A Prescription Outline for Watershed Restoration, Saxon Creek Sub-basin, Quadra Island

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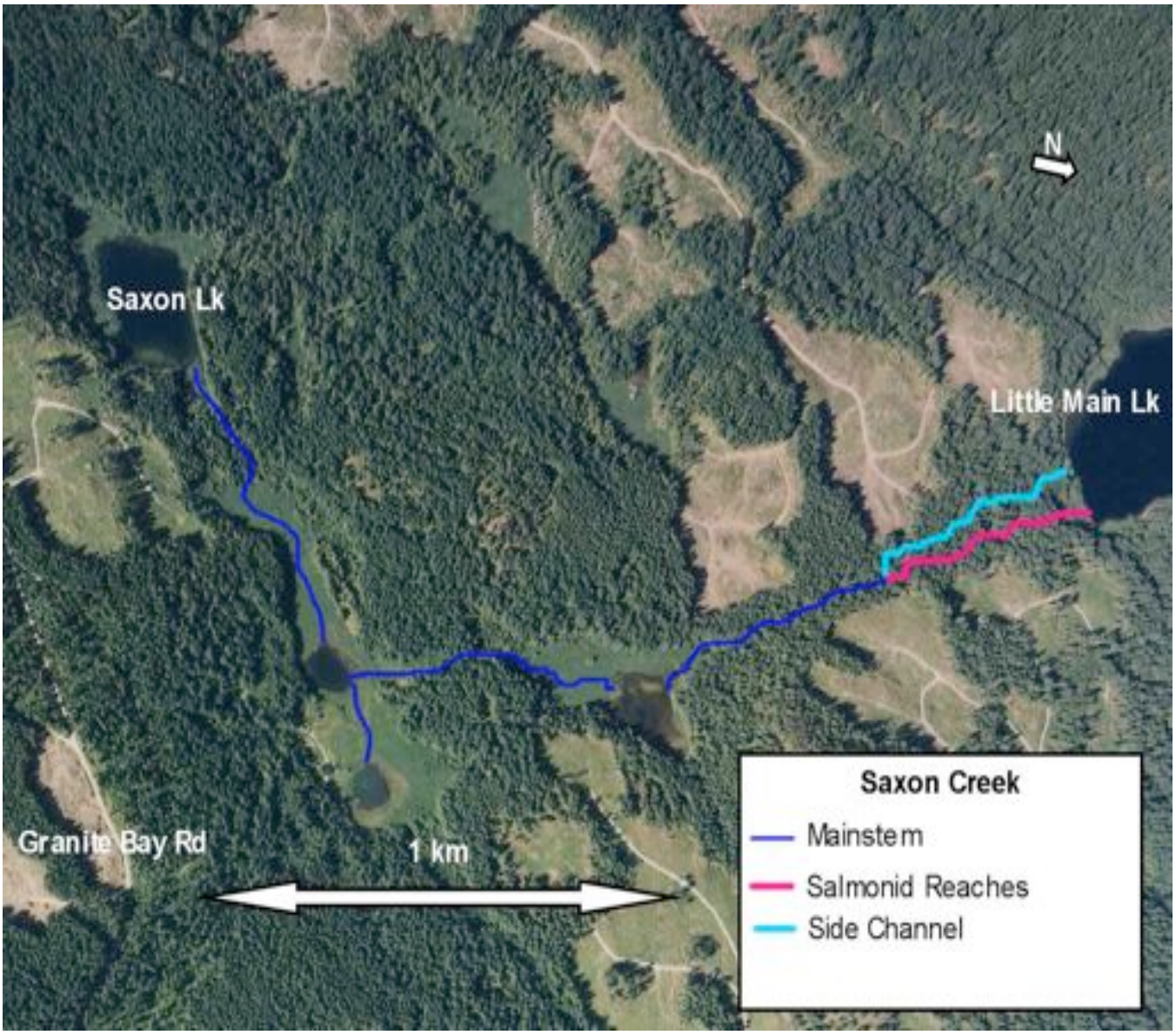
I. Background & Watershed Conditions

The following account is based upon field summary notes of Saxon Creek contained in the January, 2009 report, "A Level 1 Watershed and Fish Habitat Assessment for the TFL 47 Portion of the Village Lakes Watershed, Quadra Island, BC", prepared by this author. The initial assessments indicated that there is a natural salmonid barrier on the creek, 336m above the stream's confluence with Little Main Lake. Therefore, though the stream is more than 3 km in length the following discussions relative to fish habitat will pertain only to the lower salmonid accessible reaches (see Map 1).



