	23	4.4	12	1.0	12	1.0	4	0
359	2002	BP	low	58	DPb	LB10	68	RBT	1	5	0.8	H	1.00	0.52	0.45	6.0	19	23	4.4	0	0.0	2	2.5	0	0
360	2002	BP	low	58	DPb	LB10	1	RBT	1	4	0.8	H	1.00	0.64	0.54	7.0	25	19	4.9	25	1.0	2	2.0	0	0
361	2002	BP	low	58	DPb	LB10	82	RBT	1	22	0.9	H	0.30	0.18	0.18	1.0	19	22	4.5	0	0.0	12	1.0	4	0
362	2002	BP	low	58	DPb	LB10	30	RBT	1	4	0.6	R	1.10	0.49	0.49	4.0	19	2	4.2	0	0.0	2	1.0	0	0
363	2002	BP	low	58	DPb	LB10	44	RBT	1	5	0.6	H	0.95	0.16	0.16	2.0	2	19	1.0	0	0.0	2	0.0	4	0
364	2002	BP	low	58	DPb	LB10	43	RBT	1	4	0.8	F	1.20	0.11	0.00	2.0	2	19	1.0	0	0.0	2	0.0	4	0
365	2002	BP	low	58	DPb	LB10	33	RBT	1	4	0.6	H	0.90	0.18	0.18	2.5	19	2	3.2	0	0.0	12	2.0	4	0
366	2002	BP	low	58	DPb	RB10	48	RBT	1	3	0.9	H	1.90	0.18	0.17	5.0	30	0	7.0	0	0.0	2	1.0	0	0
367	2002	BP	low	58	DPb	RB10	54	RBT	1	4	0.4	H	1.60	0.16	0.16	4.0	2	30	1.0	0	0.0	2	0.0	0	0
368	2002	BP	low	58	DPb	RB10	39	RBT	1	5	0.6	H	1.50	0.16	0.16	4.0	2	30	1.0	0	0.0	2	0.0	0	0
369	2002	BP	low	58	DPb	RB10	17	RBT	1	4	0.4	H	1.40	0.12	0.13	4.0	2	30	1.0	0	0.0	2	0.0	0	0
370	2002	BP	low	58	DPb	RB10	63	RBT	1	3	0.2	H	1.20	0.05	0.11	4.0	2	30	1.0	0	0.0	2	0.0	0	0
371	2002	BP	low	58	DPb	XS10	74	RBT	1	4	0.8	H	2.50	0.74	0.62	20.0	26	25	6.1	29	2.0	2	1.5	0	0
372	2002	BP	low	58	DPb	XS10	46	RBT	1	5	0.8	H	2.50	0.72	0.53	22.0	27	26	6.2	28	1.5	26	0.5	0	0
373	2002	BP	low	58	DPb	XS10	38	RBT	1	5	0.6	H	2.40	0.76	0.76	23.0	2	27	1.0	29	1.5	2	0.0	0	0
374	2002	BP	low	58	DPb	XS10	51	RBT	1	15	0.6	H	2.90	0.74	0.74	27.0	28	27	6.6	28	1.0	28	1.0	0	0
375	2002	BP	low	58	DPb	XS10	61	RBT	1	6	0.8	H	2.60	0.75	0.48	26.0	28	27	6.7	2	0.5	2	0.5	0	0
376	2002	BP	low	58	DPb	XS10	5	RBT	1	28	0.6	H	5.80	0.95	0.95	37.0	28	29	7.0	30	1.5	28	0.5	0	0
377	2002	BP	low	58	DPb	XS10	130	RBT	1	35	0.6	H	5.60	1.09	1.32	35.0	29	28	7.0	29	1.5	29	1.5	0	0
378	2002	BP	low	58	DPb	XS10	14	RBT	1	30	0.6	H	5.80	1.20	1.29	38.0	29	0	7.0	30	4.0	29	2.0	0	0
379	2002	BP	low	58	DPb	XS10	29	RBT	1	20	0.4	R	7.60	1.26	1.32	28.0	30	29	7.0	30	1.5	30	2.0	0	0
380	2002	BP	low	58	DPb	XS10	155	RBT	1	30	0.4	D													
381	2002	BP	low	58	DPb	LB60	61	RBT	1	3	0.2	H	1.40	0.35	0.33	0.5	30	29	7.0	0	0.0	4	0.5	4	0
382	2002	BP	low	58	DPb	LB60	46	RBT	1	4	0.2	H	0.50	0.14	0.12	1.0	30	0	7.0	0	0.0	1	0.5	4	0
383	2002	BP	low	58	DPb	RB60	25	RBT	1	5	0.8	H	2.90	0.26	0.22	1.5	28	2	7.0	0	0.0	25	3.0	4	0
384	2002	BP	low	58	DPb	RB60	30	RBT	1	3	0.2	H	1.65	0.29	0.29	1.5	30	19	7.0	0	0.0	4	2.0	4	0
385	2002	BP	low	58	DPb	RB60	54	RBT	1	4	0.8	H	2.70	0.30	0.34	2.0	30	2	7.0	0	0.0	30	1.5	0	0
386	2002	BP	low	58	DPb	RB60	9	RBT	1	3	0.2	H	0.60	0.14	0.11	3.0	28	30	7.0	0	0.0	28	0.5	4	0
387	2002	BP	low	58	DPb	RB60	47	SCP	1	3	1.0	H	1.50	0.10		3.0	30	27	6.9	0	0.0	4	1.5	4	0
388	2002	BP	low	58	DPb	RB60	1	RBT	1	3	0.2	H	2.30	0.29	0.36	2.5	29	2	7.0	0	0.0	28	2.0	4	0
389	2002	BP	low	58	DPb	RB60	13	RBT	1	3	0.2	H	2.30	0.20	0.29	2.0	29	2	7.0	0	0.0	28	2.0	0	0
390	2002	BP	low	58	DPb	RB60	68	RBT	1	9	0.8	H	2.80	0.07		8.0	2	19	1.0	0	0.0	2	0.0	0	0

Appendix A. (continued)

Rec #	Year	Reach	Seg-ment	Habitat Unit #	Habitat Unit Type	Trans #	Mark #	Spec	# Fish	Fish Size	Focal Ht	Fish Activ	Depth	Mean Veloc	Focal Veloc	Dist to Bank	Substrate Dom	Substrate SubDom	Substrate Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
391	2002	BP	low	58	DPb	RB60	85	RBT	1	2	0.1	H	0.75	0.06	0.10	3.0	27	25	6.0	0	0.0	27	0.5	0	0
392	2002	BP	low	58	DPb	RB60	17	RBT	1	2	0.1	H	0.80	0.04	0.06	3.0	27	25	6.0	0	0.0	27	0.5	0	0
393	2002	BP	low	58	DPb	RB60	33	RBT	1	3	0.8	H	0.80	0.08	0.07	4.0	27	25	6.0	0	0.0	4	0.5	0	0
394	2002	BP	low	58	DPb	RB60	82	RBT	1	3	0.8	H	0.90	0.08	0.06	2.0	27	25	6.0	0	0.0	27	1.0	4	0
395	2002	BP	low	58	DPb	XS60	106	RBT	1	30	0.6	R	10.00	0.46	0.53	39.0	29	28	6.9	29	2.0	29	2.0	0	0
396	2002	BP	low	58	DPb	XS60	109	RBT	1	35	0.6	F	11.80	1.38	1.69	50.0	30	29	6.9	30	4.0	30	4.0	0	0
397	2002	BP	low	58	DPb	XS60	127	RBT	1	18	0.6	R	10.50	1.01	0.94	40.0	28	29	6.7	30	0.5	29	2.0	0	0
398	2002	BP	low	58	DPb	XS60	132	RBT	1	8	0.8	R	3.40	0.00	0.00	13.0	2	0	1.0	2	0.0	2	0.0	0	0
399	2002	BP	low	32	SP	LB11	58	RBT	1	6	0.8	H	1.50	1.66		0.5	30	26	6.7	29	0.5	29	0.5	0	1
400	2002	BP	low	32	SP	LB11	79	RBT	1	4	0.6	F	1.35	0.00	0.00	1.0	26	27	6.3	0	0.0	28	1.0	4	1
401	2002	BP	low	32	SP	LB11	44	RBT	1	5	0.6	F	1.20	0.18	0.18	4.0	26	28	6.4	29	1.0	28	1.0	4	1
402	2002	BP	low	32	SP	LB11	6	RBT	1	16	0.6	R	3.25	1.45	1.35	11.0	30	29	6.7	29	2.0	29	2.0	0	1
403	2002	BP	low	32	SP	LB11	38	RBT	1	4	0.8	F	0.60	0.40	0.31	2.0	28	27	6.9	0	0.0	2	1.0	0	0
404	2002	BP	low	32	SP	LB11	12	RBT	1	3	0.9	R	1.10	0.23	0.07	1.0	27	28	6.4	0	0.0	27	0.5	4	0
405	2002	BP	low	32	SP	LB11	36	RBT	1	5	0.8	F	0.70	0.46	0.37	2.0	30	27	6.8	0	0.0	2	0.5	0	0
406	2002	BP	low	32	SP	LB11	43	RBT	1	5	0.8	R	0.60	0.52	0.57	3.0	30	0	7.0	0	0.0	2	0.5	0	0
407	2002	BP	low	32	SP	LB11	26	RBT	1	5	0.8	F	2.00	0.48	0.43	5.0	30	27	6.8	0	0.0	28	1.0	0	0
408	2002	BP	low	32	SP	LB11	37	RBT	1	3	0.9	R	0.60	0.57	0.44	2.0	30	28	6.8	0	0.0	2	0.5	0	0
409	2002	BP	low	32	SP	LB11	100	RBT	1	6	0.8	F	1.70	0.50	0.47	5.0	28	29	6.9	0	0.0	29	1.0	0	0
410	2002	BP	low	32	SP	LB11	67	RBT	6	4	0.6	F	0.80	0.31	0.31	1.0	28	27	6.8	0	0.0	29	1.0	0	0
411	2002	BP	low	32	SP	LB11	46	RBT	1	5	0.8	F	1.30	0.64	0.65	4.0	30	0	7.0	0	0.0	28	2.0	0	1
412	2002	BP	low	32	SP	LB11	67	RBT	1	6	0.6	H	2.40	0.58	0.58	3.0	27	28	6.3	29	1.0	28	0.5	0	0
413	2002	BP	low	32	SP	LB11	30	SCP	1	5	1.0	H	1.70	0.83	0.47	2.5	27	28	6.2	29	2.0	28	0.5	0	0
414	2002	BP	low	32	SP	LB11	61	RBT	1	5	0.6	F	2.00	0.44	0.44	3.0	29	28	6.8	29	1.0	29	1.0	0	0
415	2002	BP	low	32	SP	LB11	9	RBT	1	4	0.8	F	1.60	0.41	0.23	1.0	27	28	6.4	0	0.0	12	1.0	4	0
416	2002	BP	low	32	SP	LB11	68	RBT	1	5	0.8	F	1.60	0.66	0.51	1.5	28	27	6.7	0	0.0	29	1.5	0	0
417	2002	BP	low	32	SP	LB11	11	RBT	1	6	0.8	H	2.00	0.57	0.37	2.0	28	27	6.6	0	0.0	2	0.5	0	0
418	2002	BP	low	32	SP	XS11	62	RBT	1	7	0.8	H	2.00	0.80	0.57	22.0	29	28	6.7	0	0.0	29	1.0	0	1
419	2002	BP	low	32	SP	XS11	52	RBT	1	8	0.9	H	1.80	0.56	0.46	23.0	29	28	6.8	0	0.0	28	1.0	0	0
420	2002	BP	low	32	SP	RB11	20	RBT	1	8	0.6	H	1.50	0.66	0.66	3.0	29	0	7.0	28	0.5	28	0.5	0	0
421	2002	BP	low	32	SP	RB11	8	RBT	1	5	0.6	H	1.25	0.55	0.55	3.0	29	0	7.0	29	1.5	29	1.5	0	0
422	2002	BP	low	32	SP	RB11	61	RBT	1	5	0.6	H	1.20	0.28	0.28	3.0	29	0	7.0	29	1.5	29	1.5	0	0
423	2002	BP	low	32	SP	RB11	56	RBT	1	3	0.4	F	1.30	0.17	0.15	2.0	2	19	1.5	0	0.0	29	1.0	0	0
424	2002	BP	low	32	SP	RB11	60	RBT	1	7	0.8	H	1.80	0.67	0.49	2.5	27	2	6.5	28	1.0	29	2.0	0	0
425	2002	BP	low	32	SP	RB11	39	RBT	1	4	0.5	H	1.40	0.13	0.15	1.5	2	19	1.3	29	2.0	29	2.0	0	0
426	2002	BP	low	32	SP	RB11	3	RBT	1	4	0.2	H	1.00	0.20	0.25	1.0	2	19	1.5	0	0.0	29	1.0	0	0
427	2002	BP	low	32	SP	RB11	85	RBT	1	7	0.8	H	1.30	0.54	0.51	3.0	29	0	7.0	28	1.0	29	2.0	0	0
428	2002	BP	low	32	SP	RB11	13	RBT	1	30	0.9	H	2.40	0.93	1.17	3.5	29	0	7.0	27	2.0	27	2.0	0	1
429	2002	BP	low	32	SP	RB11	74	RBT	1	6	0.8	H	2.00	0.69	0.35	4.0	30	29	7.0	30	0.5	30	0.5	0	1
430	2002	BP	low	32	SP	RB11	59	CHB	1	8	0.8	H	1.50	0.98	1.22	4.0	30	28	7.0	30	1.0	30	1.0	0	1
431	2002	BP	low	32	SP	RB11	17	SCP	1	8	1.0	R	1.90	0.44	0.28	4.0	25	21	5.6	30	1.0	30	1.0	0	1
432	2002	BP	low	32	SP	LB41	48	SCP	1	7	1.0	H	2.20	0.72	0.70	1.0	29	27	6.7	0	0.0	27	0.5	0	1
433	2002	BP	low	32	SP	LB41	47	RBT	1	5	0.8	H	3.00	1.11	0.65	1.5	29	27	6.9	0	0.0	29	0.5	0	0
434	2002	BP	low	32	SP	LB41	17	SCP	1	9	1.0	H	2.40	1.13	1.09	1.5	27	28	6.3	30	1.5	28	0.5	0	0

Appendix A. (continued)

Rec #	Year	Reach	Seg-ment	Habitat Unit #	Habitat Unit Type	Trans #	Mark #	Spec	# Fish	Fish Size	Focal Ht	Fish Activ	Depth	Mean Veloc	Focal Veloc	Dist to Bank	Substrate Dom	Substrate SubDom	Substrate Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
435	2002	BP	low	32	SP	LB41	33	SCP	1	5	1.0	H	2.20	1.06	0.80	0.5	28	27	6.8	30	2.0	27	0.0	0	0
436	2002	BP	low	32	SP	LB41	62	RBT	1	7	0.8	H	1.30	0.82	0.72	3.5	26	21	5.6	0	0.0	27	2.0	0	0
437	2002	BP	low	32	SP	LB41	47	RBT	1	8	0.8	H	1.20	1.12	1.00	2.5	27	26	5.9	0	0.0	28	1.0	13	0
438	2002	BP	low	32	SP	LB41	3	RBT	1	5	0.6	F	1.20	0.49	0.49	3.5	27	21	5.8	0	0.0	27	0.5	0	0
439	2002	BP	low	32	SP	LB41	74	RBT	1	4	0.9	H	0.80	0.54	0.37	2.5	25	19	6.1	0	0.0	13	1.0	0	0
440	2002	BP	low	32	SP	LB41	39	RBT	1	4	0.8	H	0.80	0.58	0.50	3.0	26	27	6.0	0	0.0	30	2.0	0	0
441	2002	BP	low	32	SP	LB41	85	RBT	1	3	0.2	F	0.90	0.32		0.5	2	19	1.4	0	0.0	2	0.0	4	0
442	2002	BP	low	32	SP	LB41	20	RBT	1	5	0.4	F	1.00	1.07	1.33	0.5	28	27	6.8	28	0.5	28	1.0	4	1
443	2002	BP	low	32	SP	LB41	59	RBT	1	4	0.2	F	0.20	0.00	0.00	1.5	30	27	6.8	29	0.0	27	0.5	4	0
444	2002	BP	low	32	SP	LB41	61	SCP	1	2	1.0	H	0.90	1.05	0.99	0.5	28	0	7.0	0	0.0	28	0.5	4	0
445	2002	BP	low	32	SP	XS41	56	SCP	1	6	1.0	H	2.10	1.26	0.57	24.0	29	28	6.9	29	2.0	29	2.0	0	0
446	2002	BP	low	32	SP	XS41	13	RBT	1	9	0.5	F	2.10	1.19	1.18	30.0	29	26	6.6	29	0.5	28	2.0	0	0
447	2002	BP	low	32	SP	XS41	52	RBT	1	10	0.9	H	3.30	0.54	0.23	32.0	30	29	6.9	30	2.0	30	2.0	0	0
448	2002	BP	low	32	SP	XS41	8	RBT	1	25	0.6	R	2.80	0.73	0.87	35.0	29	30	6.8	30	1.5	30	1.5	0	0
449	2002	BP	low	32	SP	RB41	67	RBT	1	6	0.6	H	2.40	0.93	0.93	5.0	29	28	7.0	29	2.0	2	0.0	0	0
450	2002	BP	low	32	SP	RB41	12	RBT	1	5	0.8	H	1.80	0.54	0.39	5.0	28	30	6.8	29	3.0	29	1.0	0	0
451	2002	BP	low	32	SP	RB41	9	RBT	1	4	0.8	H	2.50	0.90	0.33		29	30	7.0	30	1.0	29	0.5	0	0
452	2002	BP	low	32	SP	RB41	67	RBT	1	6	0.8	H	2.80	1.21	0.59	2.0	27	28	6.8	29	3.0	29	3.0	0	0
453	2002	BP	low	32	SP	RB41	61	RBT	1	5	0.6	H	1.10	0.54	0.54	1.0	20	21	3.0	0	0.0	29	0.5	4	0
454	2002	BP	low	32	SP	RB41	21	RBT	1	7	0.8	D													
455	2002	BP	low	32	SP	RB41	43	RBT	1	16	0.6	R	2.90	0.60	0.42	8.0	27	28	6.5	30	3.0	29	1.5	0	1
456	2002	BP	low	32	SP	RB41	30	RBT	1	15	0.8	R	2.70	0.86	0.87	2.0	30	0	7.0	0	0.0	30	2.0	0	1
457	2002	BP	low	32	SP	XS41	46	RBT	1	27	0.8	R	3.60	2.12	2.65	41.0	28	27	6.5	30	1.5	30	1.5	0	1
458	2002	BP	low	32	SP	XS41	38	SCP	1	3	1.0	H	2.50	0.25	0.36	28.0	20	19	4.0	29	4.0	16	1.0	0	1
459	2002	BP	low	32	SP	XS41	79	RBT	1	25	0.8	H	2.70	0.89	0.29	3.0	29	28	6.9	29	1.5	29	2.0	0	1
460	2002	BP	low	32	SP	XS41	68	RBT	1	30	0.8	H	3.80	1.21	0.76	4.0	28	29	6.9	28	0.5	30	0.5	0	1
461	2002	BP	low	32	SP	XS41	37	RBT	1	28	0.8	H	3.80	1.40	1.11	5.0	28	29	6.9	28	0.5	30	0.5	0	1
462	2002	BP	low	31	RN	XS 26	40	RBT	1	25	0.5	H	3.10	1.70	2.54		29	28	6.7	30	1.0	29	3.0	0	1
463	2002	BP	low	31	RN	XS 26	56	RBT	1	26	0.8	R	3.80	1.69	0.96		28	27	6.4	28	1.5	28	1.5	0	1
464	2002	BP	low	31	RN	XS 26	11	LMP	1	17	1.0	H	3.50	1.87			28	27	6.6	27	1.0	27	1.0	0	1
465	2002	BP	low	31	RN	XS 26	26	RBT	1	22	0.6	H	2.70	1.63	1.76		28	27	6.2	28	3.0	28	3.0	0	1
466	2002	BP	low	31	RN	XS 26	3	RBT	1	30	0.7	H	2.80	1.95	1.81		27	28	6.2	28	2.0	29	4.0	0	1
467	2002	BP	low	31	RN	XS 26	100	RBT	1	35	0.8	H	2.80	1.93	1.26		28	27	6.7	28	3.0	28	3.0	0	1
468	2002	BP	low	31	RN	LB 26	10	RBT	1	6	0.8	H	1.55	0.48	0.44	2.0	28	20	7.0	28	1.0	28	1.0	4	0
469	2002	BP	low	31	RN	LB 26	17	RBT	1	5	0.9	H	1.25	0.16	0.18	1.0	20	28	4.1	28	0.5	4	0.5	4	0
470	2002	BP	low	31	RN	LB 26	45	RBT	1	5	0.6	H	2.15	0.07	0.07	2.0	30	25	6.8	30	1.0	28	0.5	0	0
471	2002	BP	low	31	RN	LB 26	48	RBT	1	6	0.8	H	1.20	0.37	0.52	7.0	30	27	6.8	30	0.5	28	3.0	0	1
472	2002	BP	low	31	RN	LB 26	56	RBT	1	6	0.8	H	1.20	0.45	0.56	7.0	30	27	6.8	30	0.5	28	3.0	0	1
473	2002	BP	low	31	RN	LB 26	20	SCP	1	8	1.0	H	2.00	0.38		2.0	30	25	6.8	30	0.5	28	0.5	0	0
474	2002	BP	low	31	RN	LB 26	1	RBT	1	20	0.8	H	2.30	1.69	0.83	9.5	27	28	6.4	28	1.0	28	1.0	0	1
475	2002	BP	low	31	RN	LB 26	58	RBT	1	10	0.6	H	3.20	0.48	0.45		28	25	6.8	28	0.0	28	1.0	0	1
476	2002	BP	low	31	RN	LB 26	67	RBT	1	3	0.7	H	1.10	0.22	0.29	1.5	28	4	7.0	28	1.0	28	1.0	0	0
477	2002	BP	low	31	RN	LB 26	74	RBT	1	4	0.5	H	1.80	0.45	0.42	1.5	28	27	6.8	28	0.5	28	0.5	0	0
478	2002	BP	low	31	RN	LB 26	36	RBT	1	5	0.5	H	1.70	0.23	0.39	2.0	28	27	6.8	27	0.0	2	0.5	0	0

Appendix A. (continued)

Rec #	Year	Reach	Seg-ment	Habitat Unit #	Habitat Unit Type	Trans #	Mark #	Spec	# Fish	Fish Size	Focal Ht	Fish Activ	Depth	Mean Veloc	Focal Veloc	Dist to Bank	Substrate Dom	Substrate SubDom	Substrate Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
479	2002	BP	low	31	RN	LB 26	38	SCP	1	8	1.0	H	1.90	0.65		2.5	28	27	6.7	28	0.5	28	0.5	0	0
480	2002	BP	low	31	RN	LB 26	61	RBT	1	5	0.6	H	1.40	0.45	0.45	5.0	28	27	6.7	28	0.5	28	0.5	0	1
481	2002	BP	low	31	RN	LB 26	68	SCP	1	9	1.0	H	1.45	0.33		4.0	28	27	6.6	28	0.5	28	0.5	0	1
482	2002	BP	low	31	RN	LB 26	62	RBT	1	5	0.9	F	1.50	0.39	0.39	2.0	30	0	7.0	30	1.5	30	1.5	0	1
483	2002	BP	low	31	RN	LB 26	80	RBT	1	7	0.8	H	0.80	1.00	0.42	8.0	26	25	6.2	28	0.0	4	0.5	0	1
484	2002	BP	low	31	RN	LB 26	32	SCP	1	8	1.0	H	0.80	1.00	0.42	8.0	26	25	6.0	26	1.0	27	0.5	0	1
485	2002	BP	low	31	RN	LB 26	85	RBT	1	5	0.6	H	1.50	0.53	0.53	2.5	28	26	6.8	28	1.0	28	1.0	0	0
486	2002	BP	low	31	RN	LB 26	79	SCP	1	9	1.0	H	1.50	0.40	0.23	2.0	28	26	6.2	26	0.0	26	0.5	0	0
487	2002	BP	low	31	RN	LB 26	60	RBT	1	5	0.7	H	0.90	0.50	0.56	5.5	29	4	7.0	0	0.0	4	0.5	0	0
488	2002	BP	low	31	RN	LB 26	9	SCP	1	3	1.0	H	0.70	0.55	0.37	5.0	29	4	7.0	0	0.0	4	0.5	0	0
489	2002	BP	low	31	RN	LB 26	31	RBT	3	9	0.8	R	2.30	0.34	0.34	10.0	26	4	6.1	0	0.0	4	0.5	0	0
490	2002	BP	low	31	RN	RB 26	13	RBT	1	8	0.9	H	1.70	1.20	0.65	4.0	27	20	6.1	27	1.0	28	0.5	0	1
491	2002	BP	low	31	RN	RB 26	31	RBT	1	25	0.9	H	1.10	0.60	0.39	6.0	29	27	6.9	28	2.0	29	0.0	29	0
492	2002	BP	low	31	RN	RB 26	43	RBT	1	7	0.9	H	0.90	0.52	0.32	1.0	28	21	6.5	27	1.0	27	1.0	4	0
493	2002	BP	low	31	RN	RB 26	6	RBT	1	4	0.5	H	0.50	0.28	0.30	6.0	27	2	6.0	0	0.0	27	0.5	0	0
494	2002	BP	low	31	RN	RB 26	44	RBT	1	5	0.6	H	1.70	0.38	0.38	5.0	2	27	1.0	0	0.0	2	0.0	0	0
495	2002	BP	low	31	RN	RB 26	59	RBT	1	4	0.6	H	1.60	0.57	0.57	5.0	2	27	1.0	0	0.0	2	0.0	0	0
496	2002	BP	low	31	RN	RB 26	29	RBT	1	6	0.7	H	1.80	0.51	0.54	5.0	2	27	1.0	0	0.0	2	0.0	0	0
497	2002	BP	low	31	RN	RB 26	74	RBT	5	3	0.5	H	1.30	0.23	0.12	2.0	2	27	1.0	0	0.0	2	0.0	0	0
498	2002	BP	low	31	RN	RB 26	8	RBT	1	4	0.7	H	1.60	0.47	0.31	5.5	2	27	1.0	0	0.0	2	0.0	0	0
499	2002	BP	low	31	RN	RB 26	39	RBT	1	4	0.7	H	1.50	0.65	0.43	5.5	2	27	1.0	0	0.0	2	0.0	0	0
500	2002	BP	low	31	RN	RB 26	24	RBT	1	5	0.7	H	1.60	0.61	0.43	5.5	2	27	1.0	0	0.0	2	0.0	0	0
501	2002	BP	low	31	RN	RB 26	68	RBT	1	7	0.7	H	1.60	0.41	0.33	5.0	2	27	1.0	0	0.0	2	0.0	0	0
502	2002	BP	low	31	RN	RB 26	12	RBT	1	4	0.8	H	1.70	0.48	0.53	5.0	2	27	1.0	0	0.0	2	0.0	0	0
503	2002	BP	low	31	RN	RB 26	61	RBT	1	4	0.7	H	1.60	0.43	0.33	5.5	2	27	1.0	0	0.0	2	0.0	0	0
504	2002	BP	low	31	RN	RB 26	67	RBT	1	5	0.9	H	1.40	0.51	0.45	0.5	21	28	5.0	0	0.0	29	1.0	0	0
505	2002	BP	low	31	RN	RB 26	15	RBT	1	6	0.8	H	1.20	0.43	0.25	3.5	20	27	4.4	29	1.0	29	1.0	0	1
506	2002	BP	low	31	RN	XS 56	36	SKR	1	20		D													
507	2002	BP	low	31	RN	XS 56	67	RBT	1	24	0.9	H	2.30	0.72	0.67	20.0	29	30	7.0	29	2.0	29	1.5	0	1
508	2002	BP	low	31	RN	XS 56	80	RBT	1	25	0.7	H	2.50	1.69	1.43		28	29	7.0	29	2.5	29	0.5		
509	2002	BP	low	31	RN	XS 56	15	RBT	1	19	0.8	H	2.60	1.32	1.66	15.0	28	29	7.0	30	5.0	29	1.0	0	0
510	2002	BP	low	31	RN	XS 56	62	RBT	1	21	0.6	R	2.50	1.71	1.71	20.0	28	29	7.0	29	1.0	29	2.5	0	0
511	2002	BP	low	31	RN	LB 56	1	RBT	1	24		D													
512	2002	BP	low	31	RN	LB 56	20	RBT	1	5	0.6	H	0.75	0.24	0.24	3.0	28	27	6.6	29	2.0	2	2.0	0	0
513	2002	BP	low	31	RN	LB 56	17	RBT	1	6	0.8	H	1.20	0.41	0.29	1.0	28	27	6.8	0	0.0	4	0.0	4	0
514	2002	BP	low	31	RN	LB 56	46	RBT	1	4	0.8	H	0.65	0.09	0.07	1.0	28	27	6.6	28	0.5	4	0.0	4	0
515	2002	BP	low	31	RN	LB 56	48	RBT	1	5	0.9	H	0.95	0.18	0.11	2.0	27	29	6.4	28	0.0	27	0.5		
516	2002	BP	low	31	RN	LB 56	31	RBT	1	5	0.8	H	1.00	0.35	0.10	2.5	27	29	6.4	28	0.0	27	0.5	0	0
517	2002	BP	low	31	RN	LB 56	20	RBT	1	8	0.6	H	1.30	0.64	0.64	4.5	26	25	6.2	28	1.0	28	1.0	5	0
518	2002	BP	low	31	RN	LB 56	60	RBT	1	5		D													
519	2002	BP	low	31	RN	LB 56	9	SCP	1	8	1.0	H	0.90	0.70	0.43	5.0	21	23	5.0	30	0.5	30	0.0	5	1
520	2002	BP	low	31	RN	LB 56	26	RBT	1	6	0.6	H	1.10	0.60	0.60	2.0	25	28	6.5	29	0.5	28	0.5	1	1
521	2002	BP	low	31	RN	LB 56	56	RBT	1	8		D													
522	2002	BP	low	31	RN	LB 56	24	RBT	1	7	0.8	H	1.35	0.53	0.52	9.0	29	28	6.9	28	0.5	28	0.5	0	0