The Saxon Creek sub-basin is ~243 ha in size with 95% of the area being Crown-owned and contained within TFL 47, leased to TimberWest Forest Products. Land cover is 70-95 year old fir/hemlock forest with several large bogs associated with the upper mainstem of Saxon Creek. Topography is a mix of undulating lowland bog and steep-sloped rock outcrop. Slopes are low to moderately connected to the creek with little evidence of upland erosion issues. Approximately 60-65% of the areas beyond the stream's riparian area have been logged within the 8 years.

The riparian zone is a mix of intact 75-90 year old softwoods with a minimum of width of 40m and bog in the upper reaches. Two of the more recent cutblocks located on the lower eastern side of the stream are exposed to winter south-easterlies resulting in considerable windthrow falling into and across the creek.

2009 watershed assessment of this S3 (1.5-5m wetted width) stream itself ended approximately 336m upstream from Little Main Lake, where two large rock outcroppings create a natural barrier to salmonid movement upstream. However much of the creek above this point is lowland bog such that stream conditions are considered to be stable. Below the barriers the creek bed is primarily composed of broken angular rock (in the upper two reaches where gradients avg. 3-4%), grading down to cobble and gravel-sized angular rock in the lower 175m (1-2% gradient). It is this lower reach that is considered to be high salmonid quality spawning habitat. Of great significance is a several hundred metre side channel beginning in the upper portion of reach 2 (at 0+53m, reach 2)and exiting into Little Main Lake. The entrance to the channel is choked by a gravel bar and LWD therefore restricting flow. However juvenile fry were observed in the stream in March of 2010.

Since upland and riparian conditions appear stable aside from potential micro erosional site issues associated with forestry roads and wind throw from the outer fringes the riparian zone of two cutblocks further rehabilitation assessments are focused upon Saxon Creek itself.

II. Channel Stability of Saxon Creek

II a. The Mainstem

Reaches 1 & 2 (0 to +303m above Little Main Lk.) are lower gradient (1-4% range, but 2% dominant) with coarse to medium gravels dominating the stream bed. There are relatively low amounts (gravels are ~50% embedded) of fines interstitially with the gravels and no accumulations of pure fines. The gravels are transported during peak flows to a limited degree and occasional small gravel bars are evident. Stream banks within these reaches average 05.m in height and are predominately silt/gravel in nature. Bank incision (cut banks) is evident but localized. The stream meanders very weakly to not at all so that overall bank erosion in these reaches is minimal. Reach 3 (0+303 to 0+336m) is steeper gradient (4-5+%) but with rock outcrop, boulder and coarse gravel stream bank erosion, and subsequent instability, is minimal even in spite of several sites where large logs have jammed. Upstream of Reach 3 gradients level again to only 1.5-3%

and are fractured rock bed and banks. Stability issues are again stable in nature. The stream bed in the remaining upper 2/3 of the 4km Saxon Creek is bog-like, with several varying sized ponds. Channel-like conditions in this area are also considered to be stable in nature.

II b. The Side Channel

The side channel is low gradient, 1-1.5%, and is silt laden due to its restricted flow conditions. There is insufficient flow to cleanse much of the stream and therefore the entire channel is stable.

III. Salmonid Use of Saxon Creek

The barrier at 0+336m limits potential salmonid utilization of Saxon Creek to the lower 3 reaches with the predominate use being in Reach 1 (0-0+175m) where gravels dominate the streambed and gradients range from 1-2%. More limited use of reaches 2 & 3 likely occurs, where stream gradients range from 3-5% and the stream bed transitions into predominately broken rock.

Only coho have been confirmed to utilize the creek, however steelhead utilize the outlet stream to Little Main Lake 2/3km distant, and given the nature of Saxon Creek, these fish may also utilize a portion of the creek. As well, kokanee have been observed spawning in a small discharge that enters Little Main Lake 75m to the east of the Saxon Creek. Fry trapping this coming summer could confirm the presence of both species.