Appendix A. (continued)

Rec #	Year	Reach	Seg-ment	Habitat Unit #	Habitat Unit Type	Trans #	Mark #	Spec	# Fish	Fish Size	Focal Ht	Fish Activ	Depth	Mean Veloc	Focal Veloc	Dist to Bank	Substrate Dom	Substrate SubDom	Substrate Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
523	2002	BP	low	31	RN	LB 56	39	RBT	1	5	0.8	F	1.00	0.39	0.53	7.0	28	30	7.0	30	0.0	30	0.5	0	0
524	2002	BP	low	31	RN	LB 56	6	RBT	1	6	0.9	H	0.70	0.49	0.43	7.0	28	29	6.9	0	0.0	2	0.5	0	0
525	2002	BP	low	31	RN	LB 56	31	RBT	1	8		D													
526	2002	BP	low	31	RN	RB 56	68	RBT	1	7	0.5	F	2.10	0.50	0.44	0.5	21	20	4.7	28	2.0	29	0.5	1	0
527	2002	BP	low	31	RN	RB 56	8	RBT	1	10	0.8	H	0.70	0.24	0.26	2.0	20	19	7.0	0	0.0	28	1.0	0	0
528	2002	BP	low	31	RN	RB 56	45	RBT	1	10	0.8	H	0.80	0.42	0.46	2.0	20	19	7.0	0	0.0	27	1.5	0	0
529	2002	BP	low	31	RN	RB 56	47	RBT	1	12	0.8	H	0.90	0.33	0.22	0.5	20	28	7.0	0	0.0	28	1.0	0	0
530	2002	BP	low	31	RN	RB 56	74	RBT	1	8	0.8	H	0.90	0.33	0.28	1.5	20	28	7.0	0	0.0	2	0.5	0	0
531	2002	BP	low	31	RN	RB 56	59	RBT	1	5	0.8	H	1.00	0.44	0.44	1.0	28	20	7.0	0	0.0	4	1.0	0	0
532	2002	BP	low	31	RN	RB 56	12	RBT	1	5	0.8	H	0.80	0.23	0.24	2.0	20	19		0	0.0	28	1.5	0	0
533	2002	BP	low	31	RN	RB 56	44	RBT	1	4	0.8	H	0.50	0.22	0.27	0.5	28	19	7.0	0	0.0	4	0.5	0	0
534	2002	BP	low	31	RN	RB 56	43	RBT	1	7	0.9	H		0.37	0.47	3.5	29	19	7.0	0	0.0	28	1.5	0	0
535	2002	BP	low	31	RN	RB 56	8	RBT	1	8	0.8	F	0.60	0.27	0.23	1.0	29	28	7.0	0	0.0	30	0.5	4	0
536	2002	BP	low	31	RN	RB 56	37	RBT	1	4	0.8	H	0.90	0.39	0.40	1.5	28	27	6.6	28	1.0	28	1.0	0	0
537	2002	BP	low	31	RN	RB 56	63	RBT	1	3	0.9	H	0.60	0.23	0.22	2.5	28	29	7.0	0	0.0	29	1.0	1	0
538	2002	BP	low	31	RN	RB 56	33	RBT	1	4	0.9	H	0.60	0.23	0.17	3.0	28	29	7.0	0	0.0	29	0.5	1	0
539	2002	BP	low	31	RN	RB 56	65	RBT	1	4	0.8	H	0.70	0.25	0.25	3.5	28	29	7.0	0	0.0	29	0.5	1	0
540	2002	BP	low	31	RN	RB 56	47	RBT	1	3	0.5	H	0.60	0.35	0.37	5.0	29	28	7.0	0	0.0	4	1.0	4	0
541	2002	BP	low	31	RN	RB 56	56	SCP	1	8	1.0	H	2.10	2.08	0.82	11.0	29	28	7.0	29	1.0	29	1.0	0	0
542	2002	BP	low	31	RN	RB 56	29	SCP	1	10	1.0	H		1.63	0.57	2.0	28	20	7.0	28	0.5	28	0.5	0	1
543	2002	BP	up	155	DP	XS 1	100	RBT	1	25	0.8	H	1.05	0.09	0.11	1.0	2	27	2.0	0	0.0	5	2.0	4	0
544	2002	BP	up	177	RN	XS 1	54	SCP	1	9	1.0	H	1.50	0.26	0.26	6.0	29	28	7.0	29	1.0	28	1.5	0	1
545	2002	BP	up	177	RN	XS 1	28	RBT	1	10	0.8	H	2.30	1.13	1.18	33.0	28	27	6.8	29	2.0	29	2.0	0	0
546	2002	BP	up	177	RN	XS 1	30	RBT	1	17	0.6	R	2.70	1.24	1.09	35.0	26	28	6.3	29	2.0	29	2.0	0	1
547	2002	BP	up	177	RN	XS 1	38	RBT	1	24	0.8	H	4.40	0.71	0.63	5.0	27	30	6.7	30	1.0	30	1.0	0	1
548	2002	BP	up	182	RF	XS 1	3	SCP	1	4	1.0	H	0.80	0.21	0.36	2.0	29	30	7.0	30	1.0	30	1.0	4	0
549	2002	BP	up	182	RF	XS 2	48	SCP	1	7	1.0	H	1.00	1.58	1.68	10.0	28	29	6.9	28	0.5	28	0.5	0	1
550	2002	BP	up	182	RF	XS 2	38	SCP	1	7	1.0	H	1.10	0.39		45.0	29	28	7.0	28	0.0	28	0.0	4	0
551	2002	BP	up	182	RF	XS 2	30	RBT	1	15	0.8	H	2.40	1.03	1.06	16.0	25	29	6.7	29	0.0	29	1.0	0	1
552	2002	BP	up	183	PW	XS 1	12	RBT	1	5	0.8	H	1.10	0.09	0.07	1.0	26	19	4.2	30	1.0	30	1.0	4	0
553	2002	BP	up	183	PW	XS 1	48	RBT	1	12	0.6	H	1.40	0.73	0.73	8.0	26	25	5.4	27	1.0	29	1.5	0	1
554	2002	BP	up	183	PW	XS 1	38	RBT	1	10	0.8	H	1.80	3.16	1.54	25.0	28	2	7.0	28	2.0	28	2.0	0	1
555	2002	BP	up	186	RN	XS 1	48	RBT	1	7	0.6	H	1.40	0.84	0.84	4.0	27	28	6.2	27	1.0	27	1.0	0	1
556	2002	BP	up	186	RN	XS 1	38	SCP	1	10	1.0	H	1.90	2.27	0.98	10.0	27	29	6.6	29	0.0	28	1.0	0	1
557	2002	BP	up	186	RN	XS 1	54	SCP	1	6	1.0	H	1.60	2.33	1.32	8.0	26	27	6.1	27	0.5	27	0.5	0	1
558	2002	BP	up	186	RN	XS 1	28	SCP	1	7	1.0	H	2.10	1.66	0.71	16.0	28	29	6.8	29	1.0	29	1.0	0	1
559	2002	BP	up	186	RN	XS 1	38	RBT	1	16	0.6	F	1.90	1.11	1.11	17.0	27	28	6.2	27	0.5	25	0.5	0	1
560	2002	BP	up	186	RN	XS 1	46	RBT	1	21	0.6	F	2.80	1.39	1.46	36.0	29	28	6.9	30	4.0	27	1.5	0	1
561	2002	BP	up	186	RN	XS 1	68	RBT	1	9	0.6	R	1.30	0.55	0.55	5.0	28	29	6.9	28	1.5	28	1.5	0	0
562	2002	BP	up	186	RN	XS 2	33	RBT	1	12	0.6	H	2.00	2.51	2.51		27	28	6.5	28	0.5	28	0.5	0	1
563	2002	BP	up	186	RN	XS 2	35	RBT	1	18	0.8	H	1.90	0.79	0.59	16.0	27	28	6.5	28	0.0	29	2.0	0	1
564	2002	BP	up	186	RN	XS 2	60	RBT	1	20	0.8	H	2.00	1.28	1.10	18.0	27	29	6.3	28	1.0	28	1.0	0	1
565	2002	BP	up	186	RN	XS 2	13	RBT	1	35	0.6	R	1.60	0.80	0.80	12.0	28	29	6.8	29	1.0	29	1.0	0	1
566	2002	BP	up	186	RN	XS 2	3	RBT	1	20	0.6	H	1.60	1.17	1.17	11.0	28	29	6.7	29	1.0	29	1.0	0	1

Appendix A. (continued)

Rec			Seg-	Habitat Unit		Trans	Mark		#	Fish	Focal	Fish		Mean	Focal	Dist to	Substrate			Velocity Cover		Escape Cover		OVH	Turb
#	Year	Reach	ment	#	Type	#	#	Spec	Fish	Size	Ht	Activ	Depth	Veloc	Veloc	Bank	Dom	SubDom	Bovee	Type	Dist	Type	Dist	Cover	Cover
567	2002	BP	up	186	RN	XS 2	47	RBT	1	16	0.8	H	1.90	0.74	0.53	12.0	27	28	6.4	27	0.0	29	2.0	0	1
568	2002	BP	up	186	RN	XS 2	26	RBT	1	17	0.6	R	1.70	0.77	0.77	11.0	28	29	6.8	28	1.0	28	1.0	0	1
569	2002	BP	up	186	RN	XS 2	12	RBT	1	20	0.6	H	2.00	0.97	0.97	17.0	28	29	6.8	29	2.5	29	2.5	0	1
570	2002	BP	up	186	RN	XS 2	67	RBT	1	25	0.8	H	2.00	2.04	1.90	28.0	29	27	6.9	29	2.5	28	1.0	0	1
571	2002	BP	up	186	RN	XS 2	63	RBT	1	18	0.6	H	2.70	1.77	1.63	31.0	29	30	7.0	29	2.0	29	1.0	0	1
572	2002	BP	up	186	RN	XS 2	44	RBT	1	22	0.8	H	2.70	1.23	0.77	30.0	28	29	6.1	28	1.5	28	1.5	0	1
573	2002	BP	up	186	RN	XS 2	30	RBT	1	17	0.8	H	3.00	2.15	1.96	36.0	29	30	7.0	29	0.5	30	2.5	0	2
574	2002	BP	up	186	RN	XS 2	52	RBT	1	30	0.8	H	4.20	1.97	1.90	27.0	30	29	7.0	30	0.5	30	0.5	0	2
575	2002	BP	up	186	RN	XS 2	43	RBT	1	18	0.6	H	3.90	1.00	1.10	10.0	30	29	7.0	29	2.0	29	2.0	0	0
576	2002	BP	up	186	RN	XS 2	85	RBT	1	27	0.6	R	3.80	1.15	1.33	9.0	30	27	6.8	29	2.5	29	2.5	0	0
577	2002	BP	up	186	RN	XS 2	67	RBT	1	18	0.6	R	2.40	2.06	2.06	8.0	29	30	7.0	29	1.0	29	1.0	0	1
578	2002	BP	up	195	RN	XS 1	46	RBT	1	10	0.8	H	1.20	0.40	0.28	4.0	25	0	5.0	30	1.0	30	1.0	4	1
579	2002	BP	up	195	RN	XS 1	26	RBT	1	6	0.8	H	1.20	1.11	0.94	14.0	27	26	6.0	27	1.5	28	2.0	0	1
580	2002	BP	up	195	RN	XS 1	51	RBT	1	20	0.8	H	1.80	1.60	0.98	20.0	25	24	5.5	29	3.0	29	3.0	0	1
581	2002	BP	up	195	RN	XS 1	56	RBT	1	18	0.8	R	2.50	0.92	0.77	24.0	25	27	5.2	30	0.5	30	0.5	0	0
582	2002	BP	up	195	RN	XS 1	85	RBT	1	25	0.8	F	2.00	0.25	0.23	23.0	26	25	5.4	29	1.0	29	1.0	0	0
583	2002	BP	up	195	RN	XS 1	67	RBT	1	20	0.8	F	3.20	1.42	0.84	26.0	26	28	6.5	28	1.0	28	1.0	0	1
584	2002	BP	up	195	RN	XS 1	38	RBT	1	22	0.8	H	2.50	1.17	1.04	24.0	26	25	5.5	30	3.0	0	0.0	0	1
585	2002	BP	up	195	RN	XS 1	46	RBT	1	13	0.6	R	2.40	1.54	1.54	27.0	30	25	7.0	28	1.0	28	1.0	0	1
586	2002	BP	up	195	RN	XS 1	38	RBT	1	7	0.8	H	2.00	2.12	1.40	26.0	21	28	5.0	30	0.5	27	1.0	0	1
587	2002	BP	up	195	RN	XS 1	64	RBT	1	7	0.8	H	2.20	1.85	0.67	25.0	26	24	5.6	30	2.0	30	2.0	0	1
588	2002	BP	up	195	RN	XS 1	43	RBT	1	20	0.8	H	3.90	1.72	1.86	36.0	29	0	7.0	30	3.0	30	3.0	0	2
589	2002	BP	up	195	RN	XS 1	68	RBT	1	17	0.8	R	2.60	0.91	0.64	46.0	29	30	7.0	30	1.5	30	1.5	0	1
590	2002	BP	up	195	RN	XS 1	13	RBT	1	23	0.8	H	2.50	0.25	0.23	44.0	27	28	6.8	27	1.5	27	1.5	0	1
591	2002	BP	up	195	RN	XS 1	39	RBT	1	17	0.6	H	2.20	0.27	0.27	27.0	30	0	7.0	30	2.0	30	2.0	0	0
592	2002	BP	up	195	RN	XS 1	1	RBT	1	13	0.6	H	1.90	2.52	2.52	23.0	30	2	7.0	30	1.0	30	1.0	0	2
593	2002	BP	up	195	RN	XS 1	36	RBT	1	12	0.6	H	1.00	0.67	0.67	13.0	29	0	7.0	30	2.0	29	1.0	0	2
594	2002	BP	up	208	PW	XS 1	54	RBT	1	5	0.6	H	0.30	0.31	0.31	0.5	26	27	6.0	0	0.0	28	2.0	4	0
595	2002	BP	up	208	PW	XS 1	58	RBT	1	6	0.6	H	0.75	0.60	0.60	1.0	25	26	6.1	0	0.0	28	1.5	4	0
596	2002	BP	up	208	PW	XS 1	85	RBT	1	17	0.6	H	1.80	1.64	1.64	24.0	27	25	5.9	28	1.0	28	1.0	0	1
597	2002	BP	up	208	PW	XS 1	43	RBT	1	6	0.8	H	1.50	0.44	0.47	28.0	27	24	5.7	30	0.0	30	1.5	0	1
598	2002	BP	up	208	PW	XS 1	44	RBT	1	22	0.6	H	2.90	0.91	0.60	22.0	30	25	6.9	30	1.5	30	1.5	0	2
599	2002	BP	up	208	PW	XS 1	52	RBT	1	15	0.8	H	2.70	1.72	0.85	12.0	29	30	7.0	30	3.0	30	3.0	0	1
600	2002	BP	up	208	PW	XS 2	8	RBT	1	9	0.8	H	1.20	1.13	0.42	24.0	23	30	5.0	30	0.5	30	0.5	0	1
601	2002	BP	up	208	PW	XS 2	79	SCP	1	5	1.0	H	2.40	0.36	0.34	25.0	29	26	6.8	28	0.5	30	3.0	0	1
602	2002	BP	up	209	SP	XS 1	38	RBT	1	3	0.6	F	0.60	0.95	0.95	2.0	29	22	7.0	28	2.0	28	2.0	4	1
603	2002	BP	up	209	SP	XS 1	48	RBT	1	25	0.6	F	3.60	1.22	1.08	11.0	25	24	5.8	30	1.5	30	1.5	0	1
604	2002	BP	up	209	SP	XS 1	63	RBT	1	30	0.6	H	3.90	1.88	1.99	13.0	28	27	6.8	28	1.0	30	2.0	0	1
605	2002	BP	up	209	SP	XS 1	38	RBT	1	23	0.6	R	2.20	0.79	0.79	16.0	23	22	5.4	30	2.0	30	2.0	0	1
606	2002	BP	up	209	SP	XS 1	26	RBT	1	5	0.6	R	1.30	0.24	0.24	5.0	29	25	7.0	29	1.0	29	1.0	0	0
607	2002	BP	up	209	SP	XS 1	28	RBT	1	7	0.8	H	1.10	0.50	0.48	2.0	28	0	7.0	28	0.0	28	1.0	0	0
608	2002	BP	up	209	SP	XS 1	30	RBT	1	11	0.8	H	1.40	0.63	0.55	3.0	29	0	7.0	29	2.0	29	0.5	0	0
609	2002	BP	up	210	PW	XS 1	47	RBT	1	25	0.6	H	1.80	0.69	0.69	1.0	29	26	6.7	30	4.0	30	4.0	0	2
610	2002	BP	up	210	PW	XS 1	100	RBT	1	16	0.8	H	2.50	1.44	1.10	5.0	28	26	6.8	29	1.0	29	3.0	0	0

Appendix A. (continued)

Rec			Seg-	Habitat Unit		Trans	Mark		#	Fish	Focal	Fish		Mean	Focal	Dist to	Substrate			Velocity Cover		Escape Cover		OVH	Turb
#	Year	Reach	ment	#	Type	#	#	Spec	Fish	Size	Ht	Activ	Depth	Veloc	Veloc	Bank	Dom	SubDom	Bovee	Type	Dist	Type	Dist	Cover	Cover
611	2002	BP	up	210	PW	XS 1	52	RBT	1	23	0.8	H	2.90	1.98	1.30	17.0	25	24	6.2	29	1.5	29	1.5	0	2
612	2002	BP	up	210	PW	XS 1	51	RBT	1	20	0.8	F	3.30	2.04	1.65	18.0	27	28	6.4	29	2.0	29	2.0	0	2
613	2002	BP	up	210	PW	XS 1	79	RBT	1	18	0.6	H	1.30	1.26	1.26	6.0	30	0	7.0	27	0.5	29	2.0	0	1
614	2002	BP	up	210	PW	XS 1	36	RBT	1	10	0.8	H	1.60	0.46	0.39	6.0	27	25	5.6	30	0.0	30	2.0	0	0
615	2002	BP	up	210	PW	XS 1	30	RBT	1	20	0.8	H	1.50	1.96	2.05	4.0	29	25	6.9	30	3.0	28	1.0	0	1
616	2002	BP	up	210	PW	XS 1	9	RBT	1	8	0.8	H	1.70	0.51	0.29	4.0	28	25	6.8	0	0.0	27	0.5	0	1
617	2002	BP	up	211	RF	XS 1	64	RBT	1	8	0.8	H	2.00	2.13	1.68	17.0	31	25	8.0	30	3.5	30	3.5	0	1
618	2002	BP	up	211	RF	XS 1	38	RBT	1	5	0.8	H	1.00	0.22		15.0	27	26	6.0	0	0.0	29	2.0	0	0
619	2002	BP	up	211	RF	XS 1	54	RBT	1	14	0.6	R	0.70	0.36	0.36	12.0	25	24	5.7	0	0.0	4	0.5	4	1
620	2002	BP	up	211	RF	XS 1	85	RBT	1	22	0.8	H	2.00	2.09	1.68	11.0	31	25	8.0	30	3.5	30	3.5	0	1
621	2002	BP	up	211	RF	XS 1	39	RBT	1	7	0.6	H	0.75	0.81	0.81	10.0	27	25	5.9	0	0.0	5	1.0	5	0
622	2002	BP	up	211	RF	XS 1	1	RBT	1	11	0.8	H	1.75	1.43	1.29	5.0	31	28	7.8	30	2.0	30	2.0	0	1
623	2002	BP	up	211	RF	XS 1	30	RBT	1	22	0.8	H	1.80	1.36	0.88	4.0	30	28	6.8	29	3.0	0	0.0	0	2
624	2002	BP	up	211	RF	XS 2	106	RBT	1	15	0.8	H	3.30	1.07	0.74	8.0	30	25	6.8	30	0.0	30	2.5	0	2
625	2002	BP	up	211	RF	XS 2	35	RBT	1	23	0.6	H	3.60	1.34	1.83	2.0	28	27	7.0	28	0.0	29	2.0	0	0
626	2002	BP	up	211	RF	XS 2	62	RBT	1	15	0.6	H	2.30	0.39	0.39	3.0	29	2	7.0	30	1.0	30	1.0	0	1
627	2002	BP	up	211	RF	XS 2	82	RBT	1	12	0.8	H	2.00	1.19	0.62	17.0	30	0	7.0	30	0.5	28	1.5	0	1
628	2002	BP	up	217	SP	XS 1	3	RBT	1	7	0.8	H	1.80	0.67	0.67	8.0	29	2	7.0	30	1.0	30	1.0	0	0
629	2002	BP	up	217	SP	XS 1	54	RBT	1	8	0.8	H	2.00	0.82	0.61	8.0	28	2	7.0	29	1.0	30	2.0	0	0
630	2002	BP	up	217	SP	XS 1	13	RBT	1	7	0.8	H	1.90	0.66	0.57	8.0	28	2	7.0	30	1.0	30	1.0	0	0
631	2002	BP	up	217	SP	XS 1	26	RBT	1	6	0.8	H	3.00	0.73	0.43	11.0	29	2	7.0	30	1.0	30	1.0	0	0
632	2002	BP	up	217	SP	XS 1	51	RBT	1	5	0.8	H	3.60	1.04	0.65	11.0	26	27	6.5	30	2.0	30	2.0	0	0
633	2002	BP	up	217	SP	XS 1	36	RBT	1	13	0.8	H	3.50	1.11	1.04	30.0	27	0	6.0	29	2.0	29	2.0	0	0
634	2002	BP	up	217	SP	XS 1	48	RBT	1	15	0.6	H	3.40	1.27	1.26	40.0	26	27	6.3	28	2.0	28	2.0	0	0
635	2002	BP	up	217	SP	XS 1	12	CHB	1	11	0.8	H	3.00	1.07	1.07	28.0	27	0	6.3	29	2.0	29	4.0	0	0
636	2002	BP	up	217	SP	XS 1	46	SKR	1	10	1.0	H	3.20	1.15		39.0	27	2	6.1	28	2.0	29	3.0	0	0
637	2002	BP	up	217	SP	XS 1	85	RBT	1	18	0.8	H	5.50	0.92	1.02		27	26	6.2	29	2.0	29	2.0	0	0
638	2002	BP	up	217	SP	XS 1	39	RBT	1	25	0.8	H	6.00	1.20	0.99	16.0	28	26	6.3	30	2.0	30	4.0	0	0
639	2002	BP	up	217	SP	XS 1	100	RBT	1	25	0.6	H	3.50	0.78	0.86	3.0	30	0	7.0	30	0.0	30	0.0	0	0
640	2002	BP	up	217	SP	XS 2	56	RBT	1	7	0.8	H	3.00	0.28	0.27	10.0	27	29	6.2	30	2.0	28	1.0	0	0
641	2002	BP	up	217	SP	XS 2	17	RBT	1	21	0.8	F	3.40	1.79	0.72	13.0	29	28	6.9	29	1.5	29	1.5	0	1
642	2002	BP	up	217	SP	XS 2	46	SCP	1	8	1.0	H	3.90	1.52	0.55	15.0	29	28	6.9	29	1.0	29	1.0	0	1
643	2002	BP	up	217	SP	XS 2	38	CHB	13	12	0.8	R	5.30	1.09	0.99	45.0	28	29	6.8	28	0.5	28	0.5	0	0
644	2002	BP	up	217	SP	XS 2	39	SCP	1	8	1.0	H	5.40	0.80	0.40	40.0	28	21	6.8	28	0.5	1	1.0	0	0
645	2002	BP	up	217	SP	XS 2	74	SCP	1	10	1.0	H	4.80	1.15	0.28	42.0	29	28	7.0	28	0.5	28	0.5	0	0
646	2002	BP	up	217	SP	XS 2	106	SCP	1	10	1.0	H	5.00	0.91	0.25	28.0	21	30	3.2	26	1.0	26	1.0	0	0
647	2002	BP	up	217	SP	XS 2	9	SCP	1	6	0.6	H	3.40	0.29	0.23		29	30	7.0	29	0.5	29	0.5	0	0
648	2002	BP	up	217	SP	XS 3	8	RBT	1	30	0.8	H	2.10	0.35	0.32	3.0	28	29	6.9	30	0.0	30	1.0	0	0
649	2002	BP	up	217	SP	XS 3	17	RBT	1	7	0.6	R	2.00	0.56	0.56	2.0	28	30	7.0	30	0.0	28	0.5	0	0
650	2002	BP	up	217	SP	XS 3	74	RBT	1	25	0.6	H	4.90	0.92	0.81	20.0	29	0	7.0	29	3.0	29	2.0	0	1
651	2002	BP	up	217	SP	XS 3	106	RBT	1	27	0.6	F	4.70	0.71	0.68	22.0	29	0	7.0	29	2.5	29	2.5	0	1
652	2002	BP	up	217	SP	XS 3	39	RBT	1	35	0.6	R	4.00	1.38	1.29	13.0	29	2	7.0	29	1.0	30	2.0	0	0
653	2002	BP	up	217	SP	XS 3	64	RBT	1	20	0.6	F	5.80	0.58	0.50	30.0	30	0	7.0	30	1.0	30	1.0	0	0
654	2002	BP	up	217	SP	XS 3	43	RBT	1	25	0.6	R	4.40	0.91	0.91	27.0	29	2	7.0	29	3.0	30	3.0	0	1