IV. Stream Restoration Issues in the Lower 3 Reaches

Overall, Saxon Creek's uplands, riparian and stream channel are considered stable. Restoration considerations within the stream are therefore to be focused upon fish habitat issues.

Spawning gravel conditions in Reach 1 are likely the best of all 15 streams assessed in 2009 in the Village Lakes watershed. There is over $150m^2$ of excellent quality gravel, and, though angular in nature, contains low amounts of fines. Embeddedness rarely exceeds 50%.

The limiting salmonid habitat factors, as identified in the 2009 Level 1 watershed assessment, were listed as:

1. low to moderate LWD presence in Reach 1, particularly the lower 125m of this segment
2. too lineal a channel. Reach 1 lacks sufficient meandering (literature states that the frequency of meanders should be approx. 1 meander to the distance equal to 7 widths of the wetted width of the stream). The implication is the total amount and complexity of habitat is reduced, thus limiting juvenile rearing potential.

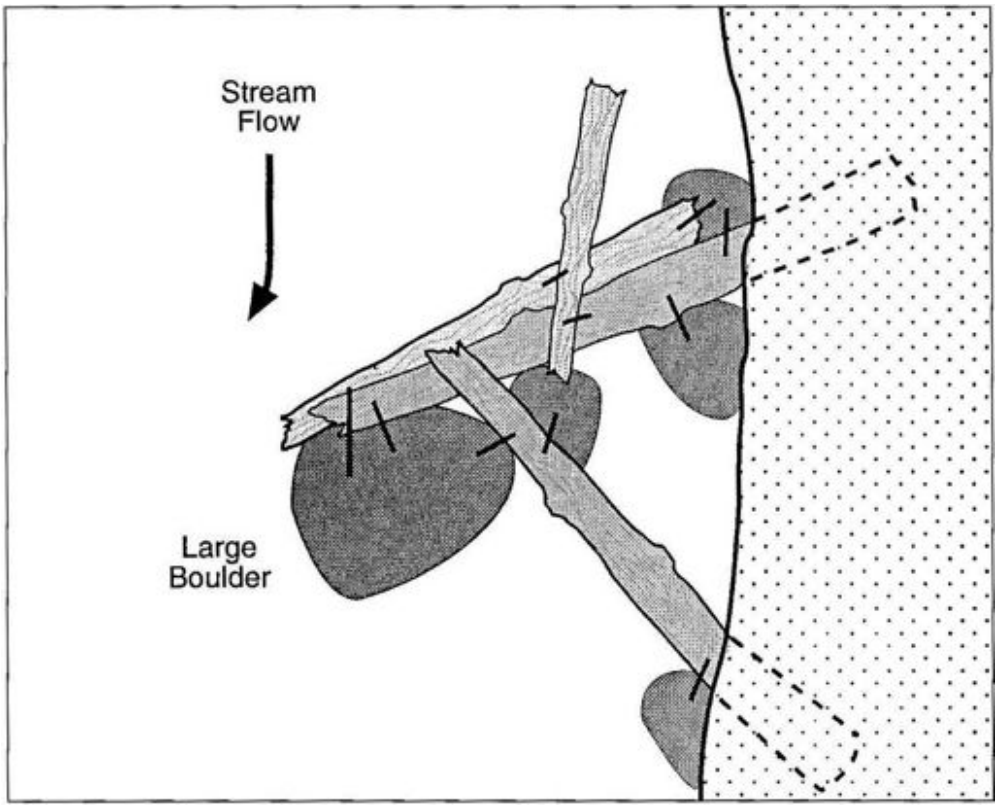
3. the side channel, though an excellent potential area for winter refuge for juvenile trout and salmonids, as well as a summer rearing site, lacks sufficient flow for both purposes.