Appendix A. (continued)

Rec #	Year	Reach	Seg-ment	Habitat Unit #	Habitat Unit Type	Trans #	Mark #	Spec	# Fish	Fish Size	Focal Ht	Fish Activ	Depth	Mean Veloc	Focal Veloc	Dist to Bank	Substrate Dom	Substrate SubDom	Substrate Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
655	2002	BP	up	217	SP	XS 3	79	RBT	1	28	0.6	F	4.40	1.03	1.09	22.0	29	2	7.0	29	0.0	29	1.0	0	1
656	2002	BP	up	217	SP	XS 3	53	RBT	1	30	0.6	R	5.10	0.36	0.34	25.0	30	28	7.0	30	2.0	30	4.0	0	0
657	2002	BP	up	217	SP	XS 3	56	RBT	1	24	0.6	R	5.50	0.72	0.64	14.0	28	29	6.9	29	4.0	29	2.0	0	1
658	2002	BP	up	217	SP	XS 3	68	RBT	1	22	0.8	R	4.60	1.06	1.14	29.0	30	2	7.0	29	3.5	29	3.5	0	1
659	2002	BP	up	217	SP	XS 3	46	RBT	1	26	0.8	H	3.50	0.81	0.67	8.0	30	19	7.0	0	0.0	30	1.0	0	0
660	2002	BP	up	217	SP	XS 3	38	RBT	1	27	0.8	R	4.20	0.56		1.0	27	19	6.3	0	0.0	30	3.0	0	0
661	2002	BP	up	230	DP	XS 2	36	RBT	1	4	1.0	H	0.80	0.07	0.16	1.0	30	29	7.0	0	0.0	30	2.0	0	0
662	2002	BP	up	230	DP	XS 2	67	RBT	1	7	0.8	H	2.40	0.62	0.47	3.0	30	0	7.0	0	0.0	30	2.0	0	0
663	2002	BP	up	230	DP	XS 2	47	RBT	1	5	0.6	H	0.50	0.08	0.08	0.5	30	19	7.0	0	0.0	30	1.0	0	0
664	2002	BP	up	230	DP	XS 2	119	RBT	1	25	0.8	H	9.50	0.71	0.44	20.0	30	0	7.0	30	1.0	30	1.0	0	0
665	2002	BP	up	230	DP	XS 3	132	RBT	1	21	0.8	R	5.50	1.26	0.90	13.0	30	26	6.9	0	0.0	30	3.0	0	1
666	2002	BP	low	58	DPt	RB34	47	RBT	1	7	0.8	H	2.90	1.43	0.23	4.0	28	0	7.0	30	1.0	30	2.0	0	0
667	2002	BP	low	58	DPt	RB34	54	RBT	1	5	0.6	H	2.80	0.29	0.36	2.0	30	27	7.0	30	1.5	30	1.5	0	0
668	2002	BP	low	58	DPt	RB34	54	RBT	1	3	0.2	H	2.80	0.29	0.24	2.0	30	27	7.0	30	1.5	30	1.5	0	0
669	2002	BP	low	58	DPt	RB34	26	RBT	1	9	0.6	F	5.20	0.60	0.56	6.0	30	29	7.0	0	0.0	29	0.0	0	0
670	2002	BP	low	58	DPt	RB34	61	RBT	1	4	0.8	H	0.45	0.31	0.18	1.0	30	0	7.0	0	0.0	30	0.5	4	0
671	2002	BP	low	58	DPt	RB34	56	RBT	1	7	0.6	H	2.05	0.24	0.24	3.0	30	2	7.0	30	2.0	30	2.0	0	0
672	2002	BP	low	58	DPt	RB34	39	RBT	1	3	0.8	H	1.50	0.15	0.08	1.0	29	2	7.0	0	0.0	30	1.0	0	0
673	2002	BP	low	58	DPt	RB34	35	RBT	1	5	0.6	H	0.40	0.18	0.18	1.0	29	0	7.0	0	0.0	30	1.5	4	0
674	2002	BP	low	58	DPt	RB34	3	RBT	1	5	0.8	H	2.20	0.77	0.88	1.5	29	0	7.0	30	0.5	30	1.0	4	0
675	2002	BP	low	58	DPt	RB34	68	RBT	1	7	0.8	H	2.40	0.75	0.69	2.0	29	2	7.0	30	1.0	30	1.0	0	0
676	2002	BP	low	58	DPt	RB34	5	RBT	1	5	0.6	F	2.50	0.87	0.87	2.0	29	2	7.0	0	0.0	30	1.0	0	0
677	2002	BP	low	58	DPt	RB34	1	RBT	1	3	0.2	H	0.90	0.21	0.24	0.5	30	0	7.0	0	0.0	30	1.0	4	0
678	2002	BP	low	58	DPt	RB34	53	SCP	1	7	1.0	H		0.39	0.33	1.5	29	0	7.0	0	0.0	30	1.0	0	0
679	2002	BP	low	58	DPt	RB34	68	RBT	1	6	0.6	H	1.30	0.24	0.24	0.5	30	0	7.0	0	0.0	12	1.0	4	0
680	2002	BP	low	58	DPt	RB34	32	RBT	1	3	0.1	H	1.35	0.20	0.21	1.0	30	0	7.0	0	0.0	12	0.5	4	0
681	2002	BP	low	56	RF	LB14	61	RBT	1	4	0.2	H	0.90	0.29	0.23	2.0	23	25	5.3	0	0.0	2	0.0	0	0
682	2002	BP	low	32	SP	LB11	68	RBT	1	5	0.8	R	0.80	0.37	0.32	2.5	30	28	6.8	0	0.0	2	0.5	0	0
683	2003	BP	mid	149	RF	LB	14	RBT	1	3	0.8	H	0.70	0.10	0.13	2.0	24	21	4.8			25	0.4	4	0
684	2003	BP	mid	149	RF	LB	43	RBT	1	3	0.8	H	0.15	0.17	0.17	0.4	24	26	5.3	24	0.3	13	0.1	13	0
685	2003	BP	mid	149	RF	LB	37	RBT	1	6	0.8	H	0.35	1.06	0.77	5.0	25	24	5.8	25	0.8	25	0.8		1
686	2003	BP	mid	149	RF	LB	3	RBT	1	4	0.6	H	0.35	0.74	0.74	4.7	24	25	5.3	24	0.6	2	1.3	0	1
687	2003	BP	mid	149	RF	LB	46	RBT	1	3	0.8	F	0.35	0.13	0.13	4.5	24	23	4.9	23	0.3	23	0.3	0	0
688	2003	BP	mid	149	RF	LB	36	RBT	1	4	0.8	H	0.30	0.78	0.78	5.4	24	23	4.9	24	0.6	24	0.6	0	1
689	2003	BP	mid	149	RF	LB	48	RBT	1	6	0.8	F	0.40	0.53	0.52	3.0	22	23	4.9	25	0.4	25	0.6	0	1
690	2003	BP	mid	149	RF	LB	13	RBT	1	4	0.8	H	0.50	1.31		3.2	22	23	4.9	25	0.9	25	0.9	0	1
691	2003	BP	mid	149	RF	LB	7	RBT	1	4	0.8	H	0.45	1.46	1.37	3.4	22	23	4.9	25	0.7	25	0.7	0	1
692	2003	BP	mid	149	RF	LB	8	RBT	1	4	0.8	H	0.50	1.18	0.89	3.2	22	23	4.9	25	0.6	25	0.6	0	1
693	2003	BP	mid	149	RF	LB	38	RBT	1	4	0.8	F	0.60	1.35	1.62	4.0	22	25	5.3	24	0.2	25	0.6	0	1
694	2003	BP	mid	149	RF	LB	20	RBT	1	6	0.8	F	0.45	1.21	0.86	4.2	25	22	5.6	24	0.1	24	0.4	0	1
695	2003	BP	mid	149	RF	LB	28	RBT	1	4	0.8	H	0.60	1.36	1.58	3.9	25	22	5.6	24	0.3	24	0.3	0	1
696	2003	BP	mid	149	RF	LB	9	RBT	1	6	1.0	H	0.80	1.81	1.56	4.6	25	23	5.6	24	0.8	24	0.8	0	1
697	2003	BP	mid	149	RF	LB	5	RBT	1	10	0.8	H	0.70	1.81	1.43	5.6	25	24	5.7	26	1	26	1.0	0	1
698	2003	BP	mid	149	RF	LB	1	RBT	1	5	1.0	H	0.10	1.17	0.84	4.0	25	24	5.7	25	0.6	25	0.6	0	1

Appendix A. (continued)

Rec #	Year	Reach	Seg-ment	Habitat Unit #	Habitat Unit Type	Trans #	Mark #	Spec	# Fish	Fish Size	Focal Ht	Fish Activ	Depth	Mean Veloc	Focal Veloc	Dist to Bank	Substrate Dom	Substrate SubDom	Substrate Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
699	2003	BP	mid	149	RF	LB	17	RBT	1	8	0.8	H	0.70	1.13	0.60	3.3	23	22	4.9	24	0.3	24	0.5	0	1
700	2003	BP	mid	149	RF	LB	29	RBT	1	4	0.8	H	0.50	0.54	0.35	1.4	22	23	4.9			24	0.3	0	1
701	2003	BP	mid	149	RF	LB	30	RBT	1	3	0.6	H	0.30	0.41	0.41	1.3	23	24	4.9			25	0.1	0	0
702	2003	BP	mid	149	RF	LB	40	RBT	1	4	0.8	H	0.30	0.75	0.75	1.5	22	23	4.9	23	0.3	27	0.8	0	0
703	2003	BP	mid	149	RF	LB	36	RBT	1	6	0.8	H	0.60	1.28	1.26	1.4	23	25	5.3	25	0.9	25	0.9	0	1
704	2003	BP	mid	149	RF	LB	39	RBT	1	5	0.8	H	0.40	0.94	0.66	3.0	23	24	5.2	25	0.6	26	0.9	0	1
705	2003	BP	mid	149	RF	LB	26	RBT	1	6	0.8	H	0.50	1.32	1.10	1.4	23	24	5.2	25	0.3	25	0.3	0	1
706	2003	BP	mid	149	RF	LB	68	RBT	1	6	0.8	H	0.50	1.05	1.03	3.3	24	26	5.4	26	0.5	26	0.5	0	1
707	2003	BP	mid	149	RF	LB	80	RBT	1	8	0.8	F	1.30	1.94	1.52	6.0	25	26	5.9	25	0.9	25	0.9	0	1
708	2003	BP	mid	149	RF	LB	47	RBT	1	4	1.0	H	0.60	0.47	0.65	3.4	24	23	5.1	26	0.6	26	0.6	0	1
709	2003	BP	mid	149	RF	LB	2	RBT	1	8	0.8	H	1.10	1.89	1.30	5.0	27	25	6.0	25	0.5	25	0.6	0	1
710	2003	BP	mid	149	RF	LB	67	RBT	1	8	1.0	H	0.40	1.33	1.14	3.7	26	24	5.7	26	0.6	26	0.6	0	1
711	2003	BP	mid	149	RF	LB	32	RBT	1	5	0.8	H	0.90	1.17	1.04	3.3	25	23	5.6	26	0.9	26	0.9	0	1
712	2003	BP	mid	149	RF	LB	84	RBT	1	6	0.8	H	0.60	1.03	0.88	3.6	25	24	5.1	24	0.6	24	0.6	0	1
713	2003	BP	mid	149	RF	LB	85	RBT	1	8	0.8	H	1.00	1.77	1.64		26	24	5.8	26	0.4	26	0.4	0	1
714	2003	BP	mid	149	RF	LB	53	RBT	1	7	0.8	H	1.10	1.97	1.57	5.2	24	23	5.2	25	1.3	25	1.3	0	1
715	2003	BP	mid	149	RF	LB	88	RBT	1	4	0.8	H	0.40	0.17	0.17	1.0	21	20	4.9	25	0.7	25	0.7	0	0
716	2003	BP	mid	149	RF	LB	89	RBT	1	4	0.8	H	0.40	0.26	0.26	1.7	22	21	4.8	25	0.8	25	0.8	0	0
717	2003	BP	mid	149	RF	LB	51	RBT	1	7	1.0	H	1.40	2.20	0.83	7.0	25	23	5.8	26	1	26	1.0	0	1
718	2003	BP	mid	149	RF	LB	74	RBT	1	7	0.8	H	0.80	1.37	1.41	3.4	26	24	5.7	26	0.5	26	0.5	3	1
719	2003	BP	mid	149	RF	LB	64	RBT	1	6	0.8	H	0.70	1.20	1.23	3.9	26	23	5.7			3	0.0	3	1
720	2003	BP	mid	149	RF	LB	83	RBT	1	8	0.8	H	1.20	1.74	1.21	5.2	25	24	5.5	26	1.0	26	1.0	3	1
721	2003	BP	mid	149	RF	LB	68	RBT	1	7	0.8	H	1.10	1.68	1.42	5.0	25	24	5.5	26	2.0	4	1.0	0	1
722	2003	BP	mid	149	RF	LB	54	RBT	1	12	0.8	H	1.30	2.66	2.10	6.3	25	24	5.6	26	2.0	26	2.0	0	1
723	2003	BP	mid	149	RF	LB	86	RBT	1	5	0.6	H	1.50	0.56	0.56	3.5	26	24	5.5	26	0.5	26	0.5	3	0
724	2003	BP	mid	149	RF	LB	63	RBT	1	5	0.6	H	1.30	0.36	0.36	25.0	23	5.7						0	1
725	2003	BP	mid	149	RF	LB	82	RBT	1	5	0.8	H	0.80	0.38											
726	2003	BP	mid	149	RF	LB	61	RBT	1	6	0.8	H	0.80	0.38											
727	2003	BP	mid	149	RF	LB	56	RBT	1	7	0.8	H	0.70	0.38											
728	2003	BP	mid	149	RF	LB	62	RBT	1	6	0.8	H	0.70	0.44	0.10		26	21	5.7			25	0.1		
729	2003	BP	mid	149	RF	LB	79	RBT	1	8	0.8	H	1.50	0.63	0.50	4.0	25	26	6.1	26	0.2	26	0.2	0	1
730	2003	BP	mid	149	RF	XS 22	60	RBT	1	5	0.8	H	0.70	1.29	0.99	10.4	21	20	4.8	25	0.9	26	1.0	0	1
731	2003	BP	mid	149	RF	XS 22	51	RBT	1	4	1.0	H	0.70	0.36	0.24	10.6	21	20	5.7	25	1.0	26	1.0	0	1
732	2003	BP	mid	149	RF	XS 22	67	RBT	1	5	0.8	R	0.70	0.95	0.71	11.6	25	22	5.7	28	2.0	25	1.0	0	1
733	2003	BP	mid	149	RF	XS 22	68	RBT	1	8	0.9	F	0.90	1.60	0.87	11.9	25	22	5.7	28	2.0	25	1.0	0	1
734	2003	BP	mid	149	RF	XS 22	85	RBT	1	14	0.8	F	1.50	1.37	1.15	15.3	22	25	5.4	29	3.0	28	1.0	0	1
735	2003	BP	mid	149	RF	XS 22	83	RBT	1	18	0.8	H	1.30	1.27	0.66	33.0	25	28	6.4	29	2.5	28	1.0	0	1
736	2003	BP	mid	149	RF	XS 22	63	RBT	1	20	0.8	F	2.00	2.65	2.10	30.0	28	25	5.6	29	2.0	28	2.0	0	1
737	2003	BP	mid	149	RF	XS 57	88	RBT	1	17	1.0	S	1.50	0.60	0.44	34.5	21	29	5.0	29	0.0	29	0.0	0	0
738	2003	BP	mid	149	RF	RB	51	RBT	1	7	0.8	H	2.00	1.12	0.95	5.5	30	28	6.7	28	0.5	28	0.5	0	1
739	2003	BP	mid	149	RF	RB	74	RBT	1	6	0.6	H	1.30	0.89	0.68	4.0	28	25	6.9	28	0.3	28	0.3	4	0
740	2003	BP	mid	149	RF	RB	64	RBT	1	6	0.6	H	1.50	1.62	1.10	3.7	28	25	6.9	28	0.0	4	1.0	4	1
741	2003	BP	mid	149	RF	RB	68	RBT	1	7	0.9	H	1.00	0.92	0.60	3.0	28	25	6.9	28	0.0	4	1.0	4	1
742	2003	BP	mid	149	RF	RB	88	RBT	1	8	0.9	H	1.60	0.38	0.42	5.0	22	28	5.1	28	1.0	28	1.0	0	1

Appendix A. (continued)

Rec #	Year	Reach	Seg-ment	Habitat Unit #	Habitat Unit Type	Trans #	Mark #	Spec	# Fish	Fish Size	Focal Ht	Fish Activ	Depth	Mean Veloc	Focal Veloc	Dist to Bank	Substrate Dom	Substrate SubDom	Substrate Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
743	2003	BP	mid	149	RF	RB	68	RBT	1	7	0.8	H	1.10	0.29	0.23	0.8	22	28	5.1		0.0	28	0.4	4	0
744	2003	BP	mid	149	RF	RB	83	RBT	1	4	0.8	H	1.15	0.27	0.23	2.7	22	28	5.1		0.0	28	0.4	4	0
745	2003	BP	mid	149	RF	RB	54	RBT	1	5	0.8	H	1.60	0.81	0.77	2.2	30	25	6.7		0.0	4	2.0	0	1
746	2003	BP	mid	149	RF	RB	56	RBT	1	5	0.9	H	1.00	0.66	0.60	0.9	22	28	5.1		0.0	29	0.7	4	0
747	2003	BP	mid	149	RF	RB	63	RBT	1	7	0.8	H	1.70	0.89	0.71	2.2	30	25	6.7		0.0	4	2.0	0	1
748	2003	BP	mid	136	SPb	LB	5	RBT	1	7	0.8	F	1.80	0.79	0.69	0.9	28	20	6.9		0.9	12	0.5	4	0
749	2003	BP	mid	136	SPb	LB	14	SCP	1	5	1.0	H	1.30	0.50	0.32	1.5	26	28	6.3	26	0.3	26	0.3	0	0
750	2003	BP	mid	136	SPb	LB	43	SCP	1	3	1.0	H	1.60	0.97	0.14	2.3	20	28	4.2	28	0.3	2	0.8	0	0
751	2003	BP	mid	136	SPb	LB	29	RBT	1	4	0.2	F	1.20	0.09	0.14	4.8	26	28	6.4	30	4.5	2	0.0	0	0
752	2003	BP	mid	136	SPb	LB	39	RBT	1	4	0.2	F	1.20	0.10	0.19	4.7	26	28	6.4	30	4.5	2	0.0	0	0
753	2003	BP	mid	136	SPb	LB	17	RBT	1	4	0.6	F	1.10	0.23	0.23	2.5	26	20	5.9	26	1.0	2	0.0	0	0
754	2003	BP	mid	136	SPb	LB	9	RBT	1	5	0.8	R	1.20	0.18	0.12	5.0	26	21	5.8	29	2.5	26	0.5	0	0
755	2003	BP	mid	136	SPb	LB	13	RBT	1	5	0.8	H	1.20	0.10	0.03	5.0	25	21	5.8	29	2.0	26	0.7	0	0
756	2003	BP	mid	136	SPb	LB	7	RBT	1	3	0.2	F	0.80	0.13	0.21	1.5	29	25	6.8	0.5	26.0	1.5	30.0	0	0
757	2003	BP	mid	136	SPb	LB	38	RBT	1	5		D													
758	2003	BP	mid	136	SPb	LB	8	RBT	1	5	0.8	F	1.30	0.60	0.22	6.5	28	20	6.9	28	0.1	28	0.7	0	1
759	2003	BP	mid	136	SPb	LB	30	RBT	1	5	0.9	H	0.40	0.51	0.12	5.5	26	23	5.8	29	0.0	29	0.0	0	1
760	2003	BP	mid	136	SPb	LB	46	RBT	1	6		D													
761	2003	BP	mid	136	SPb	LB	1	SCP	1	3	1.0	H	0.80	3.22	0.87	2.5	25	28	6.3	28	0.5	25	0.3	0	1
762	2003	BP	mid	136	SPb	LB	28	SCP	1	4	1.0	H	0.80	2.43	0.50	9.0	21	29	4.8	29	0.0	29	0.0	0	1
763	2003	BP	mid	136	SPb	LB	36	RBT	1	8	0.6	F	0.70	0.17	0.55	1.0	25	26	6.0		0.5	26	0.5	4	1
764	2003	BP	mid	136	SPb	RB	28	SCP	1	11	1.0	H	2.20	0.26	0.20	5.0	25	29	6.4	27	0.3	27	0.3	0	0
765	2003	BP	mid	136	SPb	RB	8	RBT	1	6	0.8	H	2.30	0.55	0.34	4.0	30	30	7.0	30	1.0	30	1.0	0	0
766	2003	BP	mid	136	SPb	RB	38	RBT	1	5	0.8	H	1.80	0.24	0.12	0.7	29	26	6.8	28	0.6	28	0.6	4	0
767	2003	BP	mid	136	SPb	RB	14	RBT	1	7	0.9	H	1.50	0.44	0.34	2.0	30	30	7.0	30	1.0	30	1.0	0	0
768	2003	BP	mid	136	SPb	RB	37	RBT	1	6	0.8	F	1.50	0.69	0.51	2.2	30	30	7.0	30	1.0	30	1.0	0	0
769	2003	BP	mid	136	SPb	RB	1	RBT	1	5	0.6	F	1.50	0.61	0.61	4.0	29	29	7.0	30	1.5	30	1.5	0	0
770	2003	BP	mid	136	SPb	RB	3	RBT	1	4	0.8	F	2.00	0.84	0.53	4.7	25	29	6.4	29	1.0	29	1.0	1	0
771	2003	BP	mid	136	SPb	RB	29	CHB	1	9	0.8	R	1.70	0.80	0.41	5.0	26	25	6.0	26	0.8	26	0.8	1	0
772	2003	BP	mid	136	SPb	RB	40	LMP	1	20	1.0	R	2.40	0.20	0.24	6.0	27	26	6.5	27	0.6	27	0.6	0	1
773	2003	BP	mid	136	SPb	RB	47	RBT	1	4	0.8	H		0.28	0.17	4.0	26	25	6.1	26	1.0	26	1.0	0	0
774	2003	BP	mid	136	SPb	RB	32	RBT	1	5	0.6	F	1.90	0.35	0.35	3.5	26	27	6.5	27	1.0	27	1.0	0	0
775	2003	BP	mid	136	SPb	RB	20	RBT	1	4	0.8	H	1.30	0.52	0.38	7.0	27	28	6.5	26	0.6	2	0.6	0	0
776	2003	BP	mid	136	SPb	RB	48	RBT	1	4	0.6	F	1.40	0.65	0.67	7.0	29	29	7.0	29	0.6	29	0.6	0	0
777	2003	BP	mid	136	SPb	RB	36	RBT	1	4	0.6	R	1.90	0.61	0.61	8.5	26	30	6.4	30	1.5	30	1.5	0	0
778	2003	BP	mid	136	SPb	RB	26	RBT	1	3	0.8	H	0.70	0.22	0.20	1.5	30	30	7.0			2	0.5	0	0
779	2003	BP	mid	136	SPb	RB	7	RBT	1	3	0.8	H	0.50	0.13	0.13	3.0	30	30	7.0			2	1.0	0	0
780	2003	BP	mid	136	SPb	RB	30	RBT	1	3	0.6	H	0.25	0.23	0.23	0.5	30	30	7.0			2	1.0	0	0
781	2003	BP	mid	136	SPb	RB	17	RBT	1	4	0.8	H	0.80	0.12	0.13	1.8	30	30	7.0			2	0.0	0	0
782	2003	BP	mid	136	SPb	RB	43	RBT	1	5	0.8	H	1.95	0.04	0.03	1.5	30	2	7.0			2	0.0	0	4
783	2003	BP	mid	136	SPb	RB	39	RBT	1	6	0.8	H	2.10	0.44	0.14	3.5	25	27	6.5	27	0.5	27	0.5	0	0
784	2003	BP	mid	136	SPb	RB	5	RBT	1	6	0.8	H	2.30	0.38	0.34	2.0	25	28	6.5	30	0.5	30	0.5	4	0
785	2003	BP	mid	136	SPb	RB	9	RBT	1	6	0.8	H	2.50	0.39	0.35	3.0	29	28	7.0			29	2.0	0	4
786	2003	BP	mid	136	SPb	RB	46	RBT	1	5	0.8	F	2.00	0.57	0.45	7.5	26	30	6.4	30	1.5	30	1.5	0	0

Appendix A. (continued)