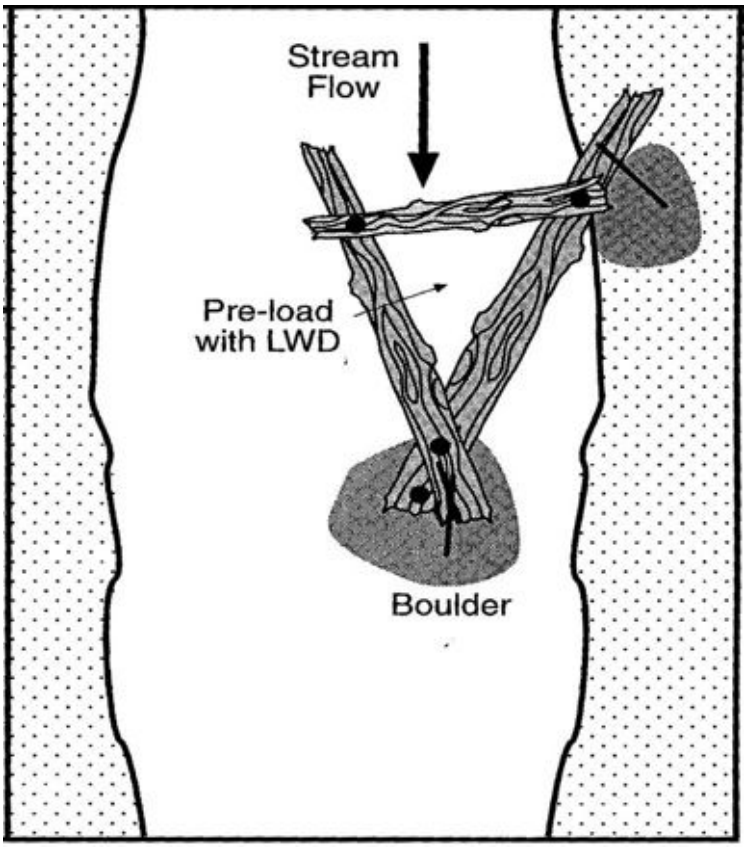
The following discussions relative to stream habitat enhancement prescriptions will therefore address these 3 points of concern.

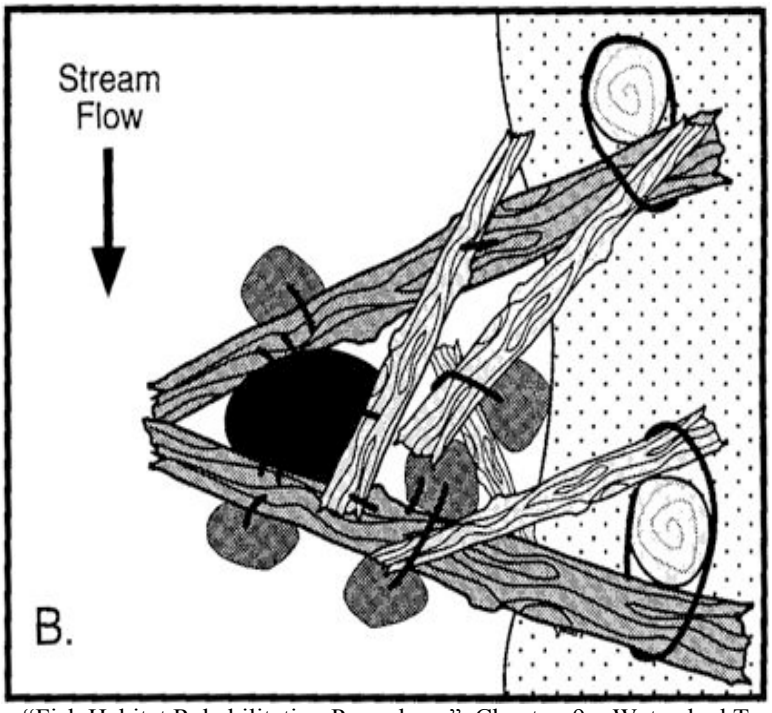
V. Stream Restoration Prescriptions

Several sites are recommended for LWD loading in Reach 1 (0 to 0+175m). The design and strategic placement of most of these structures will be to address points 1 & 2 in Section IV simultaneously. Additional LWD will serve to provide additional refuge cover for both spawning adults and juveniles, create pools for additional wetted area during the summer low water periods, increase the food source for rearing juveniles, and finally to redirect the thalweg, causing the stream to deflect off the LWD structures and reconfigure the banks into a greater degree of meandering. Structure will also be designed in such a manner as to collect and hold floating woody debris during the high flow events.

Typical design standards:







All Figures from "Fish Habitat Rehabilitation Procedures", Chapter 9 – Watershed Tech. Circular # 9,

Watershed Restoration Program, MELP, 1997.