Rec #	Year	Reach	Seg-ment	Habitat Unit #	Habitat Unit Type	Trans #	Mark #	Spec	# Fish	Fish Size	Focal Ht	Fish Activ	Depth	Mean Veloc	Focal Veloc	Dist to Bank	Substrate Dom	Substrate SubDom	Substrate Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
787	2003	BP	mid	136	SPb	RB	2	RBT	1	5	0.6	R	1.90	0.56	0.56	7.0	25	30	6.3	26	1.0	26	1.0	0	0
788	2003	BP	mid	136	SPb	RB	13	CHB	8	7	0.8	R	1.80	0.68	0.55	8.0	27	26	6.2	26	0.6	26	0.6	0	0
789	2003	BP	mid	136	SPb	XS 14	47	RBT	1	6	0.9	H	1.75	0.42	0.29	15.5	20	28	4.1	30	4.0	2	0.6	0	1
790	2003	BP	mid	136	SPb	XS 14	17	RBT	1	8	0.8	F	1.90	0.40	0.53	16.0	27	21	5.8	30	3.0	2	1.0	0	1
791	2003	BP	mid	136	SPb	XS 14	14	RBT	1	8	0.8	F	1.80	0.58	0.72	16.5	27	21	5.8	30	3.0	2	1.0	0	1
792	2003	BP	mid	136	SPb	XS 14	84	RBT	1	20	0.8	F	1.90	0.82	0.66	19.5	29	21	6.9	29	1.4	2	1.0	0	1
793	2003	BP	mid	136	SPb	XS 14	1	RBT	1	15	0.6	R	2.65	1.02	1.23	32.0	27	23	5.8	29	3.0	28	0.5	0	1
794	2003	BP	mid	136	SPb	XS 14	3	RBT	1	20		D													
795	2003	BP	mid	136	SPb	XS 14	13	RBT	1	22		D													
796	2003	BP	mid	136	SPb	XS 14	37	RBT	1	18	0.4	H	5.05	0.64	0.64	40.0	21	29	4.4	29	0.5	29	0.5	0	2
797	2003	BP	mid	136	SPb	XS 14	8	RBT	1	12		D													
798	2003	BP	mid	136	SPb	XS 14	38	LMP	1	17	1.0	H	5.00	2.05	2.85	48.0	29	28	7.0	30	3.0	2	1.5	0	2
799	2003	BP	mid	132	DPt	LB47	84	RBT	1	3	0.8	H	0.50	0.19	0.15	1.5	20	27	4.0		1.5	1	28.0	4	0
800	2003	BP	mid	132	DPt	LB47	51	RBT	1	5	0.8	H	1.50	0.23	0.14	6.0	28	27	6.8	29	1.5	29	1.5	0	0
801	2003	BP	mid	132	DPt	LB47	53	RBT	1	7	0.8	H	2.00	0.29	0.18	6.0	28	27	6.8	29	1.5	29	1.5	0	0
802	2003	BP	mid	132	DPt	LB47	89	RBT	1	6	0.6	H	1.55	0.25	0.25	5.5	29	28	7.0	29	0.5	2	0.5	0	0
803	2003	BP	mid	132	DPt	LB47	64	RBT	1	6	0.8	H	1.60	0.20	0.18	5.3	29	28	6.9	29	1.0	29	1.0	0	0
804	2003	BP	mid	132	DPt	LB47	62	RBT	1	6	0.8	H	1.80	0.23	0.19	5.1	29	28	6.9	2	0.4	2	0.4	0	0
805	2003	BP	mid	132	DPt	LB47	82	RBT	1	5	0.8	H	1.60	0.22	0.20	5.6	29	28	7.0	2	0.6	2	0.6	0	0
806	2003	BP	mid	132	DPt	LB47	56	RBT	1	6	0.6	H	1.90	0.09	0.09	5.0	29	28	7.0	29	0.5	29	0.5	0	0
807	2003	BP	mid	132	DPt	LB47	63	CHB	1	7	0.6	F	1.40	0.12	0.12	4.5	29	28	7.0	29	0.4	2	0.5	0	0
808	2003	BP	mid	132	DPt	LB47	83	RBT	1	5	0.2	H	1.60	0.20	0.20	1.0	19	29	4.5	2	0.0	2	0.0	4	0
809	2003	BP	mid	132	DPt	LB47	60	RBT	1	6		D													0
810	2003	BP	mid	132	DPt	LB47	54	RBT	1	7	0.6	F	1.60	0.40	0.40	8.8	29	28	7.0	29	1.0	29	1.0	0	0
811	2003	BP	mid	132	DPt	LB47	68	CHB	1	8	0.8	R	1.60	0.21	0.13	5.5									0
812	2003	BP	mid	132	DPt	LB47	67	RBT	1	8		D													0
813	2003	BP	mid	132	DPt	LB47	86	RBT	1	6	0.6	H	1.90	0.33	0.33	2.0	28	27	6.8	28	1.4	28	1.0	0	0
814	2003	BP	mid	132	DPt	LB47	74	RBT	1	7		D													0
815	2003	BP	mid	132	DPt	LB47	61	RBT	1	4	0.6	F	0.90	0.18	0.18	7.0	28	29	7.0	30	0.5	30	0.5	0	0
816	2003	BP	mid	132	DPt	LB47	80	RBT	1	5	0.8	H	0.80	0.21	0.24	7.0	28	29	7.0			30	0.5	30	0
817	2003	BP	mid	132	DPt	LB47	71	RBT	1	6	0.6	F	1.10	0.19	0.19	6.0	29	28	7.0			29	0.3	0	0
818	2003	BP	mid	132	DPt	LB47	26	RBT	1	6	0.6	F	1.40	0.24	0.24	6.0	29	28	7.0			2	0.0	0	0
819	2003	BP	mid	132	DPt	LB47	39	RBT	1	6	0.6	F	1.50	0.23	0.23	6.0	29	28	7.0			2	0.0	0	0
820	2003	BP	mid	132	DPt	LB47	17	RBT	1	5	0.6	F	1.60	0.21	0.21	6.3	29	28	7.0			2	0.0	0	0
821	2003	BP	mid	132	DPt	LB47	30	RBT	1	6	0.8	F	1.20	0.22	0.19	7.5	29	28	7.0			2	0.0	0	0
822	2003	BP	mid	132	DPt	LB47	47	RBT	1	6	0.8	H	1.30	0.14	0.15	7.7	29	28	7.0			2	0.0	0	0
823	2003	BP	mid	132	DPt	LB47	43	RBT	1	5	0.6	F	1.20	0.23	0.23	7.5	29	28	7.0			2	0.3	0	0
824	2003	BP	mid	132	DPt	LB47	36	CHB	5	7	0.8	H	1.50	0.20	0.16	8.0	29	0	7.0			2	1.0	0	0
825	2003	BP	mid	132	DPt	LB47	14	RBT	1	3	0.8	H	0.95	0.00	0.00		29	0	7.0			4	0.5	4	0
826	2003	BP	mid	132	DPt	LB47	1	RBT	1	3	0.2	H	1.10	0.00	0.00		28	19	7.0			28	0.5	4	0
827	2003	BP	mid	132	DPt	LB47	8	RBT	1	4	0.6	H	0.80	0.17	0.17		28	19	7.0			2	0.3	4	0
828	2003	BP	mid	132	DPt	LB47	9	RBT	1	4	0.6	H	0.80	0.11	0.11		28	19	7.0			2	0.3	4	0
829	2003	BP	mid	132	DPt	RB47	29	RBT	1	7	0.6	H	2.60	0.57	0.57	6.0	30	20	7.0	30	0.2	30	1.5	0	0
830	2003	BP	mid	132	DPt	RB47	47	RBT	1	7	0.9	H	2.30	1.82	0.47	2.0	20	30	4.1		2.0	30	0.3	4	1

Appendix A. (continued)

Rec #	Year	Reach	Seg-ment	Habitat Unit #	Habitat Unit Type	Trans #	Mark #	Spec	# Fish	Fish Size	Focal Ht	Fish Activ	Depth	Mean Veloc	Focal Veloc	Dist to Bank	Substrate Dom	Substrate SubDom	Substrate Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
831	2003	BP	mid	132	DPt	RB47	9	RBT	1	5	0.9	H	1.20	1.47	0.71	0.8	30	28	7.0		0.8	30	0.0	4	1
832	2003	BP	mid	132	DPt	RB47	39	RBT	1	6	0.9	H	2.20	0.46	0.42	3.0	20	30	4.2	29	1.0		3.0	4	0
833	2003	BP	mid	132	DPt	RB47	43	RBT	1	4	0.9	H	2.20	0.46	0.42	3.0	20	30	4.2	29	1.0		3.0	4	0
834	2003	BP	mid	132	DPt	XS 47	17	RBT	1	19	0.6	H	4.50	1.91	1.62	21.0	26	30	6.3	29	0.5	30	3.5	0	1
835	2003	BP	mid	132	DPt	XS 47	3	RBT	1	24	0.8	H	4.60	1.28	1.09	22.0	30	26	6.9	30	2.0	30	4.0	0	1
836	2003	BP	mid	132	DPt	XS 47	38	RBT	1	22	0.4	R	4.80	1.47	0.70	17.0	30	26	6.9	30	3.0	30	4.0	0	1
837	2003	BP	mid	132	DPt	XS 47	8	RBT	1	20	0.6	F	5.20	1.12	0.83	11.0	30	21	7.0	30	1.5	30	3.0	0	1
838	2003	BP	mid	132	DPt	XS 47	10	RBT	1	30	0.8	R	4.00	1.57	1.25	7.0	30	0	7.0	30	1.5	30	3.0	0	1
839	2003	BP	mid	132	DPt	XS 47	84	RBT	1	20		D													
840	2003	BP	mid	133	DPb	LB61	79	RBT	1	6	0.8	H	3.55	0.18	0.16	3.0	28	19	6.6	28	0.5	2	1.5	0	0
841	2003	BP	mid	133	DPb	LB61	64	SCP	1	7	1.0	H	2.55	0.20	0.07	3.5	29	19	6.7	29	1.0	29	0.5	4	0
842	2003	BP	mid	133	DPb	LB61	71	CHB	1	7	0.8	H	1.40	0.13	0.12	4.0	29	19	6.8	29	1.0	29	1.0	0	0
843	2003	BP	mid	133	DPb	LB61	63	RBT	1	8	0.8	F	1.50	0.17	0.22	2.0	29	19	6.8	29	1.0	29	1.0	4	0
844	2003	BP	mid	133	DPb	LB61	88	RBT	1	5	0.8	F	1.30	0.30	0.30	3.0	29	19	6.8	29	1.0	29	1.0	4	0
845	2003	BP	mid	133	DPb	LB61	60	RBT	1	5	0.8	F	1.80	0.27	0.24	4.0	29	26	6.5	29	0.5	29	0.5	4	0
846	2003	BP	mid	133	DPb	LB61	82	CHB	1	6	0.8	H	0.95	0.05	0.02	3.0	29	0	7.0			30	2.0	4	0
847	2003	BP	mid	133	DPb	RB61	5	SCP	1	4	1.0	H	1.10	0.20	0.12	5.0	30	19	7.0						
848	2003	BP	mid	133	DPb	RB61	43	RBT	1	4	0.8	F	1.10	0.18	0.24	5.0	29	19	6.8			29	0.5	0	0
849	2003	BP	mid	133	DPb	RB61	3	CHB	3	3	0.8	R	1.60	0.07	0.07	1.8	19	24	3.2			4	0.0	4	
850	2003	BP	mid	133	DPb	XS 61	30	SCP	1	3	1.0	H	6.90	1.47		34.5	30	0	7.0	30	2.0	30	2.0	0	1
851	2003	BP	mid	133	DPh	LB10	68	RBT	1	6	0.8	H	0.90	0.15	0.15	3.0	25	19	6.0			25	0.2	0	
852	2003	BP	mid	133	DPh	LB10	51	RBT	1	5	0.8	H	1.60	0.40	0.42	2.0	25	19	6.0			25	0.2	4	
853	2003	BP	mid	133	DPh	LB10	67	SCP	1	8	1.0	H	0.70	0.08	0.12	1.5	25	19	6.0			25	0.2	4	
854	2003	BP	mid	133	DPh	LB10	56	RBT	1	5	0.8	H	1.10	0.21	0.17	2.0	25	26	6.0			25	0.2	0	
855	2003	BP	mid	133	DPh	LB10	68	RBT	1	5	0.8	H	3.00	0.31	0.35	2.5	24	25	5.8			25	0.2	0	
856	2003	BP	mid	133	DPh	LB10	83	SCP	1	9	1.0	H	2.00	0.16	0.20	1.5	30	24	6.7			30	0.6	4	
857	2003	BP	mid	133	DPh	LB10	62	RBT	1	4	0.8	F	1.80	0.12	0.09	1.5	22	25	5.2			25	1.0	4	
858	2003	BP	mid	133	DPh	LB10	53	RBT	1	6	0.8	F	2.00	0.13	0.09	2.0	22	25	5.2			25	1.0	4	
859	2003	BP	mid	133	DPh	LB10	89	RBT	1	6	0.8	F	2.00	0.12	0.10	2.0	22	25	5.2			25	1.0	4	
860	2003	BP	mid	133	DPh	RB10	9	RBT	1	5	0.9	F	2.00	0.69	1.11		30	21	6.6	30	1.0	30	1.0	0	1
861	2003	BP	mid	133	DPh	RB10	39	RBT	1	8	0.9	F	1.40	0.09	0.14		24	23	4.8	29	1.0	29	1.0	0	0
862	2003	BP	mid	133	DPh	RB10	17	RBT	1	5	0.2	F	1.50	0.39	0.44		24	23.0	4.8	29	1.0	29	1.0	0	0
863	2003	BP	mid	133	DPh	RB10	1	SCP	1	2	1.0	H		0.12			22	23.0	4.5	29	2.0	29	2.0	0	0
864	2003	BP	mid	133	DPh	RB10	47	SCP	1	10	1.0	R	1.45	0.15			19	19.0	4.3	29	1.0	29	1.0	0	0
865	2003	BP	mid	133	DPh	RB10	8	RBT	1	7	0.6	R	1.30	0.20	0.20		24	21.0	4.8	29	1.5	29	1.5	0	0
866	2003	BP	mid	133	DPh	RB10	38	RBT	1	7	0.9	R	2.00	0.39	0.31	0.5	30	23.0	7.0			30	1.5	0	0
867	2003	BP	mid	133	DPh	RB10	36	RBT	1	7	0.9	H	2.00	0.70	0.57		30	29.0	7.0			30	1.5	0	0
868	2003	BP	mid	133	DPh	XS 10	1	RBT	1	22		D													
869	2003	BP	mid	138	PW	LB	20	RBT	1	6	0.9	F	1.00	0.62	0.50	5.0	29	19	7.0	28	1.0	28	1.0	0	1
870	2003	BP	mid	138	PW	LB	47	RBT	1	8	0.6	F	2.10	0.80	0.88	3.5	23	25	5.3	29	2.0	28	2.0	0	1
871	2003	BP	mid	138	PW	LB	30	RBT	1	10	0.9	F	2.20	0.69	0.82	3.5	21	28	4.9	28	1.3	28	1.3	0	1
872	2003	BP	mid	138	PW	LB	36	RBT	1	6	0.8	R	2.30	0.92	0.77	6.5	28	21	7.0	29	2.0	28	1.4	0	1
873	2003	BP	mid	138	PW	LB	28	RBT	1	23	0.8	H	2.25	0.83	0.67	6.5	28	21	7.0	30	2.0	29	2.0	0	1
874	2003	BP	mid	138	PW	LB	1	RBT	1	5	0.8	F	2.00	0.35	0.25	4.7	25	21	5.6	29	0.3	29	0.3	0	1

Appendix A. (continued)

Rec #	Year	Reach	Seg-ment	Habitat Unit #	Habitat Unit Type	Trans #	Mark #	Spec	# Fish	Fish Size	Focal Ht	Fish Activ	Depth	Mean Veloc	Focal Veloc	Dist to Bank	Substrate Dom	Substrate SubDom	Substrate Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
875	2003	BP	mid	138	PW	LB	37	RBT	1	9	0.9	F	1.40	0.43	0.22	2.6	27	28	6.8	28	2.5	28	1.5	0	1
876	2003	BP	mid	138	PW	LB	8	RBT	1	10	0.9	H	1.60	1.02	0.56	7.5	21	27	5.2	30	0.6	4	0.0	4	1
877	2003	BP	mid	138	PW	LB	9	SCP	1	9	1.0	H	1.40	0.59	0.00	6.0	27	28	6.4	30	2.0	27	0.0	0	1
878	2003	BP	mid	138	PW	LB	46	RBT	1	8	0.8	F	2.00	0.51	0.36	5.0	29	27	6.7	28	2.5	29	1.0	0	1
879	2003	BP	mid	138	PW	LB	17	RBT	1	6		D					26	28	6.3	28	1.0	30	1.5	0	1
880	2003	BP	mid	138	PW	LB	5	RBT	1	8	0.9	H	1.70	0.81	0.84	5.5	28	22	7.0	28	0.0	28	0.0	0	1
881	2003	BP	mid	138	PW	LB	13	SCP	1	9	1.0	H	0.80	3.03		4.5	28	23	6.9	28	0.0	28	0.0	0	1
882	2003	BP	mid	138	PW	LB	29	RBT	1	8	0.9	F	0.45	0.77		2.5	27	28	6.5		2.5	4	2.5	4	1
883	2003	BP	mid	138	PW	LB	14	RBT	1	10	0.9	H	2.00	1.73	1.27	8.0	26	28	6.3	29	1.5	29	2.0	0	1
884	2003	BP	mid	138	PW	LB	43	RBT	1	5	0.9	H	0.80	0.23	0.21	3.0	21	28	5.3		3.0	28	4.3	4	1
885	2003	BP	mid	138	PW	LB	39	RBT	1	10	0.7	F	2.15	0.53	0.46	3.0	21	29	5.2	29	1.0	2	0.3	0	1
886	2003	BP	mid	138	PW	LB	26	SCP	1	12	1.0	H	2.15	0.38	0.34	3.0	21	29	5.2	29	1.0	2	0.3	0	1
887	2003	BP	mid	138	PW	LB	3	RBT	1	5	0.9	H	1.40	0.22	0.12	3.0	28	22	7.0	28	0.1	28	0.1	4	0
888	2003	BP	mid	138	PW	LB	38	RBT	1	5	0.5	H	0.80	0.26	0.26	4.5	20	21	4.3			2	0.4	0	0
889	2003	BP	mid	138	PW	LB	36	RBT	1	6	0.6	F	1.30	0.26	0.26	6.0	21	28	4.7			2	1.0	4	0
890	2003	BP	mid	138	PW	LB	40	RBT	1	8	0.6	F	1.90	0.36	0.39	7.0	21	28	4.7			2	0.5	4	0
891	2003	BP	mid	138	PW	LB	2	CHB	1	9	0.9	F	1.50	0.13	0.14	7.0	20	21	4.4			2	0.0	4	0
892	2003	BP	mid	138	PW	LB	7	RBT	1	7	0.9	F	1.80	0.52	0.53	5.0	29	20	7.0	29	4.0	2	4.0	0	1
893	2003	BP	mid	138	PW	XS 47	83	RBT	1	20	0.8	H	2.20	1.14	0.88	26.0	27	28	6.3	28	0.5	28	1.0	0	1
894	2003	BP	mid	138	PW	XS 47	68	RBT	1	12	0.9	H		2.58	2.15	25.5	28	27	6.4	28	0.0	27	1.0	0	1
895	2003	BP	mid	138	PW	XS 47	60	RBT	1	17	0.8	H	3.30	1.75	1.36	37.5	27	21	5.4	27	1.0	27	1.0	0	1
896	2003	BP	mid	138	PW	XS 47	88	RBT	1	12		D													
897	2003	BP	mid	138	PW	XS 47	68	RBT	1	12	0.8	H	2.30	0.64	0.57	37.0	29	21	6.5	29	1.5	29	1.5	0	1
898	2003	BP	mid	138	PW	XS 47	61	RBT	1	20		D													
899	2003	BP	mid	138	PW	XS 47	62	RBT	1	22	0.9	H	2.65	1.13	0.77	33.0	21	20	4.5	29	2.0	29	1.0	0	1
900	2003	BP	mid	138	PW	XS 47	84	SCP	1	8	1.0	H	2.60	2.41	1.91		28	26	6.5	26	0.0	26	0.0	0	1
901	2003	BP	mid	138	PW	XS 47	54	RBT	1	25	0.8	H	3.10	1.80	0.59	19.0	28	21	6.6	28	0.3	28	0.3	0	1
902	2003	BP	mid	138	PW	XS 47	63	RBT	1	18	0.8	F	2.80	0.56	0.58	13.0	29	22	6.7	28	2.0	26	1.5	0	1
903	2003	BP	mid	138	PW	XS 47	71	RBT	1	20	0.8	H	2.50	0.61	0.78		22	27	5.3	26	1.5	26	1.5	0	0
904	2003	BP	mid	138	PW	RB	37	RBT	1	7	0.8	H	1.30	0.49	0.43	9.0	28	27	6.9	28	0.4	2	0.0	0	1
905	2003	BP	mid	138	PW	RB	36	RBT	1	7	0.6	H	1.40	0.27	0.27	8.0	28	27	6.9	28	0.2	2	0.4	0	0
906	2003	BP	mid	138	PW	RB	39	RBT	1	7	0.8	H	1.00	0.39	0.36	5.0	28	27	6.9	28	0.5	2	0.3	0	1
907	2003	BP	mid	138	PW	RB	29	RBT	1	8	0.2	H	0.80	0.46	0.59	6.0	28	19	7.0	29	2.0	2	0.5	4	0
908	2003	BP	mid	138	PW	RB	40	RBT	1	5	0.8	H	1.00	0.00	0.00	1.0	19	29	3.0			2	2.0	4	0
909	2003	BP	mid	138	PW	RB	38	RBT	1	5	0.8	H	1.00	0.00	0.00	1.0	19	29	3.0			2	2.0	4	0
910	2003	BP	mid	138	PW	RB	79	RBT	1	5	0.8	H	1.00	0.00	0.00	1.0	19	29	3.0			2	2.0	4	0
911	2003	BP	mid	138	PW	RB	68	RBT	1	4	0.6	H	0.50	0.23	0.23	2.0	29	19	7.0			2	0.0	4	0
912	2003	BP	mid	138	PW	RB	51	RBT	1	6	0.6	F	0.90	0.37	0.37	5.5	28	19	7.0	29	1.0	2	0.2	0	0
913	2003	BP	mid	138	PW	RB	62	RBT	1	6	0.8	H	1.20	0.96	0.35	1.0	21	28	5.1	28	0.3	28	0.3	4	1
914	2003	BP	mid	138	PW	RB	83	RBT	1	7	0.6	H	1.50	0.22	0.22	4.5	20	28	6.8	28	0.5	2	2.0	4	1
915	2003	BP	mid	138	PW	RB	82	RBT	1	4	0.8	F	0.65	0.18	0.18	2.0	28	26	6.8			4	1.0	4	0
916	2003	BP	mid	138	PW	RB	63	RBT	1	5	0.2	F	0.90	0.26	0.24	2.5	28	0	7.0			2	0.5	4	0
917	2003	BP	mid	138	PW	RB	86	RBT	1	3	0.2	F	0.40	0.35	0.35	2.0	28	0	7.0			2	0.0	4	0
918	2003	BP	mid	138	PW	RB	68	RBT	1	4	0.8	H	1.10	0.11	0.07	2.0	21	28	4.8	28	0.4	28	0.4	0	0

Appendix A. (continued)

Rec #	Year	Reach	Seg-ment	Habitat Unit #	Habitat Unit Type	Trans #	Mark #	Spec	# Fish	Fish Size	Focal Ht	Fish Activ	Depth	Mean Veloc	Focal Veloc	Dist to Bank	Substrate Dom	Substrate SubDom	Substrate Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
919	2003	BP	mid	138	PW	RB	14	RBT	1	8	0.8	H	1.40	0.76	0.83	1.0	24	28	5.3	28	0.5	28	0.5	4	0
920	2003	BP	mid	138	PW	RB	47	RBT	1	7	0.8	H	1.30	0.72	0.41	6.0	30		7.0	29	0.5	29	0.5	0	0
921	2003	BP	mid	138	PW	RB	5	RBT	1	5	0.8	F	1.25	0.21	0.18	5.0	30	28	7.0	28	0.5	0.5	28.0	0	0
922	2003	BP	mid	138	PW	RB	1	RBT	1	4	0.8	H	0.60	0.62	0.58	3.0	28		7.0	29	0.5	0.5	28.0	4	0
923	2003	BP	mid	138	PW	RB	9	RBT	1	6	0.8	H	1.30	0.18	0.08	4.0	26	28	6.5	28	0.5	28	0.5	4	0
924	2003	BP	mid	138	PW	RB	13	SCP	1	10	1.0	H	1.30	0.58	0.23	4.0	26	27	6.4	28	1.0	28	1.0	4	0
925	2003	BP	mid	138	PW	RB	26	RBT	1	6	0.8	H	1.50	0.24	0.14	4.0	29	26	6.7	28	1.0	28		0	0
926	2003	BP	mid	138	PW	RB	46	RBT	1	8	0.8	F	1.50	0.25	0.15	4.0	29	26	6.7	28	1.0	28	1.0	0	0
927	2003	BP	mid	138	PW	RB	43	RBT	1	7	0.8	H	1.40	0.24	0.15	4.0	29	26	6.7	28	1.0	28	1.0	0	0
928	2003	BP	mid	138	PW	RB	36	RBT	1	5	0.8	H	1.20	0.30	0.15	4.0	29		7.0	29	0.5	29	0.5	0	0
929	2003	BP	mid	138	PW	RB	8	RBT	1	5	0.8	F	1.20	0.18	0.16	4.0	28		7.0	29	1.5	29	1.5	0	0
930	2003	BP	mid	138	PW	RB	28	RBT	1	6	0.8	H	1.20	0.45	0.19	4.0	28		7.0	29	1.5	29	1.5	0	0
931	2003	BP	mid	138	PW	RB	7	RBT	1	5	0.8	H	1.20	0.40	0.18	4.0	28		7.0	29	1.5	29	1.5	0	0
932	2003	BP	mid	138	PW	RB	30	RBT	1	7	0.6	H	1.50	0.24		4.0	28		7.0	29	1.5	29	1.5	0	0
933	2003	BP	mid	138	PW	RB	20	RBT	1	5	0.8	F	1.20	0.37	0.10	4.0	28		7.0	29	1.5	29	1.5	0	0
934	2003	BP	mid	138	PW	RB	17	RBT	1	12	0.8	H	2.40	1.91	0.77	5.0	22	30	5.0	30	0.5	2	1.0	0	1
935	2003	BP	mid	138	PW	RB	3	RBT	1	9	0.8	F	2.10	1.04	0.19	4.0	26	29	6.5	29	0.5	29	0.5	0	1
936	2003	BP	mid	102	RF	LB	49	RBT	1	6		D													
937	2003	BP	mid	102	RF	LB	50	RBT	1	6		D													
938	2003	BP	mid	102	RF	LB	50	RBT	1	9		D													
939	2003	BP	mid	102	RF	LB	47	RBT	1	5	0.5	H	1.30	0.27	0.21	2.2	19	28	4.2	28	0.5	28	0.5	0	1
940	2003	BP	mid	102	RF	XS	35	RBT	1	8	0.6	F	1.50	0.14	0.14	9.0	28	30	7.0	30	0.0	30	0.0	0	0
941	2003	BP	mid	102	RF	XS	34	RBT	1	15		D													
942	2003	BP	mid	102	RF	XS	36	SCP	1	12	1.0	H	2.90	2.45	0.99		28	19	7.0	30	3.0	30	3.0	0	2
943	2003	BP	mid	102	RF	RB	27	RBT	1	8	0.8	H	1.90	0.50	0.35	2.5	27	28	6.2	27	0.0	27	0.0	4	0
944	2003	BP	mid	102	RF	RB	46	RBT	1	8	0.8	H	1.50	0.59	0.28	1.0	27	28	6.2	27	0.0	27	0.0	4	0
945	2003	BP	mid	102	RF	RB	37	RBT	1	11		D													
946	2003	BP	mid	105	PW	LB	53	RBT	1	20	0.6	R	2.30	3.08	3.08	9.5	28	22	7.0	30	1.0	30	1.0	0	1
947	2003	BP	mid	105	PW	LB	63	RBT	1	8	0.8	H	1.90	0.42	0.51	2.0	28	29	7.0	28	0.0	28	0.3	4.0	0
948	2003	BP	mid	105	PW	LB	72	RBT	1	15	0.6	H	2.10	1.14	1.14	5.0	30	28	7.0	30	1.0	30	1	0.0	1
949	2003	BP	mid	105	PW	LB	70	RBT	1	25	0.8	H	3.10	0.87	1.08	3.0	28	20	6.7	28	0.0	28	1	0.0	1
950	2003	BP	mid	105	PW	LB	69	RBT	1	25	0.8	R	2.20	1.65	1.35	6.5	29	20	6.7	29	0.5	29	0.5	0.0	1
951	2003	BP	mid	105	PW	LB	56	RBT	1	20	0.8	H	3.00	1.22	0.32	6.5	29	19	7.0	30	1.0	30	1	0.0	1
952	2003	BP	mid	105	PW	LB	62	RBT	1	8	0.8	R	1.30	1.55	0.62	5.0	30	0	7.0	30	0.0	30	0.5	0.0	1
953	2003	BP	mid	105	PW	XS 22	21	RBT	1	8	0.8	H	3.20	0.95	0.44	14.0	22	25	4.1	30	0.0	30	3	0.0	1
954	2003	BP	mid	105	PW	XS 22	11	RBT	1	10	0.6	R	3.80	0.55	0.53	19.0	20	26	4.0	28	0.0	30	1.5	0.0	1
955	2003	BP	mid	105	PW	XS 22	18	RBT	1	22	0.6	R	4.20	1.12	1.00	29.0	29	26	7.0	29	1.5	29	1.5	0.0	1
956	2003	BP	mid	105	PW	XS 22	25	RBT	1	20	0.6	R	4.70	1.20	1.03	26.0	20	26	4.2	30	4.5	30	4.5	0.0	1
957	2003	BP	mid	105	PW	XS 22	24	RBT	1	15	0.8	H	4.30	1.66	1.68	43.0	26	27	5.7	30	1.5	30	1.5	0.0	1
958	2003	BP	mid	105	PW	XS 22	9	RBT	1	30	0.6	H	3.80	0.80	0.73	35.0	26	20	6.1	27	1.0	30	2	0.0	1
959	2003	BP	mid	105	PW	XS 22	7	RBT	1	25	0.9	H	4.20	1.18	1.48	13.5	23	21	4.9	30	0.0	30	1.0	0	1
960	2003	BP	mid	105	PW	RB	16	RBT	1	8	0.8	H	3.20	2.58	0.78	7.5	25	20	6.3	29	0.0	29	0.0	0	2
961	2003	BP	mid	105	PW	RB	10	RBT	1	21	0.6	H	2.40	1.49	1.49	1.5	25	20	6.1	28	0.5	28	0.5	4	1
962	2003	BP	mid	105	PW	RB	17	RBT	1	7	0.8	H	3.60	1.44	1.05	6.5	27	28	5.0	28	1.0	28	0.5	0	1

Appendix A. (continued)

Rec #	Year	Reach	Seg-ment	Habitat Unit #	Habitat Unit Type	Trans #	Mark #	Spec	# Fish	Fish Size	Focal Ht	Fish Activ	Depth	Mean Veloc	Focal Veloc	Dist to Bank	Substrate Dom	Substrate SubDom	Substrate Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
963	2003	BP	mid	105	PW	RB	22	RBT	1	9	0.8	H	3.40	0.56	0.52	2.0	21	27	5.3	30	0.5	30	0.5	4	1
964	2003	BP	mid	105	PW	RB	12	RBT	1	8	1.0	H	4.00	0.75	0.39	6.0	20	23	4.1	30	0.0	30	0.0	0	2
965	2003	BP	mid	105	PW	RB	15	RBT	1	9	0.8	H	2.50	1.58	0.68	3.0	26	27	5.8	28	1.5	27	1.5	0	1
966	2003	BP	mid	105	PW	RB	23	RBT	1	18	0.6	H	3.10	0.67	0.50	7.0	26	25	6.5	28	1.0	28	1.0	0	1
967	2003	BP	mid	108	RN	LB30	28	RBT	1	7	0.8	H	3.50	2.24	2.06	6.5	29	28	6.8	28	0.5	29	0.5		
968	2003	BP	mid	108	RN	LB30	41	RBT	1	12	0.9	H	2.90	1.57	0.74	6.0	29	20	7.0	29	0.5	29	0.2		1
969	2003	BP	mid	108	RN	LB30	50	RBT	1	10	0.8	H	2.40	0.40	0.40	4.0	29	20	7.0	29	1.0	29	0.2		0
970	2003	BP	mid	108	RN	XS 30	13	RBT	1	30		D													
971	2003	BP	mid	108	RN	XS 30	8	RBT	1	15	0.9	H	5.00	1.58	2.32	34.5	22	30	5.0	30	1.5	30	2.5		2
972	2003	BP	mid	108	RN	XS 30	17	RBT	1	15	0.9	H	4.60	0.83	0.68	21.0	20	25	4.3	29	0.5	29	0.5		
973	2003	BP	mid	108	RN	RB30	62	RBT	1	3	0.2	H	5.30	0.46	0.75	3.6	30	29	7.0	3	0.0	30	0.5	0	0
974	2003	BP	mid	108	RN	RB30	75	RBT	1	7	0.6	H	3.80	0.68	0.68	5.2	30	29	7.0	29	4.0	30	3.4	0	0
975	2003	BP	mid	108	RN	RB30	55	RBT	1	4		D													
976	2003	BP	mid	108	RN	RB30	54	RBT	1	7		D													
977	2003	BP	mid	108	RN	RB30	53	RBT	1	7		D													
978	2003	BP	mid	108	RN	RB30	59	RBT	1	7	0.8	H	2.40	0.59	0.56	0.7	29	19	7.0	29	2.0	29	0.5	4	1
979	2003	OR		14	SP	XS86	NO FISH																		
980	2003	OR		14	SP	RB86	74	RBT	1	8	0.8	H	1.30	0.63	0.44	4.0	25	26	5.7	27	1.0	27	1.0	0	0
981	2003	OR		14	SP	RB86	89	RBT	1	6	0.8	H	1.10	0.39	0.23	11.0	26	25	6.1	26	0.5	26	0.5	0	0
982	2003	OR		14	SP	RB86	100	RBT	1	5	0.8	H	1.00	0.37	0.29	13.0	26	27	6.1	27	1.0	27	1.0	0	0
983	2003	OR		14	SP	RB86	71	RBT	1	5	0.8	H	0.50	0.13	0.08	6.0	26	24	5.9	26	1.0	26	1.0	0	0
984	2003	OR		14	SP	LB86	60	RBT	1	4	0.8	H	1.00	0.28	0.30	2.0	27	24	6.1	28	1.0	28	1.0	0	0
985	2003	OR		14	SP	LB86	57	RBT	1	5	0.8	H	1.40	0.41	0.12	3.5	28	26	6.8	27	0.5	27	0.5	0	0
986	2003	OR		14	SP	LB86	68	SKR	1	7	1.0	H	1.30	0.14	0.00	3.5	27	28	6.8	27	0.2	2	0.2	0	0
987	2003	OR	-	23	DPh	LB 526	40	RBT	1	6	0.6	F	2.10	0.42	0.42	7.4	28	29	7.0	28	0.5	28	0.5	0	0
988	2003	OR	-	23	DPh	LB 526	36	SKR	1	8	0.8	F	2.00	0.28	0.11	7.0	28	29	7.0	28	0.2	28	0.2	0	0
989	2003	OR	-	23	DPh	LB 526	48	SKR	1	7	1.0	F	1.80	0.40	0.32	5.8	27	28	6.2	28	1.0	27	0.2	0	0
990	2003	OR	-	23	DPh	LB 526	47	SKR	1	4	1.0	F	0.90	0.22	0.18	4.6	26	25	6.1	26	0.3	26	0.3	0	0
991	2003	OR	-	23	DPh	LB 526	38	SKR	1	7	1.0	F	1.95	0.18	0.27	5.5	26	27	6.3	28	0.5	28	0.5	0	0
992	2003	OR	-	23	DPh	RB 526	NO FISH																		
993	2003	OR	-	23	DPt	LB 70	97	SKR	1	5	1.0	F	1.40	0.03	0.04	8.0	25	26	6.0	26	1.0	25	0.5	0	0
994	2003	OR	-	23	DPt	LB 70	106	SKR	1	5	1.0	F	1.40	0.06	0.07	9.0	25	26	6.0	26	1.0	25	0.5	0	0
995	2003	OR	-	23	DPt	LB 70	79	SKR	1	6	1.0	F	1.00	0.23	0.11	5.5	24	25	6.0	26	0.5	25	0.5	0	0
996	2003	OR	-	23	DPt	LB 70	108	SKR	20	8	0.8	R	1.80	1.02	0.54	10.5	25	26	6.0	27	1.0	26	1.0	0	0
997	2003	OR	-	23	DPt	RB 70	94	RBT	1	4	0.8	F	0.90	0.03	0.03	5.0	30	21	7.0	30	0.2	29	1.0	0	0
998	2003	OR	-	23	DPt	XS 70	107	SKR	1	6	0.8	R	2.40	0.28	0.17	15.0	27	25	6.2	27	0.5	27	0.5	0	0
999	2003	OR	-	23	DPt	XS 70	76	SKR	1	7	1.0	H	2.90	1.14		56.5	26	22	6.1	26	1.5	26	1.5	0	0
1000	2003	OR	-	23	DPt	XS 70	86	SKR	1	7	1.0	H	2.80	1.08		55.5	26	22	6.1	26	1.5	26	1.5	0	0
1001	2003	OR	-	23	DPt	XS 70	83	SKR	1	6	1.0	F	1.50	0.67		35.5	25	21	6.0	27	1.5	27	1.5	0	0
1002	2003	OR	-	23	DPb	RB 298	NO FISH																		
1003	2003	OR	-	23	DPb	LB 298	87	SKR	6	9	0.8	R	2.40	0.37	0.23	8.0	28	27	6.1	0	0.0	27	1.0	0	0
1004	2003	OR		23	DPb	XS298	132	RBT	1	40	0.6	R	6.6	1.15	1.19	47.6	26	27	6.9	30	3.0	30	3.0		
1005	2003	OR		23	DPh	XS526	127	RBT	1	35	0.6	R	11.3	0.56	0.45	30.0	26	27	6.6	30	1.0	30	3.0		
1006	2003	OR		26	RN	LB6	14	RBT	1	4	0.8	H	2.00	0.00	0.00		29	28	7.0	28	0.5	28	0.5	0	0

Appendix A. (continued)

Rec #	Year	Reach	Seg-ment	Habitat Unit #	Habitat Unit Type	Trans #	Mark #	Spec	# Fish	Fish Size	Focal Ht	Fish Activ	Depth	Mean Veloc	Focal Veloc	Dist to Bank	Substrate Dom	Substrate SubDom	Substrate Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
1007	2003	OR		26	RN	XS6	72	SKR	1	7	1.0	F	3.05	0.57	0.24		28	26	6.6	29	2.0	29	2.0	0	0
1008	2003	OR		26	RN	XS159	73	SKR	1	8	1.0	H	2.05	0.29	0.18	13.0	26	27	6.1	29	1.0	29	1.5	0	0
1009	2003	OR		26	RN	XS159	69	SKR	1	7	1.0	R	1.80	1.10	0.72	24.0	26	27	6.0	26	1.5	26	1.5	0	0
1010	2003	OR		26	RN	XS159	127	RBT	1	40	0.6	D													
1011	2003	OR		26	RN	XS312	130	RBT	1	25	0.8	D													
1012	2003	OR		32	RF	XS171	83	RBT	1	30	0.8	H	2.10	2.30	1.70	8.0	28	29	6.9	29	1.0	28	2.0	0	1
1013	2003	OR		32	RF	XS171	28	RBT	1	25	0.6	H	2.50	1.90	1.90	10.0	28	29	7.0	28	1.0	29	2.0	0	2
1014	2003	OR		32	RF	XS171	80	RBT	1	25	0.8	H	1.80	0.76	0.42	19.0	28	26	6.8	28	0.2	28	3.0	0	1
1015	2003	OR		32	RF	XS171	103	RBT	1	30	0.6	H	2.20	1.20	1.20	24.0	28	26	6.6	27	1.0	30	4.0	0	1
1016	2003	OR		32	RF	RB171	74	RBT	1	3	0.6	H	0.40	0.43	0.43	0.5	26	28	6.2	28	0.5	28	0.5	0	0
1017	2003	OR		32	RF	RB171	66	SKR	1	4	1.0	F	0.90	0.00	0.00	1.0	26	28	6.3	28	0.5	28	0.5	0	0
1018	2003	OR		32	RF	RB171	89	RBT	1	3	0.8	H	0.90	0.17	0.07	5.0	26	21	5.8	26	0.5	26	0.5	0	0
1019	2003	OR		32	RF	LB171	96	RBT	1	6	0.8	H	1.10	0.40	0.46	2.0	25	28	6.4	28	0.1	28	0.1	0	1
1020	2003	OR	-	54	RF	LB 6	NO FISH																		
1021	2003	OR	-	54	RF	RB 6	NO FISH																		
1022	2003	OR	-	54	RF	RB 51	92	RBT	1	10	0.8	F	1.40	1.60	0.45	4.0	26	25	5.9	26	0.5	0	0.0	0	1
1023	2003	OR	-	54	RF	LB 51	NO FISH																		
1024	2003	OR	-	54	RF	LB 96	NO FISH																		
1025	2003	OR	-	54	RF	RB 96	NO FISH																		
1026	2003	OR	-	55	RN	LB 56	NO FISH																		
1027	2003	OR	-	55	RN	RB 56	NO FISH																		
1028	2003	OR	-	55	RN	LB 134	NO FISH																		
1029	2003	OR	-	55	RN	RB 134	NO FISH																		
1030	2003	OR	-	55	RN	LB 212	NO FISH																		
1031	2003	OR	-	55	RN	RB 212	NO FISH																		
1032	2003	OR	-	55	RN	XS 56																			
1033	2003	OR	-	55	RN	XS 134																			
1034	2003	OR	-	55	RN	XS 212																			
1035	2003	OR	-	62	SPb	LB 100	79	RBT	1	25	0.9	H	1.50	0.00	0.00	1.5	29	22	7.0	29	0.5	29	0.5	0	0
1036	2003	OR	-	62	SPb	RB 100	37	SKR	1	8	0.8	R	2.40	0.36	0.27	20.6	25	20	5.9	0	0.0	25	1.0	0	0
1037	2003	OR	-	62	SPb	RB 100	44	SKR	1	7	0.8	H	2.50	0.09	0.11	17.3	26	19	6.0	0	0.0	26	0.5	0	0
1038	2003	OR	-	62	SPb	RB 100	30	SKR	1	8	0.8	H	2.50	0.31	0.18	19.0	26	2	5.8	0	0.0	2	0.5	2	0
1039	2003	OR	-	62	SPb	RB 100	48	SKR	1	5	0.8	R	2.35	0.06	0.06	12.0	24	19	5.8	0	0.0	2	1.5	2	0
1040	2003	OR	-	62	SPb	XS 100	NO FISH																		
1041	2003	OR	-	74	RF	XS 325	87	RBT	1	15		D													
1042	2003	CA	-	159	RF	RB 99	NO FISH																		
1043	2003	CA	-	159	RF	XS 99	1	RBT	1	20		D													
1044	2003	CA	-	159	RF	XS 99	5	RBT	1	25	0.9	H	2.60	1.27	0.76	61.5	29	27	6.8	29	0.2	29	0.5	0	1
1045	2003	CA	-	159	RF	XS 99	8	RBT	1	19	0.8	H	2.50	0.98	0.81	60.5	28	29	6.8	29	0.2	29	0.5	0	1
1046	2003	CA	-	159	RF	XS 99	17	RBT	1	20		D													
1047	2003	CA	-	159	RF	LB 99	63	SKR	1	30	1.0	H	2.70	0.92		12.0	30	20	7.0	29	2.0	29	2.0	0	0
1048	2003	CA	-	159	RF	RB 305	14	RBT	1	21	0.3	D													
1049	2003	CA	-	159	RF	XS 305	28	RBT	1	20	0.8	H	0.60	2.16	1.29	25.5	26	24	6.1	28	1.5	28	1.5		2
1050	2003	CA	-	159	RF	XS 305	30	RBT	1	20		D													

Appendix A. (continued)

Rec #	Year	Reach	Seg-ment	Habitat Unit #	Habitat Unit Type	Trans #	Mark #	Spec	# Fish	Fish Size	Focal Ht	Fish Activ	Depth	Mean Veloc	Focal Veloc	Dist to Bank	Substrate Dom	Substrate SubDom	Substrate Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
1051	2003	CA	-	159	RF	XS 305	36	RBT	1	18	0.9	F	1.00	1.24	1.23	75.0	28	26	6.8	28	4.0	28	4.5	0	1
1052	2003	CA	-	159	RF	XS 305	3	RBT	1	22		D													
1053	2003	CA	-	159	RF	LB 305	51	CHB	4	7	0.6	R	0.90	0.37		6.0	25	26	6.0	26	0.5	26	0.5	0	0
1054	2003	CA	-	159	RF	LB 305	68	RBT	1	7	0.9	H	1.10	0.40		4.0	26	24	5.7	27	1.0	28	1.0	0	0
1055	2003	CA	-	163	DP	XS17	NO FISH																		
1056	2003	CA	-	163	DP	XS155	124	SKR	1	18	0.9	D													
1057	2003	CA	-	163	DP	XS86	132	RBT	1	20	0.6	R	5.30	0.79	0.86	49.0	27	24	6.9	28	2.0	28	2.0		0
1058	2003	CA	-	163	DP	RB17	132B	RBT	1	30	0.6	R	5.30	0.79	0.86	49.0	27	24	6.9	28	2.0	28	2.0		0
1059	2003	CA	-	163	DP	XS86	108	RBT	1	20	0.6	D													
1060	2003	CA	-	168	DPt	LB79	NO FISH																		
1061	2003	CA	-	168	DPt	XS 79	NO FISH																		
1062	2003	CA	-	168	DPb	XS 167	NO FISH																		
1063	2003	CA	-	168	DPh	XS 255	NO FISH																		
1064	2003	CA	-	168	DPb	LB167	NO FISH																		
1065	2003	CA	-	168	DPb	RB167	NO FISH																		
1066	2003	CA	-	168	DPh	LB255	NO FISH																		
1067	2003	CA	-	168	DPh	RB255	NO FISH																		
1068	2003	CA	-	168	DPt	RB79	43	RBT	1	7	0.8	H	0.80	0.90	0.70	8.0	24	21	5.0	25	1.5	25	1.5	0	0
1069	2003	CA	-	168	DPt	RB79	33	CHB	1	5	0.8	F	0.70	0.92	0.60	8.5	22	21	5.1	24	2.0	24	2.0	0	0
1070	2003	CA	-	190	SPb	RB 177	NO FISH																		
1071	2003	CA	-	190	SPb	XS 177	NO FISH																		
1072	2003	CA	-	190	SPh	LB 307	NO FISH																		
1073	2003	CA	-	190	SPt	LB 47	14	SKR	1	5	0.9	F	0.90	0.46	0.37	5.5	28	21	7.0	28	0.5	28	0.5	8	0
1074	2003	CA	-	190	SPt	LB 47	36	SKR	1	5	0.9	F	1.10	0.38	0.00	6.0	28	21	7.0	28	0.5	28	0.5	8	0
1075	2003	CA	-	190	SPt	LB 47	8	CHB	2	4	0.6	H	0.90	0.50	0.50	5.5	28	21	7.0	28	0.5	28	0.5	8	0
1076	2003	CA	-	190	SPt	LB 47	19	RBT	1	4		D													
1077	2003	CA	-	190	SPt	LB 47	47	CHB	4	5	0.6	H	0.50	0.50	0.50	6.0	27	24	6.0	27	0.5	26	2.0	0	0
1078	2003	CA	-	190	SPb	LB 177	28	RBT	1	9	0.8	H	0.45	0.00	0.00		24	2	5.1	3	0.0	3	0.0	3	0
1079	2003	CA	-	190	SPt	RB 47	39	RBT	1	10	0.6	R	0.75	0.36	0.36	2.8	25	22	5.8	27	1.0	27	1.0	0	0
1080	2003	CA	-	190	SPt	RB 47	51	RBT	1	5	0.6	F	1.20	0.71	0.71	6.2	22	28	5.1	28	1.0	28	1.0	0	0
1081	2003	CA	-	190	SPt	RB 47	13	SKR	1	7	1.0	H	1.00	0.00	0.00	3.5	24	27	5.5	27	0.5	27	0.5	0	0
1082	2003	CA	-	190	SPt	RB 47	9	CHB	1	6	0.6	F	0.60	0.51	0.51		24	27	5.5	27	0.5	27	0.5	0	0
1083	2003	CA	-	190	SPt	RB 47	29	RBT	1	4	0.6	R	0.70	0.38	0.38	3.0	24	22	5.4	27	0.5	27	0.5	0	0
1084	2003	CA	-	190	SPt	RB 47	37	RBT	1	5	0.8	H	0.75	0.38	0.28	2.5	25	22	5.8	27	1.0	27	1.0	0	0
1085	2003	CA	-	190	SPt	RB 47	28	SKR	1	6	0.8	F	0.70	0.42	0.31	2.8	25	22	5.8	27	1.0	27	1.0	0	0
1086	2003	CA	-	190	SPh	RB 307	31	RBT	1	10	0.8	R	1.30	1.10	0.64	3.6	24	25	5.8	27	1.0	27	1.0	0	1
1087	2003	CA	-	190	SPt	XS 47	36	RBT	1	4		D													
1088	2003	CA	-	190	SPt	XS 47	46	RBT	1	4	0.8	H	1.00	0.59	0.33	7.5	23	21	5.3	25	2.0	25	2.0	0	0
1089	2003	CA	-	190	SPh	XS 307	47	SKR	1	35	1.0	H	5.40	2.22	1.43	21.2	27	28	6.4	28	1.5	28	1.5	0	1
1090	2003	CA	-	190	SPh	XS 307	32	SKR	1	35	0.9	R	5.30	2.29	1.55	21.0	25	22	5.8	28	1.0	28	1.0	0	1
1091	2003	CA	-	190	SPh	XS 307	37	SKR	1	35	0.9	R	5.10	2.08	1.23	21.0	23	26	5.6	28	2.0	28	2.0	0	1
1092	2003	CA	-	190	SPh	XS 307	43	SKR	1	35	0.9	R	5.40	2.38	0.92	21.0	25	24	5.7	27	1.0	28	0.5	0	1
1093	2003	CA	-	190	SPh	XS 307	49	SKR	1	35	0.9	H	5.00	2.18	1.60	25.0	26	22	5.7	27	0.2	26	1.0	0	1
1094	2003	CA	-	190	SPh	XS 307	38	SKR	1	35	0.9	H	5.00	2.10	1.35	26.0	26	24	5.9	28	2.0	28	6.0	0	1

Appendix A. (continued)

Rec #	Year	Reach	Seg-ment	Habitat Unit #	Habitat Unit Type	Trans #	Mark #	Spec	# Fish	Fish Size	Focal Ht	Fish Activ	Depth	Mean Veloc	Focal Veloc	Dist to Bank	Substrate Dom	Substrate SubDom	Substrate Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
1095	2003	CA	-	190	SPt	LB 47	90	RBT	1	5		D													
1096	2003	CA	-	190	SPt	RB 47	86	RBT	1	6	0.6	H	0.90	0.61	0.61	7.0	22	25	5.5	27	1.0	27	1.0	0	0
1097	2003	CA	-	190	SPt	RB 47	83	RBT	1	5	0.6	F	0.90	0.92	0.92	4.8	28	21	7.0	27	0.5	27	0.5	0	0
1098	2003	CA	-	190	SPt	RB 47	94	RBT	1	8	0.6	F	1.05	1.07	1.07	4.9	28	23	7.0	27	1.0	27	1.0	0	0
1099	2003	CA	-	190	SPt	RB 47	88	RBT	1	6	0.6	F	1.05	0.80	0.80	4.5	28	23	7.0	26	0.5	26	0.5	0	0
1100	2003	CA	-	190	SPt	RB 47	68a	CHB	1	6	0.8	H	1.05	1.05	0.62	4.5	28	23	7.0	26	0.5	26	0.5	0	0
1101	2003	CA	-	190	SPt	RB 47	64	RBT	1	6	0.8	H	0.70	0.51	0.31	5.4	26	28	6.5	27	0.5	27	0.5	0	0
1102	2003	CA	-	190	SPt	RB 47	89	RBT	1	6	0.8	H	1.20	0.73	0.57	5.0	27	23	6.2	28	1.0	28	1.0	0	0
1103	2003	CA	-	190	SPt	RB 47	79	RBT	1	5	0.8	F	0.80	0.46	0.12	4.5	22	24	5.1	27	0.5	27	0.5	0	1
1104	2003	CA	-	190	SPt	RB 47	68	RBT	1	6	0.6	H	0.80	0.77	0.77	4.0	21	24	5.5	27	0.5	27	0.5	0	1
1105	2003	CA	-	190	SPt	RB 47	80	RBT	1	10	0.8	F	0.90	0.85	0.73	5.5	24	27	5.5	28	0.5	28	0.5	0	1
1106	2003	CA	-	190	SPt	RB 47	62	RBT	1	5	0.6	H	1.50	0.32	0.32	7.0	21	28	5.1	28	1.5	28	1.5	0	0
1107	2003	CA	-	190	SPt	RB 47	54	RBT	1	4	0.6	H	1.00	0.46	0.46	6.0	24	27	5.4	27	1.0	27	1.0	0	0
1108	2003	CA	-	190	SPt	RB 47	61	CHB	1	6	0.6	R	0.95	0.58	0.58	6.0	25	27	6.1	27	1.0	27	1.0	0	0
1109	2003	CA	-	190	SPt	RB 47	63	RBT	1	4	0.6	H	0.60	0.36	0.36	3.5	25	22	5.7	28	0.5	28	0.5	0	0
1110	2003	CA	-	190	SPt	RB 47	53	CHB	1	7	0.6	F	0.90	0.80	0.80	4.0	28	21	7.0	27	0.5	27	0.5	0	0
1111	2003	CA	-	190	SPt	XS 47	91	RBT	1	5	0.8	H	1.05	0.69	0.49	8.0	23	21	5.3	27	1.0	25	1.0	0	0
1112	2003	CA	-	195.2	DP	XS61	NO FISH																		
1113	2003	CA	-	195.2	DP	XS133	NO FISH																		
1114	2003	CA	-	195.2	DP	RB61	NO FISH																		
1115	2003	CA	-	195.2	DP	LB61	103	SKR	1	4	1.0	F	1.30	0.00	0.00	6.0	24	25	5.9	25	0.2	25	0.3	0	0
1116	2003	CA	-	195.2	DP	RB133	NO FISH																		
1117	2003	CA	-	195.2	DP	LB133	NO FISH																		
1118	2003	CA	-	195.8	RN	BLK12	54	RBT	1	5	0.8	H	1.05	0.84	0.79	6.5	25	23	5.3	30	2.0	30	2.0	0	1
1119	2003	CA	-	195.8	RN	BLK12	60	RBT	1	5	0.8	F	1.00	0.71	0.50	8.5	25	22	5.1	28	1.0	28	1.0	0	1
1120	2003	CA	-	195.8	RN	BLK12	61	RBT	1	7	0.8	H	1.10	1.05	0.90	8.5	25	24	5.1	28	1.5	28	1.5	0	0
1121	2003	CA	-	195.8	RN	BLK12	57	RBT	1	6	0.8	D													
1122	2003	CA	-	195.8	RN	BLK12	53	RBT	1	6	0.8	D													
1123	2003	CA	-	195.8	RN	BLK12	69	RBT	1	8	0.8	H	1.20	0.46	0.61	6.5	25	26	6.0	26	1.0	26	1.0	0	0
1124	2003	CA	-	195.8	RN	BLK12	67	RBT	1	6	0.8	D													
1125	2003	CA	-	197	SP	XS79	NO FISH																		
1126	2003	CA	-	197	SP	RB79	NO FISH																		
1127	2003	CA	-	197	SP	LB79	46	RBT	1	4	0.8	H	0.80	0.64	0.57	8.0	28	26	6.2	26	0.5	25	0.5	0	0
1128	2003	CA	-	197	SP	LB79	34	RBT	1	4	0.9	H	1.50	0.27	0.00	4.0	27	20	6.9	27	0.1	27	0.2	8	0
1129	2003	CA	-	200.1	SC-RN	BLK21	NO FISH																		
1130	2003	CA	-	200.1	SC-RF	BLK23	96	RBT	1	8	0.8	F	1.15	0.55	0.64	2.0	23	21	5.0	25	2.0	25	2.0	9	0
1131	2003	CA	-	200.2	SC-SP	BLK8	48	SKR	1	4	1.0	F	1.15	0.83	0.34	4.0	25	23	5.8	26	1.0	2	1.0	4	0
1132	2003	CA	-	200.2	SC-SP	BLK135	NO FISH																		
1133	2003	CA	-	200.2	SC-SP	BLK200	32	SKR	6	6	1.0	D													
1134	2003	CA	-	200.4	SC-RF	BLK0	54	RBT	1	10	0.8	H	0.60	3.60	2.90	6.0	24	25	5.9	26	2.5	26	1.5	0	1
1135	2003	CA	-	200.4	SC-RF	BLK0	100	RBT	1	8	0.8	H	0.45	1.65	1.30	6.0	23	24	5.5	26	4.0	26	4.0	0	1
1136	2003	CA	-	200.4	SC-RF	BLK0	89	RBT	1	8	0.8	H	0.40	2.15		5.0	23	24	5.6	26	3.0	26	3.0	0	1
1137	2003	CA	-	201	RN	RB 403	60	RBT	1	3	0.6	R	0.40	0.81	0.81	3.0	23	25	5.4	25	0.0	25	0.2	0	0
1138	2003	CA	-	201	RN	XS 403	91	SKR	1	4	0.9	R	0.70	0.31		9.2	25	23	5.7	0	0.0	26	1.0	0	0

Appendix A. (continued)

Rec #	Year	Reach	Seg-ment	Habitat Unit #	Habitat Unit Type	Trans #	Mark #	Spec	# Fish	Fish Size	Focal Ht	Fish Activ	Depth	Mean Veloc	Focal Veloc	Dist to Bank	Substrate Dom	Substrate SubDom	Substrate Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
1139	2003	CA	-	201	RN	LB 403	NO	FISH																	
1140	2003	CA	-	201	RN	LB 936	NO	FISH																	
1141	2003	CA	-	201	RN	RB 936	NO	FISH																	
1142	2003	CA	-	201	RN	XS 936	NO	FISH																	
1143	2003	CA	-	201	RN	LB 1469	100	SKR	1	7		D													
1144	2003	CA	-	201	RN	LB 1469	89	SKR	1	6		D													
1145	2003	CA	-	201	RN	XS 1469	13	CRAP	1	10		R													
1146	2003	CA	-	201	RN	RB 1469	98	RBT	1	4	0.5	D													

Appendix B. Habitat availability data collected in the Upper Klamath River, California and Oregon, 2002 and 2003. Data abbreviations are Reach: BP=Bypass, CA=California Peaking, OR=Oregon Peaking; Habitat Unit Type: DP=deep pool (subscripts h,b,t=head, body, tail), SP=shallow pool, RN=run, RF=riffle, PW=pocketwater, SC=side channel; Transect #: XS=cross-sectional transect, LB/RB=left/right bank transects; Markers refer to HSC data given in Appendix A; depths, velocities, and distances are in ft or fps; see report for substrate and cover codes. Shear data is available upon request.