LWD and anchor boulders will be sized according to the following tables:

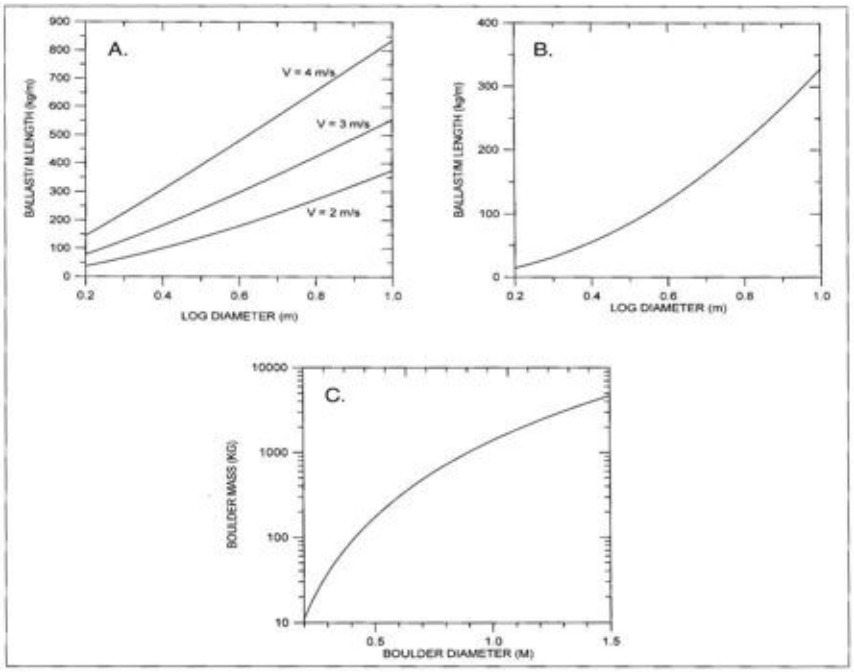


Figure 9-12. Design charts to determine ballast requirements per meter of effective length for constructed lateral log-jams. (A) Single-Log. (B) Triangular. (C) Relationship between boulder diameter and mass. Note the log scale on the Y-axis. To convert boulder mass to volume, divide the mass (in kg) by 2,650.

Figure from "Fish Habitat Rehabilitation Procedures" , pg. 9-15, – Watershed Tech. Circular # 9, Watershed Restoration Program, MELP, 1997.

Saxon Creek Prescriptions:

Works are to be carried out utilizing a chainsaw, chain saw winch, portable generator, ½ inch drills, hammer drill, Hitachi epoxy kit, 5/16 galv. limp cable/clamps, and hand tools. No standing lives trees are to fallen and used. Sufficient windfall is available creek side.

Reference point"0" is the confluence of Saxon Creek and Little Main Lk.

Site 1. 0+42m

- An existing wind thrown cedar log laying across but above the creek is to be fallen into the creek in order to create a sill log. The goal will be to create downstream ponding.
- Existing wood will be first relocated from site. Each end will then be fitted into the shoreline to ensure stream flow does not erode around the log. To pin the log in place double 1 m long ½ inch rebar will be drilled through each end of the log and, in turn, driven into the creek bed.

Site 2. 0+52m

- Two pieces of existing wind fallen riparian fir are to be placed into the creek. One piece will be placed into the creek from the east shoreline, the other 2 m downstream from the westerly shoreline, creating two deflector logs with object of creating scour holes in the creek and, as well to act as debris catchers.
- Each log will be anchored by 5/16 in. galv. cable to stream side trees with the instream end of the logs anchored with epoxyed cable and rocks.

Site 3. 0+ 62m

- An existing windthrown cedar log laying across but above the creek is to be fallen into the creek and anchored into place in order to create a pool-forming sill log. Each end of the log will be anchored using two 1 m long ½ inch rebar driven into the creek bed.

Site 4. 0+ 70 m

- A deflector log is to be installed into the creek (east side) to extend 2/3 across the creek. The log is to be anchored using 5/16 galv. cable to a stream side hemlock and epoxed to ballast rocks as required. Existing fir windfall is available adjacent to the stream.

Site 5. 0+ 79m

- An existing wind fallen large fir cross log extnds across but above the river. The downstream end of the log is to be cut to permit the log to fall in to the stream such that the log extends 2/3 across the stream bed. The large root wad will act as the anchor for the log.