Rec		Seg-	Habitat		Trans	Avail	Markers		Mean	Dist to		Substrate		Velocity Cover		Escape Cover		OVH	Turb
#	Reach	ment	Unit #	Type	#	Pt	w/in 4ft	Depth	Veloc	Bank	Dom	Sub-Dom	Bovee	Type	Dist	Type	Dist	Cover	Cover
1	BP	low	11	SP	LB 25	A1	39,48,31,8,62	1.95	0.08	1.0	28	2	7.0	0	0.0	29	0.5	4	0
2	BP	low	11	SP	XS 25	A2	none	4.80	0.70	13.0	29	28	7.0	0	0.0	29	1.5	0	0
3	BP	low	11	SP	XS 25	A3	none	6.60	1.67	14.0	30	29	7.0	30	4.0	30	4.0	0	1
4	BP	low	11	SP	RB 25	A4	none	3.20	0.95	5.0	28	27	7.0	30	1.5	30	1.5	0	0
5	BP	low	11	SP	LB 61	A5	12	1.70	0.06	5.0	2	19	1.3	0	0.0	2	0.0	0	0
6	BP	low	11	SP	XS 61	A1	none	6.20	2.96	22.0	30	20	7.0	30	2.0	30	2.0	0	1
7	BP	low	11	SP	XS 61	A2	none	5.50	1.21	28.0	19	20	4.0	30	2.0	29	0.5	0	1
8	BP	low	11	SP	RB 61	A1	none	4.40	0.23	6.0	28	0	7.0	0	0.0	2	0.0	0	0
9	BP	low	11	SP	LB 97	A1	61	1.95	1.53	6.0	27	26	6.0	0	0.0	27	0.0	0	0
10	BP	low	11	SP	XS 97	A2	none	4.50	2.10	12.0	26	27	6.4	29	1.0	29	1.0	0	1
11	BP	low	11	SP	XS 97	A3	none	4.90	2.75	26.0									
12	BP	low	11	SP	RB 97	A4	none	5.30	1.72	6.0	30	28	7.0	30	1.0	30	1.0	0	1
13	BP	low	21	RN	LB 1	A1	none	3.50	2.23	6.0	30	20	7.0	30	0.0	30	0.0	0	1
14	BP	low	21	RN	XS 1	A2	none	4.20	2.94	18.0	29	0	7.0	0	0.0	30	2.0	0	2
15	BP	low	21	RN	XS 1	A3	none	4.40	2.55	18.0	28	23	7.0	30	2.0	30	2.0	0	1
16	BP	low	21	RN	RB 1	A4	none	6.00	0.80	2.0	30	0	7.0	30	0.0	30	0.0	0	0
17	BP	low	21	RN	LB 2	A5	33	0.30	0.29	1.0	28	0	7.0	0	0.0	28	0.0	4	1
18	BP	low	21	RN	XS 2	A6	none	3.00	2.37	13.0	29	28	7.0	29	0.5	29	0.5	0	2
19	BP	low	21	RN	XS 2	A7	none	5.50	2.94	18.0	29	20	7.0	30	2.0	30	2.0	0	2
20	BP	low	21	RN	RB 2	A8	51	0.60	0.84	5.0	30	0	7.0	30	0.5	29	2.5	4	1
21	BP	low	26	PW	LB 1	A1	none	1.70	2.10	5.0	29	28	6.8	29	1.5	28	0.5	0	1
22	BP	low	26	PW	LB 1	A2	38	1.50	0.62	1.0	27	28	6.3	29	1.0	29	1.0	0	1
23	BP	low	26	PW	RB 1	A1	none	3.90	2.18	8.0	27	28	6.3	30	1.0	30	1.5	0	1
24	BP	low	26	PW	RB 1	A2	none	1.80	0.87	7.0	30	0	7.0	30	0.0	29	2.0	0	0
25	BP	low	26	PW	XS 1	A1	none	3.20	1.60	22.0	30	28	6.8	30	2.5	30	2.5	0	1
26	BP	low	26	PW	XS 1	A2	none	3.80	2.65	29.0	28	27	6.6	30	2.5	30	2.0	0	0
27	BP	low	26	PW	XS 1	A3	none	2.30	1.93	12.0	29	30	7.0	30	1.5	30	1.0	0	1
28	BP	low	30	RF	LB 1	A1	none	1.30	3.59	3.0	22	25	5.6	29	2.0	29	2.0	4	1
29	BP	low	30	RF	RB 1	A2	67,68	0.80	0.74	2.0	29	21	4.9	30	2.0	30	2.0	0	1
30	BP	low	30	RF	XS 1	A3	none	2.50	4.52	9.0	28	27	6.8	30	3.0	30	3.0	0	2
31	BP	low	30	RF	XS 1	A4	none	1.00	1.00	25.0	30	0	7.0	30	1.0	30	1.0	4	2
32	BP	low	30	RF	XS 1	A5	none	2.70	2.14	41.0	30	29	7.0	29	2.5	29	2.5	0	1
33	BP	low	30	RF	XS 1	A6	56	1.20	1.03	32.0	29	0	7.0	30	1.0	30	1.0	0	1
34	BP	low	30	RF	XS 1	A7	67	2.25	1.95	16.0	29	28	7.0	30	3.0	30	3.0	0	2
35	BP	low	31	RN	LB 26	A1	46,20,56,48	1.20	0.34	3.0	29	28	6.9	30	2.5	28	1.5	0	1
36	BP	low	31	RN	LB 26	A2	none	1.60	0.40	3.0	27	29	6.3	0	0.0	28	2.0	0	0
37	BP	low	31	RN	XS 26	A3	none	0.60	2.09	12.0	28	27	6.7	29	1.5	28	0.5	0	1
38	BP	low	31	RN	XS 26	A4	none	1.30	0.75	17.0	30	28	7.0	30	1.0	28	1.0	0	1
39	BP	low	31	RN	XS 26	A5	none	2.80	0.69	42.0	29	27	6.8	29	2.0	28	2.0	0	1
40	BP	low	31	RN	XS 26	A6	none	1.80	2.21		29	27	6.9	29	2.0	29	0.5	0	1

Appendix B. (continued)

Rec #	Reach	Seg-ment	Habitat Unit #	Habitat Type	Trans #	Avail Pt	Markers w/in 4ft	Depth	Mean Veloc	Dist to Bank	Dom	Substrate Sub-Dom	Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
41	BP	low	31	RN	XS 26	A7	26,100	2.90	1.80		30	28	7.0	28	2.5	30	0.5	0	1
42	BP	low	31	RN	RB 26	A8	none	0.90	1.84	7.0	28	27	6.7	29	1.0	29	1.0	0	1
43	BP	low	31	RN	RB 26	A9	none	0.40	1.29	3.0	29	19	7.0	29	0.5	13	0.5	13	1
44	BP	low	31	RN	LB 56	A1	10	1.40	0.39	5.0	28	2	6.9	0	0.0	28	0.5	0	0
45	BP	low	31	RN	LB 56	A2	6,31,39	1.20	0.69	6.0	26	29	6.4	0	0.0	28	0.5	0	0
46	BP	low	31	RN	XS 56	A3	none	1.30	5.08	24.0	30	0	7.0	30	2.0	30	2.0	0	1
47	BP	low	31	RN	XS 56	A4	none	1.80	2.27	43.0	30	0	7.0	30	2.5	30	2.0	0	1
48	BP	low	31	RN	XS 56	A5	none	0.20	2.33	31.0	30	0	7.0	30	1.0	30	4.0	0	1
49	BP	low	31	RN	XS 56	A6	none	2.00	2.05	12.0	28	0	7.0	28	0.5	28	0.5	0	1
50	BP	low	31	RN	RB 56	A7	59,47,45,8,74,12,44,68	1.55	0.23	2.0	20	28	7.0	28	1.0	28	1.0	0	0
51	BP	low	31	RN	RB 56	A8	29	2.75	1.53	2.0	30	22	6.9	0	0.0	28	1.0	0	1
52	BP	low	32	SP	LB 1	A1	36,43,37,100,67,26	1.10	0.31	3.0	27	28	6.3	0	0.0	2	0.0	0	0
53	BP	low	32	SP	LB 1	A2	44,79,58	1.20	1.18	7.0	30	26	6.7	29	0.5	29	0.5	0	1
54	BP	low	32	SP	XS 1	A1	62,52	2.20	0.51	21.0	29	0	7.0	0	0.0	30	1.0	0	0
55	BP	low	32	SP	XS 1	A2	none	4.50	2.77	41.0	30	27	6.9	0	0.0	30	2.0	0	1
56	BP	low	32	SP	XS 1	A3	none	2.90	0.72	35.0	29	20	7.0	29	3.0	28	2.0	0	0
57	BP	low	32	SP	XS 1	A4	13	2.90	1.58	15.0	30	27	7.0	30	2.5	30	2.5	0	1
58	BP	low	32	SP	RB 1	A1	none	2.40	0.92	2.0	29	27	7.0	30	2.0	30	2.0	0	1
59	BP	low	32	SP	RB 1	A2	none	0.70	3.50	7.0	30	0	7.0	30	2.0	30	2.0	0	2
60	BP	low	32	SP	LB 2	A1	62,85,3,47	1.20	0.33	3.0	27	19	6.0	0	0.0	27	1.0	0	0
61	BP	low	32	SP	LB 2	A2	none	1.30	1.98	6.0	28	27	6.8	28	1.5	28	1.5	0	1
62	BP	low	32	SP	XS 2	A1	none	1.90	0.26	18.0	30	0	7.0	30	3.5	2	2.5	0	0
63	BP	low	32	SP	XS 2	A2	none	3.20	3.09	32.0	28	29	6.7	30	2.0	30	2.0	0	1
64	BP	low	32	SP	XS 2	A3	none	5.00	3.08	46.0	30	28	7.0	30	1.5	30	1.5	0	2
65	BP	low	32	SP	XS 2	A4	none	2.10	0.18	36.0	19	26	2.0	28	1.0	28	1.5	0	0
66	BP	low	32	SP	XS 2	A5	none	1.50	1.95	26.0	28	27	7.0	30	2.0	30	2.0	0	0
67	BP	low	32	SP	XS 2	A6	79	2.00	0.70	11.0	28	29	7.0	29	1.0	17	1.0	0	1
68	BP	low	32	SP	RB 2	A1	none	2.10	0.50	7.0	29	30	7.0	30	3.0	30	0.5	0	0
69	BP	low	32	SP	RB 2	A2	none	2.30	1.54	6.0	28	27	7.0	30	6.0	30	0.5	0	0
70	BP	low	33	PW	XS 39	A2	none	3.80	1.58	26.0	28	29	6.0	29	1.0	29	6.5	0	1
71	BP	low	33	PW	XS 39	A3	none	4.80	2.18	27.0	30	0	7.0	29	0.0	30	2.0	0	1
72	BP	low	33	PW	LB 39	A4	none	3.20	1.48	1.0	26	25	7.0	30	1.0	30	1.0	0	1
73	BP	low	33	PW	LB 39	A5	31,6,33,1,39,24	2.10	1.46	6.0	26	25	6.0	0	0.0	27	2.0	0	1
74	BP	low	33	PW	RB 39	A6	100,61,38,13	1.70	0.78	4.0	27	26	6.0	0	0.0	27	2.0	0	0
75	BP	low	33	PW	RB 39	A7	none	1.90	0.92	6.0	28	21	6.7	0	0.0	29	2.0	0	1
76	BP	low	33	PW	LB 106	A1	none	1.80	1.18	8.0	30	27	6.5	29	5.0	30	3.0	0	1
77	BP	low	33	PW	LB 106	A2	36	2.20	1.73	6.0	30	27	6.7	0	0.0	28	1.0	0	0
78	BP	low	33	PW	RB 106	A1	67	3.20	2.14	6.0	28	26	6.5	30	2.0	30	2.0	0	0
79	BP	low	33	PW	RB 106	A2	none	0.20	0.76	7.0	30	29	7.0	29	0.5	29	0.5	0	0
80	BP	low	33	PW	XS 106	A1	none	3.00	2.18	10.0	27	29	6.3	0	0.0	29	1.5	0	0

Appendix B. (continued)

Rec		Seg-	Habitat		Trans	Avail	Markers		Mean	Dist to		Substrate		Velocity Cover		Escape Cover		OVH	Turb
#	Reach	ment	Unit #	Type	#	Pt	w/in 4ft	Depth	Veloc	Bank	Dom	Sub-Dom	Bovee	Type	Dist	Type	Dist	Cover	Cover
81	BP	low	33	PW	XS 106	A2	none	2.50	0.97	25.0	30	27	6.6	30	3.0	30	3.0	0	1
82	BP	low	33	PW	XS 106	A3	none	3.75	1.67	32.0	29	28	7.0	30	4.0	29	1.0	0	1
83	BP	low	33	PW	LB 173	A1	none	3.80	1.29	1.0	20	28	4.2	30	1.0	30	0.5	0	1
84	BP	low	33	PW	LB 173	A2	31,24	1.80	1.10	3.0	30	29	7.0	0	0.0	29	1.0	0	0
85	BP	low	33	PW	XS 173	A3	none	1.00	1.32	12.0	30	0	7.0	30	0.5	30	2.0	0	1
86	BP	low	33	PW	XS 173	A4	none	2.95	0.62	24.0	29	27	6.7	2	0.5	30	1.0	0	0
87	BP	low	33	PW	XS 173	A5	none	5.30	2.01	38.0	28	27	6.8	0	0.0	28	1.5	0	0
88	BP	low	33	PW	XS 173	A6	none	4.80	2.24	18.0	28	26	6.5	0	0.0	30	3.0	0	0
89	BP	low	33	PW	RB 173	A7	62	1.20	0.90	3.0	27	26	6.3	0	0.0	27	1.0	0	0
90	BP	low	33	PW	RB 173	A8	none	2.40	0.90	5.0	28	29	7.0	0	0.0	28	0.5	0	0
91	BP	low	38	RN	LB 1	A1	43	1.70	1.33	2.0	29	0	7.0	30	0.5	30	0.5	0	1
92	BP	low	38	RN	XS 1	A2	none	2.80	1.96	26.0	30	0	7.0	0	0.0	30	2.0	0	2
93	BP	low	38	RN	XS 1	A3	none	4.70	2.56	28.0	28	27	6.9	0	0.0	29	2.0	0	2
94	BP	low	38	RN	RB 1	A4	12	0.40	0.18	3.0	29	0	7.0	0	0.0	4	3.0	4	0
95	BP	low	40	RF	RB 1	A1	13,100	1.60	0.10	2.0	30	26	6.7	0	0.0	30	2.0	0	0
96	BP	low	40	RF	LB 1	A2	none	2.70	3.15	4.0	30	0	7.0	0	0.0	30	2.0	0	2
97	BP	low	53	RF	LB 1	A1	none	2.90	0.37	1.0	30	29	7.0	30	1.0	30	1.0	4	1
98	BP	low	53	RF	XS 1	A2	48	2.80	0.84	15.0	30	2	7.0	30	4.0	30	2.0	0	1
99	BP	low	53	RF	XS 1	A3	none	2.50	4.08	35.0	29	28	7.0	30	2.0	30	2.0	0	2
100	BP	low	53	RF	XS 1	A4	none	1.70	2.21	35.0	28	26	6.3	0	0.0	28	1.0	0	2
101	BP	low	53	RF	XS 1	A5	none	1.10	3.31	15.0	27	25	6.1	27	1.0	27	1.0	0	2
102	BP	low	53	RF	RB 1	A6	64	0.70	2.46	6.0	25	23	5.9	30	6.0	2	2.0	0	1
103	BP	low	56	RF	XS 1	A1	none	0.90	2.72	16.0	23	21	5.3	27	2.0	27	2.0	0	1
104	BP	low	56	RF	XS 1	A2	62,7	0.70	1.27	35.0	28	0	7.0	28	2.0	28	2.5	29	0
105	BP	low	56	RF	XS 1	A3	none	3.20	3.21	28.0	28	29	7.0	29	1.5	29	1.5		
106	BP	low	56	RF	XS 1	A4	none	4.80	2.51	9.0	30	29	7.0	0	0.0	30	1.0		
107	BP	low	56	RF	LB 1	A1	none	0.80	0.99	8.0	23	20	4.8	27	5.0	2	0.5	0	1
108	BP	low	56	RF	RB 1	A1	none	1.50	0.31	6.0	30	0	7.0	30	1.0	30	1.0	0	1
109	BP	low	58	DP	XS 34	A1	none	1.00	1.27	23.0	25	24	6.0	0	0.0	27	1.0	0	0
110	BP	low	58	DP	XS 34	A2	74	1.90	0.90	44.0	30	28	6.6	0	0.0	28	2.0	0	0
111	BP	low	58	DP	XS 34	A3	none	4.70	1.45	38.0	30	29	6.9	0	0.0	28	2.0	0	0
112	BP	low	58	DP	XS 34	A4	none	6.50	1.86	17.0	30	0	6.9	0	0.0	29	4.0	0	0
113	BP	low	58	DP	LB 34	A1	7	0.80	1.69	8.0	22	21	5.0	0	0.0	26	2.0	0	0
114	BP	low	58	DP	LB 34	A2	none	1.00	0.84	3.0	20	21	4.2	0	0.0	2	3.0	0	0
115	BP	low	58	DP	RB 34	A1	none	4.50	1.35	8.0	29	27	7.0	30	1.5	30	1.5	0	0
116	BP	low	58	DP	RB 34	A2	3	2.20	1.21	2.0	29	0	7.0	30	0.5	30	1.0	0	0
117	BP	low	58	DP	LB 10	A1	26	0.40	1.53	3.0	25	23	5.8	0	0.0	25	0.5	0	0
118	BP	low	58	DP	LB 10	A2	44	1.50	0.17	4.0	2	19	1.0	0	0.0	2	0.0	0	0
119	BP	low	58	DP	XS 10	A3	none	1.80	0.48	13.0	26	19	6.0	2	0.0	2	0.0	0	0
120	BP	low	58	DP	XS 10	A4	none	4.10	0.78	27.0	28	27	6.9	28	0.5	28	0.5	0	0
121	BP	low	58	DP	XS 10	A5	none	6.40	0.98	41.0	28	29	7.0	29	1.0	29	1.0	0	0
122	BP	low	58	DP	XS 10	A6	none	7.90	1.22	33.0	29	28	7.0	30	1.0	30	1.0	0	0
123	BP	low	58	DP	XS 10	A7	none	7.60	0.86	19.0	30	28	7.0	30	1.0	30	2.5	0	0
124	BP	low	58	DP	RB 10	A8	none	2.90	0.39	2.0	30	2	7.0	0	0.0	30	2.0	0	0
125	BP	low	58	DP	RB 10	A9	none	5.60	0.65	4.0	30	28	7.0	30	1.0	30	1.5	0	0
126	BP	low	58	DP	LB 60	A10	none	2.90	0.07	2.0	30	2	7.0	0	0.0	30	1.0	4	0
127	BP	low	58	DP	LB 60	A11	none	3.95	0.14	3.0	19	2	1.0	0	0.0	30	1.5	4	0

Appendix B. (continued)

Rec #	Reach	Seg-ment	Habitat Unit #	Habitat Type	Trans #	Avail Pt	Markers w/in 4ft	Depth	Mean Veloc	Dist to Bank	Substrate Dom	Substrate Sub-Dom	Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
128	BP	low	58	DP	XS 60	A1	none	3.75	0.27	18.0	2	19	1.0	2	0.0	2	0.0	0	0
129	BP	low	58	DP	XS 60	A2	none	10.10	0.40	32.0	29	21	6.8	0	0.0	28	1.0	0	0
130	BP	low	58	DP	XS 60	A3	none	10.20	1.38	46.0	29	28	6.9	0	0.0	29	1.0	0	0
131	BP	low	58	DP	XS 60	A4	none	13.70	0.67	44.0	29	28	6.9	0	0.0	29	1.0	0	0
132	BP	low	58	DP	XS 60	A5	none	9.10	0.38	30.0	28	27	6.7	0	0.0	28	1.0	0	0
133	BP	low	58	DP	XS 60	A6	none	7.00	0.26	16.0	29	2	6.9	0	0.0	30	3.5	0	0
134	BP	low	58	DP	RB 60	A7	68	2.60	0.23	8.0	2	19	1.0	0	0.0	2	0.0	0	0
135	BP	low	58	DP	RB 60	A8	68	2.25	0.44	7.0	2	19	1.0	0	0.0	2	0.0	0	0
136	BP	low	58	DP	LB 11	A1	none	8.00	0.79	2.0									
137	BP	low	58	DP	RB 11	A2	none	3.80	0.05	2.0	28	19	7.0	0	0.0	4	0.0	4	0
138	BP	low	69	RF	LB 1	A1	none	1.20	3.28	6.0	25	24	5.9	29	2.5	4	5.0	0	2
139	BP	low	69	RF	RB 1	A2	26	2.00	1.50	5.0	30	28	7.0	30	1.5	30	1.0	4	1
140	BP	low	69	RF	XS 1	A3	none	3.30	0.46	15.0	28	27	6.7	30	1.5	30	1.5	0	2
141	BP	low	69	RF	XS 1	A4	none	1.60	0.85	18.0	30	0	7.0	30	2.0	30	2.0	0	2
142	BP	low	73	RF	LB 1	A1	44	1.60	1.86	5.0	23	28	5.6	29	4.0	29	3.0	0	0
143	BP	low	73	RF	RB 1	A1	none	0.40	1.49	8.0	30	0	7.0	0	0.0	30	2.0	0	0
144	BP	low	75	SP	LB 1	A1	61	2.00	0.76	2.0	30	0	7.0	30	1.0	30	1.0	0	1
145	BP	low	76	RF	LB 1	A1	47	0.50	0.65	1.0	30	0	7.0	0	0.0	27	2.0	4	0
146	BP	low	76	RF	LB 1	A2	none												
147	BP	low	76	RF	RB 1	A3	none	0.90	1.27	1.0	26	25	6.0	0	0.0	0	0.0	4	1
148	BP	low	76	RF	RB 1	A4	none	0.50	1.11	1.0	30	0	7.0	0	0.0	4	0.0	4	1
149	BP	up	155	DP	XS	A1	none	2.80	0.05	4.0	2	19	1.0	0	0.0	0	0.0	0	0
150	BP	up	155	DP	XS	A2	none	11.10	0.35	22.0	2	30	1.0	0	0.0	30	2.0	0	0
151	BP	up	155	DP	XS	A3	none	11.60	0.25	40.0	30	21	7.0	0	0.0	30	1.0	0	0
152	BP	up	155	DP	XS	A4	none	10.40	0.54	52.0	30	2	7.0	0	0.0	30	2.0	0	0
153	BP	up	155	DP	XS	A5	none	5.80	0.06	34.0	2	19	1.0	0	0.0	2	0.0	0	0
154	BP	up	155	DP	XS	A6	100	4.85	0.00	16.0	2	19	1.0	0	0.0	2	0.0	0	0
155	BP	up	177	RN	XS 1	A1	54	1.60	0.22	6.0	29	28	7.0	29	1.0	28	1.5	0	1
156	BP	up	177	RN	XS 1	A2	none	1.40	1.08	23.0	26	25	6.2	28	1.0	29	2.0	0	0
157	BP	up	177	RN	XS 1	A3	none	2.40	1.68	40.0	30	29	7.0	30	3.0	30	3.0	0	1
158	BP	up	177	RN	XS 1	A4	none	2.10	2.94	28.0	29	27	7.0	27	2.0	30	3.0	0	1
159	BP	up	177	RN	XS 1	A5	none	3.80	2.20	11.0	29	26	7.0	30	4.0	30	4.0	0	1
160	BP	up	182	RF	XS 1	A1	none	0.90	0.87	5.0	28	27	6.8	28	2.0	28	2.0	0	1
161	BP	up	182	RF	XS 1	A2	none	0.50	0.82	26.0	28	26	6.8	29	2.0	4	1.0	4	1
162	BP	up	182	RF	XS 1	A3	none	0.60	2.39	47.0	27	28	6.6	26	1.0	4	1.0	4	1
163	BP	up	182	RF	XS 1	A4	none	4.00	2.01	39.0	25	26	6.1	29	4.0	29	4.0	0	2
164	BP	up	182	RF	XS 2	A1	none	1.00	0.40	4.0	28	25	6.1	27	1.0	2	0.5	0	0
165	BP	up	182	RF	XS 2	A2	none	0.30	0.99	24.0	28	25	6.9	28	2.0	28	2.0	0	0
166	BP	up	182	RF	XS 2	A3	38	0.90	1.40	44.0	29	28	7.0	28	0.0	28	0.0	4	0
167	BP	up	182	RF	XS 2	A4	none	1.30	5.03	58.0	28	29	7.0	28	0.5	28	0.5	0	2
168	BP	up	182	RF	XS 2	A5	none	2.30	3.24	38.0	28	27	6.8	28	1.5	28	1.5	0	1
169	BP	up	182	RF	XS 2	A6	none	2.10	4.83	18.0	27	26	6.3		2.0		2.0	0	2
170	BP	up	183	PW	XS 1	A1	none	1.20	1.15	13.0	26	23	6.0	28	1.0	30	2.0	0	1
171	BP	up	183	PW	XS 1	A2	none	1.50	4.36	30.0	29	0	7.0	29	1.5	29	1.0	0	1
172	BP	up	183	PW	XS 1	A3	none	1.70	1.31	47.0	28	2	7.0	30	1.5	30	1.5	0	2
173	BP	up	183	PW	XS 1	A4	none	1.90	1.01	43.0	28	29	7.0	29	1.0	30	2.0	0	1
174	BP	up	183	PW	XS 1	A5	none			26.0									

Appendix B. (continued)

Rec #	Reach	Seg-ment	Habitat Unit #	Habitat Type	Trans #	Avail Pt	Markers w/in 4ft	Depth	Mean Veloc	Dist to Bank	Substrate Dom	Substrate Sub-Dom	Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
175	BP	up	183	PW	XS 1	A6	none	2.00	4.49	9.0	29	0	7.0	0	0.0	29	6.0	0	1
176	BP	up	186	RN	XS 1	A1	none	0.80	0.31	1.0	25	24	6.0	28	1.0	28	1.0	4	0
177	BP	up	186	RN	XS 1	A2	38,28	1.10	1.76	16.0	28	29	6.8	29	2.5	29	2.5	0	1
178	BP	up	186	RN	XS 1	A3	none	2.80	1.92	31.0	28	29	7.0	29	2.0	29	3.5	0	1
179	BP	up	186	RN	XS 1	A4	none	3.20	2.50	31.0	29	30	7.0	29	1.5	29	1.5	0	1
180	BP	up	186	RN	XS 1	A5	none	2.80	1.46	16.0	29	28	7.0	29	0.5	29	0.5	0	1
181	BP	up	186	RN	XS 2	A1	none	0.90	0.72	2.0	28	26	6.2	29	0.5	29	0.5	0	1
182	BP	up	186	RN	XS 2	A2	35	1.50	1.08	16.0	28	27	6.5	28	1.0	28	1.0	0	1
183	BP	up	186	RN	XS 2	A3	63,30,44	2.70	1.98	30.0	29	30	7.0	29	1.0	29	1.0	0	1
184	BP	up	186	RN	XS 2	A4	52	3.70	3.18	27.0	29	30	7.0	29	2.0	29	2.0	0	2
185	BP	up	186	RN	XS 2	A5	none	2.00	2.19	13.0	29	30	6.9	30	3.0	30	3.0	0	1
186	BP	up	195	RN	XS 1	A1	none	0.60	1.36	7.0	24	26	5.5	0	0.0	4	1.0	4	1
187	BP	up	195	RN	XS 1	A2	none	1.00	0.79	18.0	26	27	6.1	29	2.0	29	2.0	0	1
188	BP	up	195	RN	XS 1	A3	67	2.90	1.95	29.0	27	28	6.7	29	1.0	29	1.0	0	1
189	BP	up	195	RN	XS 1	A4	43	2.80	1.82	40.0	29	0	7.0	30	2.0	30	2.0	0	2
190	BP	up	195	RN	XS 1	A5	68	2.50	1.24	49.0	28	30	7.0	30	2.0	30	2.0	0	1
191	BP	up	195	RN	XS 1	A6	none	1.70	1.82	38.0	30	0	7.0	30	1.0	30	1.0	0	1
192	BP	up	195	RN	XS 1	A7	39	2.50	0.39	27.0	30	0	7.0	30	2.0	30	2.0	0	0
193	BP	up	195	RN	XS 1	A8	none	3.20	0.63	16.0	28	30	7.0	30	2.0	30	2.0	0	1
194	BP	up	195	RN	XS 1	A9	none	0.40	0.64	5.0	30	0	7.0	30	1.0	30	1.0	0	1
195	BP	up	208	PW	XS 1	A1	58,54	1.00	0.18	2.0	25	26	5.7	0	0.0	28	1.0	0	0
196	BP	up	208	PW	XS 1	A2	none	0.70	1.97	19.0	28	25	6.7	0	0.0	28	1.0	0	1
197	BP	up	208	PW	XS 1	A3	none	3.70	4.41	6.0	28	27	6.8	30	2.0	30	2.0	0	2
198	BP	up	208	PW	XS 2	A1	none	1.30	3.68	6.0	25	23	5.7	30	2.5	30	2.5	0	1
199	BP	up	208	PW	XS 2	A2	8	1.50	0.73	23.0	28	26	6.8	28	0.0	28	2.0	0	1
200	BP	up	208	PW	XS 2	A3	none	3.00	3.46	13.0	27	29	6.4	30	0.5	30	2.0	0	2
201	BP	up	209	SP	XS 1	A1	38	1.40	0.19	2.0	22	21	5.5	29	1.0	27	2.0	0	0
202	BP	up	209	SP	XS 1	A2	none	2.80	2.52	16.0	28	26	6.6	29	2.0	29	2.0	0	2
203	BP	up	209	SP	XS 1	A3	none	1.90	3.52	13.0	30	0	7.0	30	2.0	30	3.0	0	2
204	BP	up	210	PW	XS 1	A1	none	1.20	0.56	16.0	30	0	7.0	0	0.0	29	2.0	0	1
205	BP	up	210	PW	XS 1	A2	9	1.20	1.39	5.0	28	29	7.0	0	0.0	29	1.0	0	1
206	BP	up	211	RF	XS 1	A1	54,85	1.80	2.63	29.0	31	26	8.0	30	2.0	30	2.0	0	0
207	BP	up	211	RF	XS 2	A1	none	1.46	2.38	21.0	30	2	7.0	30	2.0	29	4.0	0	2
208	BP	up	217	SP	XS 1	A1	54,13	2.05	0.72	9.0	28	30	7.0	30	0.5	30	0.5	0	1
209	BP	up	217	SP	XS 1	A2	none	3.40	1.35	19.0	30	0	7.0	29	1.0	29	1.0	0	0
210	BP	up	217	SP	XS 1	A3	36,12	3.30	0.95	29.0	29	28	7.0	29	2.0	29	2.0	0	0
211	BP	up	217	SP	XS 1	A4	46,48	2.70	1.21	39.0	30	0	7.0	30	2.0	30	2.0	0	0
212	BP	up	217	SP	XS 1	A5	none	4.80	1.10	37.0	26	30	6.3	30	2.0	30	2.0	0	1
213	BP	up	217	SP	XS 1	A6	none	4.00	1.09	27.0	30	0	7.0	29	1.0	29	1.0	0	0
214	BP	up	217	SP	XS 1	A7	none	5.10	1.43	17.0	30	0	7.0	30	1.0	30	1.0	0	0
215	BP	up	217	SP	XS 1	A8	none	2.00	0.73	7.0	30	0	7.0	30	0.0	30	0.0	0	0
216	BP	up	217	SP	XS 2	A1	56	3.70	1.05	11.0	29	28	7.0	29	0.0	29	0.0	0	0
217	BP	up	217	SP	XS 2	A2	none	2.10	1.83	23.0	30	29	7.0	30	1.0	30	2.5	0	0
218	BP	up	217	SP	XS 2	A3	none	3.50	1.41	35.0	29	30	7.0	29	1.5	29	1.5	0	0
219	BP	up	217	SP	XS 2	A4	38	5.50	0.81	47.0	28	29	6.9	28	2.0	28	2.0	0	0
220	BP	up	217	SP	XS 2	A5	none	3.50	1.29	39.0	26	27	5.9	27	0.5	27	1.0	0	0
221	BP	up	217	SP	XS 2	A6	106	4.20	0.92	27.0	30	24	7.0	0	0.0	30	3.0	0	0

Appendix B. (continued)

Rec #	Reach	Seg-ment	Habitat Unit #	Habitat Type	Trans #	Avail Pt	Markers w/in 4ft	Depth	Mean Veloc	Dist to Bank	Substrate Dom	Substrate Sub-Dom	Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
222	BP	up	217	SP	XS 2	A7	9	0.50	0.29	15.0	29	26	7.0	30	2.5	30	2.5	0	0
223	BP	up	217	SP	XS 3	A1	none	3.90	0.45	13.0	28	27	6.6	30	1.0	30	2.0	0	0
224	BP	up	217	SP	XS 3	A2	none	5.30	2.57	27.0	28	29	7.0	30	0.0	29	1.5	0	2
225	BP	up	217	SP	XS 3	A3	none	4.00	2.13	41.0	29	30	7.0	29	0.5	30	2.0	0	2
226	BP	up	217	SP	XS 3	A4	none	4.00	1.55	27.0	29	28	6.8	30	3.0	30	3.0	0	0
227	BP	up	217	SP	XS 3	A5	none	4.80	0.54	13.0	29	29	6.9	0	0.0	0	0.0	0	0
228	BP	up	217	SP	XS 3	A6	none	3.20	0.22	1.0	30	19	7.0	0	0.0	30	4.0	0	0
229	BP	up	230	DP	XS 1	A1	none	8.20	1.33	18.0	30	0	7.0	30	2.0	30	2.0	0	0
230	BP	up	230	DP	XS 1	A2	none	4.40	0.78	3.0	30	0	7.0	29	3.0	29	1.0	0	0
231	BP	up	230	DP	XS 2	A3	none	1.50	0.86	9.0	30	0	7.0	0	0.0	30	4.0	0	0
232	BP	up	230	DP	XS 2	A4	none	8.90	1.18	31.0	29	26	6.9	30	2.0	30	2.0	0	0
233	BP	up	230	DP	XS 2	A5	67	2.10	0.18	13.0	30	0	7.0	0	0.0	30	3.0	0	0
234	BP	up	230	DP	XS 3	A6	none	5.45	0.36	8.0	26	30	6.6	0	0.0	27	4.0	0	0
235	BP	up	230	DP	XS 3	A7	none	6.10	1.71	28.0	30	21	7.0	0	0.0	29	2.0	0	0
236	BP	up	230	DP	XS 3	A8	132	3.10	1.55	13.0	30	2	7.0	30	3.0	30	3.0	0	1
237	CA	-	159	RF	XS99	A1	none	1.70	3.29	16.0	27	28	6.4	28	1.0	28	1.0	0	1
238	CA	-	159	RF	XS99	A2	none	1.10	3.04	42.0	27	28	6.2	28	3.0	28	3.0	0	1
239	CA	-	159	RF	XS99	A3	none	0.60	0.88	68.0	28	21	6.9	29	1.0	29	1.0	0	0
240	CA	-	159	RF	XS99	A4	none	1.80	2.48	94.0	26	28	6.4	29	1.5	29	1.5	0	1
241	CA	-	159	RF	XS99	A5	none	2.30	3.22	120.0	28	29	6.8	29	4.0	29	4.0	0	1
242	CA	-	159	RF	LB99	A1	none	1.65	0.10	1.5	25	26	6.1	28	1.5	28	1.5	8	0
243	CA	-	159	RF	LB99	A2	none	0.60	1.47	1.5	27	26	6.3	28	3.0	28	3.0	8	1
244	CA	-	159	RF	LB99	A3	none	0.30	0.44	1.5	24	26	5.4	27	1.5	30	30.0	8	0
245	CA	-	159	RF	RB99	A1	none	0.30	1.58	4.0	24	28	6.5	BANK		4	0.4	4	6
246	CA	-	159	RF	RB99	A2	none	1.10	0.89	6.0	28	26	6.8	28	1.5	28	2.0	0	0
247	CA	-	159	RF	RB99	A3	none	0.50	0.74	1.0	27	28	6.3			4	0.0	4	0
248	CA	-	159	RF	RB305	A1	none	0.90	1.78	2.0	26	28	6.2	28	2.2	28	1.2	0	1
249	CA	-	159	RF	RB305	A2	none	1.30	0.97	2.0	28	27	6.9	28	0.5	4	0.0	4	0
250	CA	-	159	RF	RB305	A3	none	1.00	1.69	6.0	27	23	5.8	28	6.0	27	2.0	0	1
251	CA	-	159	RF	RB305	A4	none	0.41	1.56	2.0	28	27	6.8	28	0.3	28	0.3	4	1
252	CA	-	159	RF	XS305	A1	none	0.80	2.04	17.0	24	28	6.3	29	2.0	29	25.0	0	1
253	CA	-	159	RF	XS305	A2	none	1.40	2.43	43.0	27	28	6.2	28	2.0	27	3.5	0	1
254	CA	-	159	RF	XS305	A3	none		3.33	69.0	27	28	6.4	28	3.0	28	3.0	0	1
255	CA	-	159	RF	XS305	A4	none	0.80	1.80	95.0	26	28	6.3	28	1.2	28	1.5	0	1
256	CA	-	159	RF	XS305	A5	none	0.70	2.40	121.0	27	28	6.2	28	3.0	28	6.0	0	1
257	CA	-	159	RF	XS305	A6	none	0.70	3.97	147.0	28	27	6.9	28	2.5	28	2.5	0	1
258	CA	-	159	RF	LB305	A1	none	0.40	2.00	4.5	26	27	6.4	28	1.5	28	1.5	0	1
259	CA	-	159	RF	LB305	A2	none	0.75	0.50	4.5	26	27	6.2	29	1.5	29	1.5	0	1
260	CA	-	159	RF	LB305	A3	none	1.00	0.83	4.5	26	27	6.4	28	2.0	28	2.0	0	1
261	CA	-	195.8	SC-RN	BLK12	A1	none	1.20	0.19	8.0	26	22	5.6	29	2.0	29	2.0	0	1
262	CA	-	195.8	SC-RN	BLK12	A2	none	0.80	0.07	5.0	23	28	5.0	28	0.3	28	0.3	0	1
263	CA	-	195.8	SC-RN	BLK12	A3	none	0.80	0.08	1.0	27	21	6.0	27	1.0	27	1.0	0	0
264	CA	-	195.8	SC-RN	BLK12	A4	none	1.10	0.23	12.0	25	26	6.0	28	2.0	28	2.0	0	0
265	CA	-	195.8	SC-RN	BLK12	A5	60	0.70	0.28	3.5	25	23	5.3	26	1.0	26	1.0	0	0
266	CA	-	195.8	SC-RN	BLK12	A6	none	0.40	0.22	2.0	25	22	5.3	25	0.5	25	0.5	0	0
267	CA	-	195.8	SC-RN	BLK12	A7	53	0.50	0.42	2.0	25	23	5.4	28	1.5	28	1.5	0	0
268	CA	-	195.8	SC-RN	BLK12	A8	69	0.90	0.45	5.0	25	29	6.0	29	0.3	29	0.3	0	0

Appendix B. (continued)

Rec #	Reach	Seg-ment	Habitat Unit #	Habitat Type	Trans #	Avail Pt	Markers w/in 4ft	Depth	Mean Veloc	Dist to Bank	Substrate Dom	Substrate Sub-Dom	Substrate Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
269	CA	-	168	DPt	RB79	A1	none	0.20	0.34	2.0	25	23	6.0	25	1.0	25	1.0	8	0
270	CA	-	168	DPt	RB79	A2	none	0.20	0.48	6.0	24	23	5.3	25	1.5	25	1.5	0	0
271	CA	-	168	DPt	RB79	A3	none	0.30	0.13	3.0	24	23	5.5	25	1.0	25	1.0	0	0
272	CA	-	168	DPb	RB167	A1	none	0.50	0.07	1.0	23	25	5.2	6	0.2	6	0.2	0	0
273	CA	-	168	DPb	RB167	A2	none	0.55	0.11	6.0	27	19	6.0	6	0.5	6	0.5	0	0
274	CA	-	168	DPh	RB255	A1	none	0.30	0.05	2.0	25	25	6.0	6	0.1	6	0.1	0	0
275	CA	-	168	DPh	RB255	A2	none	0.20	0.07	1.0	26	22	5.7	26	0.1	26	0.1	0	0
276	CA	-	168	DPt	LB79	A1	none	0.45	0.24	5.0	22	25	5.6						
277	CA	-	168	DPt	LB79	A2	none	1.00	0.55	3.0	21	25	4.8						
278	CA	-	168	DPt	LB79	A3	none	0.30	0.72	1.0	19	20	4.1						
279	CA	-	168	DPb	LB167	A1	none	2.40	0.17	3.0	27	30	6.9	0	0.0	2	30.0	0	0
280	CA	-	168	DPh	LB255	A2	none	2.00	0.06	1.0	30	27	6.8	30	0.0	1	30.0	0	0
281	CA	-	197	SPb	LB79	A1	none	0.70	0.38	4.0	23	27	4.9	16	1.0	16	2.0	0	0
282	CA	-	197	SPb	LB79	A2	none	1.25	0.21	2.0	25	26	4.9	16	0.5	16	0.5	8	0
283	CA	-	197	SPb	RB79	A1	none	0.30	0.64	7.0	26	25	5.9	26	1.5	26	1.5	0	0
284	CA	-	197	SPb	RB79	A2	none	0.30	0.42	2.0	24	26	5.9	26	1.5	26	1.5	0	0
285	CA	-	197	SPb	XS79	A1	none	0.60	0.53	15.0	25	21	5.5	26	1.5	26	1.5	0	0
286	CA	-	197	SPb	XS79	A2	none	2.20	1.50	47.0	26	24	5.9	25	1.0	25	1.0	0	1
287	CA	-	197	SPb	XS79	A3	none	2.70	2.10	79.0	25	24	5.7	26	1.0	26	1.0	0	1
288	CA	-	197	SPb	XS79	A4	none	2.40	1.85	101.0	25	26	6.1	26	0.5	26	0.5	0	1
289	CA	-	200.1	SC-RN	BLK21	A1	none	0.90	0.52	1.0	25	20	5.7	25	0.3	25	0.3	9	1
290	CA	-	200.2	SC-SPt	BLK8	A1	none	0.55	0.49	4.0	25	24	6.0	25	0.5	25	0.5	0	0
291	CA	-	200.2	SC-SPb	BLK135	A1	none	2.15	0.25	4.0	26	25	5.8	26	0.5	26	0.5	9	
292	CA	-	200.2	SC-SPh	BLK200	A1	none	1.10	0.00	3.6	25	21	5.8	2	1.5	2	1.5	0	0
293	CA	-	201	RN	LB403	A1	none	1.10	0.27	6.0	24	26	5.7			26	0.5	0	0
294	CA	-	201	RN	LB403	A2	none	0.60	0.34	3.0	25	27	5.8			27	0.4	0	0
295	CA	-	201	RN	XS403	A1	none	2.00	3.13	18.0	26	25	5.9	26	1.0	26	1.0	0	0
296	CA	-	201	RN	XS403	A2	none	2.60	2.74	43.0	26	25	5.9	27	1.0	27	1.0	0	0
297	CA	-	201	RN	XS403	A3	none	1.80	1.75	36.0	25	26	5.8			26	1.5	0	0
298	CA	-	201	RN	XS403	A4	91	0.70	0.38	11.0	23	25	5.3			26	1.0	0	0
299	CA	-	201	RN	RB936	A1	none	0.80	0.86	2.0	25	23	5.4	25	0.5	25	0.5	0	0
300	CA	-	201	RN	RB936	A2	none	1.10	0.32	2.0	18	25	2.2	26	1.0	26	1.0	0	0
301	CA	-	201	RN	XS936	A1	none	0.60	0.07	10.0	25	24	5.8	0	0.0	0	0.0	0	0
302	CA	-	201	RN	XS936	A2	none	0.90	0.17	35.0	24	25	5.3	0	0.0	0	0.0	0	0
303	CA	-	201	RN	XS936	A3	none	2.30	0.48	25.0	26	6	0.0	0	0.0	0	0.0	0	0
304	CA	-	201	RN	XS936	A4	none	3.90	2.20	85.0	25	26	5.9	26	1.0	26	1.0	0	0
305	CA	-	201	RN	RB403	A1	none	0.70	1.24	5.5	23	21	5.2	27	2.0	25	1.0	0	0
306	CA	-	201	RN	RB403	A2	none	0.80	1.02	5.5	25	23	5.7	25	1.0	25	1.0	0	0
307	CA	-	201	RN	LB936	A1	none	0.40	0.09	4.0	25	26	5.9	0	0.0	0	0.0	0	0
308	CA	-	201	RN	LB936	A2	none	0.30	0.17	1.0	25	25	6.0	0	0.0	0	0.0	0	0
309	CA	-	201	RN	RB1469	A1	none	1.70	0.76	4.0	28	26	6.7	29	1.0	29	1.0		0
310	CA	-	201	RN	RB1469	A2	none	0.60	0.08	1.0	23	22	5.1	26	2.0	26	2.0	12	0
311	CA	-	201	RN	RB1469	A3	none	1.30	0.12	1.0	27	26	6.1	28	1.0	28	1.0	13	0
312	CA	-	201	RN	XS1469	A1	none	2.20	1.93	22.0	27	28	6.4	28	0.5	28	1.0		1
313	CA	-	201	RN	XS1469	A2	none	2.20	2.74	44.0	27	25	6.1	27	1.0	27	1.0		1
314	CA	-	201	RN	XS1469	A3	none	2.20	2.52	66.0	24	23	6.0	27	1.0	27	1.0		1
315	CA	-	201	RN	XS1469	A4	none	1.60	0.65	90.0	23	21	5.3	26	1.5	26	1.0		1

Appendix B. (continued)

Rec		Seg-	Habitat		Trans	Avail	Markers		Mean	Dist to		Substrate		Velocity Cover		Escape Cover		OVH	Turb
#	Reach	ment	Unit #	Type	#	Pt	w/in 4ft	Depth	Veloc	Bank	Dom	Sub-Dom	Bovee	Type	Dist	Type	Dist	Cover	Cover
316	CA	-	201	RN	XS1469	A5	none	1.50	0.49	112.0	24	25	5.2	0	0.0	0	0.0	0	0
317	CA	-	201	RN	LB1469	A1	none	1.25	0.16	3.5	25	26	5.7	0	0.0	16	1.0	16	0
318	CA	-	201	RN	LB1469	A2	none	0.90	0.07	2.0	24	25	4.8	0	0.0	16	2.0	16	2
319	CA	-	201	RN	LB1469	A3	none	0.80	0.33	6.0	25	26	5.8	0	0.0	16	2.0	16	0
320	CA	-	195.2	SC-DP	RB61	A1	none	0.30	0.00	2.0	21	22	4.9	25	0.5	25	0.5	0	0
321	CA	-	195.2	SC-DP	LB61	A1	103	0.70	0.00	4.0	25	26	6.0	26	0.2	26	0.2	0	0
322	CA	-	195.2	SC-DP	XS61	A1	none	1.35	0.07	9.0	26	22	6.5	26	1.0	26	1.0	0	0
323	CA	-	195.2	SC-DP	XS61	A2	none	2.20	0.01	25.0	23	26	6.3	26	0.1	26	0.1	0	0
324	CA	-	195.2	SC-DP	XS133	A1	none	2.35	0.16	8.0	26	22	5.9	28	1.0	28	1.0	0	0
325	CA	-	195.2	SC-DP	RB133	A1	none	1.10	0.00	3.0	27	19	5.7	2	0.5	2	0.5	0	0
326	CA	-	195.2	SC-DP	LB133	A1	none	0.40	0.02	1.0	25	22	5.8	25	0.5	25	0.5	0	0
327	CA	-	190	SPt	RB47	A1	none	0.50	0.45	3.0	25	26	6.2	27	2.0	27	2.0	0	0
328	CA	-	190	SPt	RB47	A2	none	0.40	0.64	3.0	25	26	5.5	28	2.0	28	2.0	0	0
329	CA	-	190	SPt	XS47	A1	none	1.55	1.36	8.0	28	25	7.0	28	1.0	28	1.0	0	0
330	CA	-	190	SPt	XS47	A2	none	1.95	2.75	32.0	28	22	7.0	28	1.0	28	1.0	0	0
331	CA	-	190	SPt	XS47	A3	none	2.20	3.52	56.0	27	23	6.2	28	1.0	28	2.0	0	0
332	CA	-	190	SPt	XS47	A4	none	0.90	0.63	22.0	25	22	6.1	26	2.5	26	2.5	0	0
333	CA	-	190	SPt	LB47	A1	90	0.70	0.05	1.5	28	25	7.0	28	0.3	28	0.3	0	0
334	CA	-	190	SPt	LB47	A2	47	0.60	0.28	5.0	22	21	5.4	25	1.5	25	1.5	0	0
335	CA	-	190	SPb	RB177	A1	none	0.30	1.00	4.0	26	27	6.0	26	0.5	26	0.6	0	1
336	CA	-	190	SPb	RB177	A2	none	1.80	1.14	4.0	25	27	6.2	27	0.2	27	0.2	0	0
337	CA	-	190	SPb	XS177	A1	none	4.70	2.13	18.0	26	24	5.6	27	1.5	27	1.5	0	1
338	CA	-	190	SPb	XS177	A2	none	3.20	1.61	38.0	24	22	5.1	27	2.0	27	2.0	0	1
339	CA	-	190	SPb	XS177	A3	none	0.85	1.01	58.0	24	22	5.1	25	1.5	25	1.5	0	1
340	CA	-	190	SPb	XS177	A4	none	0.50	0.15	78.0	23	2	5.1	26	1.0	26	1.0	0	0
341	CA	-	190	SPb	LB177	A1	none	0.45	0.00	1.0	22	3	4.8	3	0.0	3	0.5	0	0
342	CA	-	190	SPb	LB177	A2	none	0.30	0.00	3.0	23	25	5.2	30	0.0	2	0.8	0	0
343	CA	-	190	SPh	LB307	A1	none	0.10	0.00	2.0	25	23	5.1	25	0.2	25	0.2	0	0
344	CA	-	190	SPh	LB307	A2	none	0.35	0.18	5.0	25	24	5.8	26	1.0	26	1.0	0	0
345	CA	-	190	SPh	XS307	A3	none	1.55	0.20	9.5	26	24	5.9	26	0.5	26	0.5	0	0
346	CA	-	190	SPh	XS307	A2	none	4.10	1.77	28.5	25	26	5.9	25	2.0	25	2.0	0	1
347	CA	-	190	SPh	XS307	A1	none	4.80	2.50	47.5	27	28	5.7	28	2.0	28	2.0	0	2
348	CA	-	190	SPh	RB307	A1	31	0.70	0.92	3.0	25	23	5.9	25	0.5	25	0.5	0	1
349	CA	-	190	SPh	RB307	A2	none	2.15	1.42	5.0	25	26	5.9	26	1.0	26	1.0	0	1
350	CA	-	200.4	SC-RF	BLK0	A1	none	0.30	0.71	5.0	23	24	5.5	25	3.0	25	3.0	0	0
351	CA	-	200.4	SC-RF	BLK0	A2	none	0.75	4.44	6.0	24	23	6.0	26	1.0	26	1.0	0	1
352	CA	-	200.4	SC-RF	BLK0	A3	none	0.55	3.11	4.0	23	24	5.5	26	4.0	26	4.0	0	1
353	CA	-	200.4	SC-RF	BLK0	A4	54	0.45	2.97	8.0	26	24	5.6	26	1.0	26	1.0	0	1
354	CA	-	200.4	SC-RF	BLK0	A5	100-89	0.45	2.84	5.0	23	25	5.3	25	1.5	25	1.5	0	1
355	CA	-	200.1	SC-RF	BLK23	A1	none	0.75	1.87	16.8	25	22	6.0	25	1.0	25	1.0	0	1
356	CA	-	201.1	SC-RF	BLK23	A2	none	0.55	0.80	9.0	24	23	5.3	25	0.5	25	0.5	0	1
357	CA	-	202.1	SC-RF	BLK23	A3	96	0.60	0.94	6.5	24	22	5.4	26	2.0	26	2.0	0	1
358	OR	-	14	SPh	XS86	A1	none	2.75	1.24	19.0	28	26	6.8	29	1.0	29	1.0	0	1
359	OR	-	14	SPh	XS86	A2	none	3.60	2.60	33.0	28	26	6.5	26	1.5	26	1.5	0	2
360	OR	-	14	SPh	XS86	A3	100	1.00	0.76	7.0	27	25	6.1	27	0.5	27	0.5	0	0
361	OR	-	14	SPh	RB86	A1	none	1.10	0.37	4.0	26	25	5.7	26	0.5	26	0.5	0	0
362	OR	-	14	SPh	RB86	A2	none	0.60	0.24	3.0	27	25	6.1	27	0.5	27	0.5	0	0

Appendix B. (continued)

Rec		Seg-	Habitat		Trans	Avail	Markers		Mean	Dist to		Substrate		Velocity Cover		Escape Cover		OVH	Turb
#	Reach	ment	Unit #	Type	#	Pt	w/in 4ft	Depth	Veloc	Bank	Dom	Sub-Dom	Bovee	Type	Dist	Type	Dist	Cover	Cover
363	OR	-	14	SPh	LB86	A1	60	1.30	0.38	4.0	28	23	6.9	28	0.3	28	0.3	0	0
364	OR	-	14	SPh	LB86	A2	68	0.95	0.12	5.0	26	24	5.8	26	2.0	26	2.0	0	0
365	OR	-	23	DPh	LB526	A1	none	0.20	0.18	2.0	27	28	6.4	28	0.5	28	0.5	0	0
366	OR	-	23	DPh	LB526	A2	none	0.40	0.08	1.0	25	26	6.0	26	0.5	26	0.5	0	0
367	OR	-	23	DPh	RB526	A1	none	1.30	0.16	2.0	28	29	6.9	29	0.5	29	0.5	0	0
368	OR	-	23	DPh	RB526	A2	none	0.20	0.13	2.0	30	27	5.7	29	0.5	29	0.5	0	0
369	OR	-	23	DPh	RB298	A1	none	0.75	0.08	1.0	28	27	5.7	28	1.0	28	1.0	0	0
370	OR	-	23	DPh	RB298	A2	none	1.25	0.35	3.0	23	31	5.2	31	1.0	31	1.0	0	0
371	OR	-	23	DPh	LB70	A1	none	1.80	0.27	3.0	29	27	7.0	29	0.5	29	0.5	0	0
372	OR	-	23	DPh	LB70	A2	none	0.70	0.09	6.0	26	25	6.1	27	1.0	27	1.0	0	0
373	OR	-	23	DPh	RB70	A1	none	0.65	0.23	4.0	28	26	6.7	29	1.0	29	1.0	0	0
374	OR	-	23	DPh	RB70	A2	none	0.95	0.17	6.0	24	21	5.8	30	1.0	30	1.0	0	0
375	OR	-	23	DPh	XS70	A1	107	2.30	0.12	14.3	26	25	6.1	27	1.0	27	1.0	0	0
376	OR	-	23	DPh	XS70	A2	none	3.95	1.80	42.3	27	25	6.1	26	1.0	26	1.0	0	0
377	OR	-	23	DPh	XS70	A3	none	2.30	1.13	42.2	28	25	6.8	28	0.5	28	0.5	0	0
378	OR	-	23	DPh	XS70	A4	none	1.55	0.90	14.2	26	25	6.8	26	1.0	26	1.0	0	0
379	OR	-	23	DPh	LB298	A1	none	0.60	0.10	4.0	29	28	7.0	28	1.0	28	1.0	0	0
380	OR	-	26	RN	LB6	A1	none	0.55	0.13	2.0	25	24	5.8	29	1.0	29	1.0	0	0
381	OR	-	26	RN	LB6	A2	14	2.10	0.00		29	28	7.0	28	0.5	28	0.5	0	0
382	OR	-	26	RN	XS6	A1	none	0.40	0.24	1.0	28	23	7.0	28	1.0	28	1.0	0	0
383	OR	-	26	RN	XS6	A2	none	4.20	1.50	26.0	27	23	5.6	28	1.0	28	1.0	0	0
384	OR	-	26	RN	XS6	A3	none	2.50	1.65	51.0	28	25	6.6	29	0.5	29	0.5	0	0
385	OR	-	26	RN	XS6	A4	none	2.40	1.90	27.5	25	28	6.4	28	1.5	28	1.5	0	0
386	OR	-	26	RN	XS159	A1	none	5.80	0.58	28.0	26	27	6.2	30	2.0	30	4.0	0	0
387	OR	-	26	RN	XS159	A2	none	3.10	1.45	51.0	25	26	6.0	26	1.0	27	6.5	0	0
388	OR	-	26	RN	XS159	A3	none	0.80	0.93	38.0	25	26	5.9	26	1.0	26	1.0	0	0
389	OR	-	26	RN	XS159	A4	73	2.20	1.70	15.0	26	25	5.8	28	2.0	28	2.0	0	0
390	OR	-	26	RN	XS312	A1	none	0.70	3.60	25.0	30	1	7.0	30	1.0	30	3.0	0	1
391	OR	-	26	RN	XS312	A2	none	5.70	2.40	52.0	29	30	6.9	30	3.0	30	3.0	0	1
392	OR	-	26	RN	XS312	A3	none	2.70	0.60	29.0	28	26	6.8	30	2.0	27	1.5	0	0
393	OR	-	26	RN	XS312	A4	none	1.30	0.51	14.0	28	26	7.0	28	1.5	28	1.5	0	0
394	OR	-	26	RN	RB6	A1	none	0.70	0.18	3.0	25	25	6.0	28	1.5	28	1.5	0	0
395	OR	-	26	RN	RB6	A2	none	0.20	0.64	2.0	28	27	6.8	28	1.0	28	1.0	0	0
396	OR	-	32	RF	RB78	A1	none	0.30	0.92	2.0	25	25	6.0	25	0.5	25	0.5	0	1
397	OR	-	32	RF	RB78	A2	none	0.60	0.43	6.0	25	26	6.0	27	1.5	27	1.5	0	1
398	OR	-	32	RF	RB171	A1	none	0.60	0.90	3.0	28	27	6.7	28	0.1	28	0.1	0	0
399	OR	-	32	RF	RB171	A2	none	0.10	0.71	2.0	29	25	6.8	27	1.0	27	1.0	0	0
400	OR	-	32	RF	XS171	A1	none	1.60	1.50	18.0	29	27	6.8	28	2.0	28	2.0	0	2
401	OR	-	32	RF	XS171	A2	none	1.20	0.00	56.0	28	20	7.0	28	0.1	28	0.1	0	0
402	OR	-	32	RF	XS171	A3	none			O.W.	O.W.	O.W.	O.W.	O.W.	O.W.	O.W.	O.W.	O.W.	O.W.
403	OR	-	32	RF	XS171	A4	none	2.40	3.20	17.0	28	27	6.6	28	1.0	28	1.0	0	2
404	OR	-	32	RF	LB78	A1	none	0.70	0.82	1.0	28	27	6.5	28	0.5	28	0.5	0	1
405	OR	-	32	RF	LB78	A2	none	1.40	0.44	4.0	27	26	6.0	28	2.0	28	2.0	0	1
406	OR	-	32	RF	LB171	A1	none	0.90	4.80	3.0	26	25	6.0	26	0.5	26	0.5	0	2
407	OR	-	32	RF	LB171	A2	none	1.05	0.87	4.0	26	27	6.0	28	0.5	28	0.5	0	1
408	OR	-	54	RF	LB6	A1	none	0.90	1.52	5.0	28	27	7.0	28	1.0	28	1.0	0	1
409	OR	-	54	RF	LB51	A1	none	1.35	0.64	4.0	28	27	6.8	27	2.0	27	2.0	0	1

Appendix B. (continued)

Rec #	Reach	Seg-ment	Habitat Unit #	Habitat Type	Trans #	Avail Pt	Markers w/in 4ft	Depth	Mean Veloc	Dist to Bank	Substrate Dom	Substrate Sub-Dom	Substrate Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
410	OR	-	54	RF	LB96	A1	none	0.35	0.23	2.0	27	24	6.1	28	1.0	28	1.0	0	0
411	OR	-	54	RF	RB6	A1	none	0.60	0.50	2.0	26	23	5.7	0	0.0	0	0.0	0	0
412	OR	-	54	RF	RB51	A1	92	0.50	1.26	3.0	26	25	5.9	26	1.5	26	1.5	0	1
413	OR	-	54	RF	RB96	A1	none	0.70	4.10	4.0	25	24	5.4	0	0.0	0	0.0	0	1
414	OR	-	55	RN	LB56	A1	none	0.50	0.28	3.0	28	27	6.9	28	0.5	28	0.5	0	0
415	OR	-	55	RN	LB56	A2	none	0.80	0.44	2.0	28	26	6.7	28	0.5	28	0.5	0	0
416	OR	-	55	RN	LB134	A1	none	0.35	0.20	1.0	28	26	7.0	29	1.0	29	1.0	0	0
417	OR	-	55	RN	LB134	A2	none	2.30	0.16	6.0	27	22	5.4	27	0.5	27	0.5	0	0
418	OR	-	55	RN	LB212	A1	none	0.40	0.22	2.0	28	26	6.7	28	0.3	28	0.3	0	0
419	OR	-	55	RN	LB212	A2	none	0.15	0.27	1.0	29	27	7.0	28	0.5	28	0.5	0	0
420	OR	-	55	RN	RB56	A1	none	0.55	0.27		26	24	5.8	27	1.5	27	1.5	0	0
421	OR	-	55	RN	RB56	A2	none	0.70	0.21		26	25	5.9	27	2.0	27	1.5	0	0
422	OR	-	55	RN	RB212	A1	none	0.90	0.06		26	24	5.8	0	0.0	26	1.0	0	0
423	OR	-	55	RN	RB212	A2	none	0.40	0.11		26	24	5.8	0	0.0	26	1.0	0	0
424	OR	-	55	RN	RB134	A1	none	0.20	0.13	1.0	26	23	5.9	26	0.2	26	0.2	0	0
425	OR	-	55	RN	RB212	A2	none	0.30	0.08	2.0	26	23	5.9	26	0.5	26	0.5	0	0
426	OR	-	62	SPb	LB100	A1	none	1.60	0.24	4.0	25	21	5.8	27	1.0	27	1.0	0	0
427	OR	-	62	SPb	LB100	A2	none	1.00	0.24	6.0	29	26	7.0	29	1.0	29	1.0	0	0
428	OR	-	62	SPb	LB100	A3	none	1.60	0.08	6.0	26	25	6.3	27	2.0	27	2.0	0	0
429	OR	-	62	SPb	LB100	A4	none	1.10	0.00	1.0	26	22	5.9	28	1.5	28	1.5	0	0
430	OR	-	62	SPb	XS100	A1	none	2.00	0.11	10.0	25	21	5.6	25	0.4	25	0.4	0	0
431	OR	-	62	SPb	XS100	A2	none	1.80	2.25	29.0	25	21	4.9	25	1.0	25	1.0	0	0
432	OR	-	62	SPb	XS100	A3	none	2.10	0.80	48.0	25	20	5.6	25	1.0	25	1.0	0	0
433	OR	-	62	SPb	XS100	A4	none	2.25	1.19	67.0	26	22	5.8	26	1.5	26	1.5	0	1
434	OR	-	62	SPb	XS100	A5	none	2.90	2.56	70.0	26	21	5.9	26	0.2	25	0.2	0	1
435	OR	-	62	SPb	XS100	A6	none	2.95	1.80	51.0	26	25	5.9	25	1.0	25	1.0	0	1
436	OR	-	62	SPb	XS100	A7	none	3.10	0.61	32.0	25	26	5.8	26	0.5	26	0.5	0	1
437	OR	-	62	SPb	XS100	A1	none	0.60	0.15	3.0	29	19	7.0	0	0.0	2	1.0	2	0
438	OR	-	62	SPb	XS100	A2	none	2.40	0.08	4.0	2	19	3.0	0	0.0	2	0.0	2	0
439	OR	-	62	SPb	XS100	A3	none	2.80	0.17	2.0	19	25	4.0	0	0.0	2	3.0	2	0
440	OR	-	62	SPb	XS100	A4	none	2.40	0.07	2.0	19	26	4.3	0	0.0	2	3.0	0	0
441	OR	-	74	RF	XS325	A1	none	0.60	3.03	18.0	25	22	6.0	26	2.5	26	2.5	0	1
442	OR	-	74	RF	XS325	A2	none	1.20	2.68	46.0	25	23	6.0	25	1.0	25	1.0	0	1
443	OR	-	74	RF	XS325	A3	none	0.60	2.07	68.0	25	23	5.4	0	0.0	0	0.0	0	1
444	OR	-	74	RF	XS325	A4	none	0.90	1.74	40.0	25	24	5.2	26	0.5	0	0.0	0	1
445	OR	-	74	RF	XS325	A5	none	1.05	1.80	74.0	27	26	6.0	27	0.5	27	0.5	0	1
446	OR	-	74	RF	XS325	A6	none	1.15	1.70	12.0	27	24	5.9	0	0.0	2	1.0	0	1
447	OR	-	74	RF	XS325	A7	none	0.60	1.06	102.0	25	24	6.0	25	0.5	2	0.5	0	1
448	BP	mid	102	RF	LB1	A1	49	1.30	0.55	3.0	28	29	7.0	28	0.5	28	1.0	0	1
449	BP	mid	102	RF	LB1	A2	none	0.45	2.10	1.0	27	22	5.8	29	1.6	29	1.1	0	0
450	BP	mid	102	RF	XS1	A1	35	1.30	0.64	10.0	28	30	7.0	29	1.0	29	1.0	0	1
451	BP	mid	102	RF	XS1	A2	36	2.80	1.92	27.0	28	19	7.0	30	4.0	30	4.0	0	1
452	BP	mid	102	RF	XS1	A3	none	4.80	2.88	26.0	28	23	7.0	30	3.0	30	3.0	0	1
453	BP	mid	102	RF	XS1	A4	none	4.50	1.06	9.0	30	27	6.9	30	4.0	30	4.0	0	1
454	BP	mid	102	RF	RB1	A1	none	2.60	1.84	6.0	26	27	6.2	26	0.0	26	0.0	0	0
455	BP	mid	102	RF	RB1	A2	none	1.60	1.48	6.0	28	29	7.0	29	1.5	29	2.0	0	2
456	BP	mid	105	PW	XS22	A1	21	2.40	1.65	14.0	30	0	7.0	30	1.0	30	1.0	0	1

Appendix B. (continued)

Rec #	Reach	Seg-ment	Habitat Unit #	Habitat Type	Trans #	Avail Pt	Markers w/in 4ft	Depth	Mean Veloc	Dist to Bank	Substrate Dom	Substrate Sub-Dom	Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
457	BP	mid	105	PW	XS22	A2	24	4.20	1.85	25.0	23	28	5.2	28	1.5	28	1.5	0	1
458	BP	mid	105	PW	XS22	A3	none	3.10	2.25	26.0	29	26	7.0	29	0.5	29	0.5	0	1
459	BP	mid	105	PW	XS22	A4	none	2.80	2.90	9.0	28	27	6.9	28	0.0	28	0.0	0	1
460	BP	mid	105	PW	RB22	A1	15	1.00	1.37		28	27	6.7	BANK	0.0	28	1.0		
461	BP	mid	105	PW	RB22	A2	none	2.30	0.56										
462	BP	mid	108	RN	LB30	A1	none	1.30	1.88	3.0	29	29	7.0	29	1.5	29	3.0	0	1
463	BP	mid	108	RN	LB30	A2	none	1.95	0.49	2.0	29	29	7.0	29	2.5	29	2.5	0	1
464	BP	mid	108	RN	RB30	A1	59	2.60	0.23	3.0	22	23	4.9	29	1.5	30	0.5	4	1
465	BP	mid	108	RN	RB30	A2	none	4.80	2.40	6.0	30	23	6.9	30	0.5 d.s.	30	2.0	0	1
466	BP	mid	108	RN	XS30	A1	none	3.50	1.15	15.0	30	30	7.0	30	2.0	30	2.5	0	2
467	BP	mid	108	RN	XS30	A2	13	4.10	3.12	22.0	29	30	7.0	30	1.5	30	1.0	0	1
468	BP	mid	108	RN	XS30	A3	none	2.85	2.61	3.0	29	29	7.0	30	1.0	30	1.0	0	1
469	BP	mid	132	DPt	LB47	A1	51,53,63,56,62,64,89,82	1.50	0.55	6.0	28	27	6.8	29	1.5	29	1.5	0	0
470	BP	mid	132	DPt	RB47	A1	29	1.30	1.00	5.0	30	0	7.0	30	7.0	30	8.0	0	0
471	BP	mid	132	DPt	XS47	A1	10,8	4.70	1.40		30	20	7.0	30	1.5 d.s.	30	3.0	0	1
472	BP	mid	132	DPt	XS47	A2	none	3.70	1.56		29	20	7.0	30	2.0	30	2.0	0	1
473	BP	mid	133	DPb	XS61	A1	none	6.30	0.46	21.0	29	29	7.0	30	1.0	30	1.0	0	0
474	BP	mid	133	DPb	XS61	A2	none	10.00	0.78	36.0	29	28	6.7	30	4.0	30	4.0	0	1
475	BP	mid	133	DPb	XS61	A3	none	9.00	0.55	22.0	19	21	4.1	30	1.0	0	0.0	0	0
476	BP	mid	133	DPb	XS61	A4	none	6.00	0.17	7.0	19	20	4.0	0	0.0	2	6.5	0	0
477	BP	mid	133	DPb	LB61	A1	64	2.50	0.10		29	26	6.5	30	1.0	30	1.0	0	0
478	BP	mid	133	DPb	LB61	A2	82	3.10	0.33		30	19	7.0	30	1.5	30	1.5	0	0
479	BP	mid	133	DPb	RB61	A1	5	1.00	0.09	2.0	30	29	7.0	30	1.0	30	1.0	0	0
480	BP	mid	133	DPb	RB61	A2	none	3.10	0.17	8.0	19	19	3.7	2	0.0	2	0.0	0	0
481	BP	mid	133	DPh	XS10	A1	none	10.30	0.25	18.0	19	21	4.1	28	3.0	28	3.0	0	0
482	BP	mid	133	DPh	XS10	A2	none	11.70	0.92	30.0	28	29	7.0	28	2.0	28	2.0	0	0
483	BP	mid	133	DPh	XS10	A3	none	8.90	0.54	13.0	30	26	6.7	30	2.0	30	2.0	0	0
484	BP	mid	133	DPh	LB10	A1	56	2.70	0.55	3.0	29	26	6.6	29	0.0	29	0.0	0	0
485	BP	mid	133	DPh	LB10	A2	none	4.40	0.75		26	29	6.3	28	1.5	28	1.5	0	0
486	BP	mid	133	DPh	RB10	A1	36	5.50	0.44	7.0	30	19	7.0	30	1.5	30	1.5	0	0
487	BP	mid	133	DPh	RB10	A2	none	3.80	0.32	5.0	30	30	7.0	30	1.0	30	1.0	0	0
488	BP	mid	136	SPb	LB14	A1	17,14,39,29	0.80	0.12	4.0	26	23	5.7	2	0.0	BANK	4.0	0	0
489	BP	mid	136	SPb	LB14	A2	1	0.80	1.10	2.0	28	23	6.9	4	2.0	4	1.0	0	1
490	BP	mid	136	SPb	RB14	A1	43	1.20	0.07	2.0	30	30	7.0	BANK		4	1.0	4	0
491	BP	mid	136	SPb	RB14	A2	14	0.50	0.75	1.0	30	30	7.0	BANK		1	30.0	0	0
492	BP	mid	136	SPb	RB14	A3	37,3	1.20	0.32	2.0	30	30	7.0	30	1.0	30	1.0	0	0
493	BP	mid	136	SPb	XS14	A1	17,14,37	1.60	0.17	13.0	20	25	4.1	29	2.5	2	0.0	0	0
494	BP	mid	136	SPb	XS14	A2	none	3.80	1.41	34.0	28	27	6.8	30	4.0	28	0.5	0	1
495	BP	mid	136	SPb	XS14	A3	none	6.00	1.10	40.0	29	22	6.9	30	1.0 d.s.	30	1.0 d.s.	0	2
496	BP	mid	136	SPb	XS14	A4	none	4.40	0.61	19.0	29	28	6.8	30	1.0	30	1.0	0	1
497	BP	mid	138	PW	LB47	A1	8,9,37	0.90	0.70	7.0	28	21	7.0	29	1.5	29	1.5	0	0
498	BP	mid	138	PW	LB47	A2	39,26	1.90	0.67		21	27	5.4	29	3.0	27	1.0	0	0
499	BP	mid	138	PW	XS47	A1	54,63,71	2.50	1.86	15.0	28	26	6.9	28	0.5	28	0.5	0	1
500	BP	mid	138	PW	XS47	A2	62	2.65	1.13	33.0	21	20	4.5	29	20.0	29	1.0	0	1

Appendix B. (continued)

Rec #	Reach	Seg-ment	Habitat Unit #	Habitat Type	Trans #	Avail Pt	Markers w/in 4ft	Depth	Mean Veloc	Dist to Bank	Substrate Dom	Substrate Sub-Dom	Bovee	Velocity Cover Type	Velocity Cover Dist	Escape Cover Type	Escape Cover Dist	OVH Cover	Turb Cover
501	BP	mid	138	PW	XS47	A3	none	2.00	1.11	46.5	30	26	6.5	26	0.5	26	0.5	0	0
502	BP	mid	138	PW	XS47	A4	none	1.60	3.44	37.5	29	29	7.0	30	1.5	30	1.5	0	0
503	BP	mid	138	PW	RB47	A1	68	1.75	2.12	6.0	26	28	6.3	28	2.0	28	2.0	0	1
504	BP	mid	138	PW	RB47	A2	3	0.75	1.80	3.0	28	25	6.9	28	2.0	28	0.5	0	1
505	BP	mid	138	PW	XS47	A5	none	1.90	0.94	21.5	28	27	6.8	29	2.0	29	2.0	0	1
506	OR	-	23	DPb	XS298	A1	none	3.20	0.56	14.0	29	30	7.0	30	1.0	30	1.0	0	0
507	OR	-	23	DPb	XS298	A2	none	7.10	2.70	36.0	28	29	7.0	29	1.0	29	1.0	0	0
508	OR	-	23	DPb	XS298	A3	none	5.00	2.24	22.0	27	28	6.5	28	2.0	28	2.0	0	0
509	OR	-	23	DPh	XS526	A1	none	2.30	1.10	4.0	26	25	6.2	29	1.5	29	1.5	0	0
510	OR	-	23	DPh	XS526	A2	none	5.60	1.40	29.0	29	26	6.5	29	2.0	29	2.0	0	0
511	OR	-	23	DPh	XS526	A3	none	6.80	1.23	54.0	29	26	6.5	29	2.0	29	2.0	0	0
512	OR	-	23	DPh	XS526	A4	none	11.80	2.20	34.0	29	26	6.8	29	2.0	29	2.0	0	0
513	OR	-	163	DPt	XS17	A1	none	0.80	1.30	8.0	28	26	6.5	29	1.5	27	2.0	0	0
514	OR	-	163	DPt	XS17	A2	none	1.00	1.40	43.0	28	26	6.5	27	0.5	27	0.5	0	0
515	OR	-	163	DPt	XS17	A3	none	5.50	1.80	39.0	29	27	6.9	29	0.5	29	0.5	0	0
516	OR	-	163	DPb	XS86	A1	none	1.00	0.50	16.0	26	24	5.5	29	1.0	29	1.0	0	0
517	OR	-	163	DPb	XS86	A2	none	6.40	1.90	40.0	28	27	6.8	28	0.5	28	0.5	0	0
518	OR	-	163	DPh	XS155	A1	none	0.70	0.20	3.0	26	22	5.5	29	1.0	29	1.0	0	0
519	OR	-	163	DPh	XS155	A2	none	10.00	2.00	45.0	28	26	6.5	28	1.0	28	1.0	0	0
520	OR	-	168	DPt	XS79	A1	none	0.55	2.50	17.0	25	24	5.8	28	1.0	29	1.0	0	0
521	OR	-	168	DPt	XS79	A2	none	1.50	2.50	40.0	28	25	6.5	27	0.5	27	0.5	0	0
522	OR	-	168	DPt	XS79	A3	none	3.50	2.60	63.0	27	25	6.4	29	2.0	29	2.0	0	0
523	OR	-	168	DPt	XS79	A4	none	4.00	2.70	62.0	28	26	6.6	27	1.0	27	1.0	0	0
524	OR	-	168	DPt	XS79	A5	none	2.75	2.80	39.0	28	27	6.8	27	1.0	27	1.0	0	0
525	OR	-	168	DPt	XS79	A6	none	2.00	2.00	16.0	26	21	5.5	27	2.0	27	2.0	0	0
526	OR	-	168	DPb	XS167	A1	none	4.05	0.53	22.0	28	25	6.3	28	1.0	28	1.0	0	0
527	OR	-	168	DPb	XS167	A2	none	13.50	2.00	59.0	28	26	6.6	28	1.0	28	1.0	0	0
528	OR	-	168	DPb	XS167	A3	none	5.80	0.50	35.0	30	29	7.0	30	0.5	30	0.5	0	0
529	OR	-	168	DPh	XS255	A1	none	2.45	0.40	18.0	29	25	6.7	29	1.0	29	1.0	0	0
530	OR	-	168	DPh	XS255	A2	none	10.05	1.10	52.0	28	26	6.5	29	1.0	29	1.0	0	0
531	OR	-	168	DPh	XS255	A3	none	7.50	2.70	29.0	30	28	7.0	30	1.0	30	1.0	0	1
532	BP	mid	149	RF	XS22	A1	none	2.00	1.05	27.0	28	25	6.8	28	1.7	28	1.7	0	1
533	BP	mid	149	RF	XS22	A2	none	1.40	2.17	32.0	22	25	5.4	28	7.0	28	5.0	0	1
534	BP	mid	149	RF	LB22	A1	none	0.20	0.18	1.0	24	21	4.8	BANK		24	0.3	3	0
535	BP	mid	149	RF	LB22	A2	26,5,9,39,35,17,1,29,30,40	0.70	2.09	5.0	24	23	5.1	25	0.8	25	0.8	0	1
536	BP	mid	149	RF	LB22	A3	none	2.10	2.54	6.0	28	23	6.7	27	0.6	27	0.6	0	2
537	BP	mid	149	RF	XS51	A1	none	2.00	2.70	20.0	28	26	6.7	29	2.0	27	1.0	0	1
538	BP	mid	149	RF	XS51	A2	88	1.70	1.10	35.0	27	28	6.3	29	1.2	29	1.2	0	1
539	BP	mid	149	RF	XS51	A3	none	1.80	4.01	12.0	26	27	6.1	28	4.0	28	4.0	0	1
540	BP	mid	149	RF	RB22	A1	74	0.60	0.00	1.0	4	28	4.0	4	0.0	4	0.0	4	0
541	BP	mid	149	RF	RB22	A2	none	0.70	1.10	1.5	26	28	6.3	BANK	0.0	28	1.5	0	1
542	BP	mid	149	RF	RB22	A3	none	2.80	2.43	1.6	22	26	5.2	BANK	0.0	29	1.5	0	2