Sites 6, 7 and 8. 0+85m to 0+ 160m

- This is a zone of wind thrown fir and hemlock from the upper east side of the riparian (the result of wind exposure from an eight year old cut block above the eastern riparian zone). The trees span the creek from bank to bank. 3-4 of the trees are to be cut such that one end falls into the creek. The remainder of the tree will be of sufficient mass to anchor the instream portion of the log. The trunks will be staggered between the east and west banks in order twist the thalweg through the stream bed.

Site 9. 0+228m

- The entrance to the side channel that is partially blocked by coarse gravel accumulations. Gravels are to removed to allow greater flow in to the side channel. A deflector rock weir will be installed slightly upstream of the site to deflect the thalweg in such a manner that the entrance area becomes a scour area, rather than a deposition area thus keeping the entrance free of future gravel accumulation.

Site 1. The overhanging cedar log is to be cut, dropped and pinned into the creek bed to create a sill log.

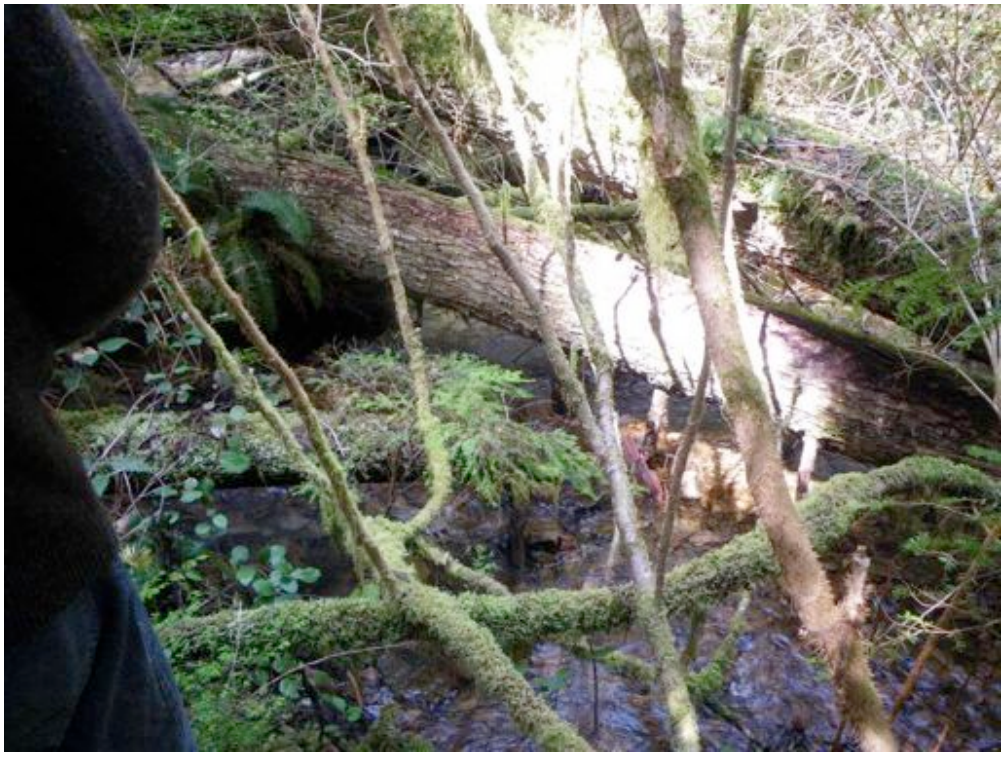
Site 2. – Site for a two log deflector installation. Each deflector extending 2/3 distance into stream bed, spaced 2 m apart.

Site 3. – Cedar cross log to be cut, dropped into creek and pinned with rebar to create a sill log.

Site 4. – A deflector log is to be installed into the creek (east side) and will extend 2/3 across the creek. The log is to be anchored using 5/16 galv. cable to a stream

side hemlock.

Site 5. – Large fir log is to be cut at approximately the ribbon point and allowed to fall into the stream. The root wad (hidden to the left) will anchor the log.



Sites 6, 7 and 8. – In an area of extensive wind fall several wind thrown logs which overhang the creek, are to be fallen into the stream to crate deflectors and debris

catchers.

Site 9. – Blocked entrance to the westerly side channel. Stream is to the left. Rock is to be removed from the inlet and used to construct a deflector berm slightly upstream. The berm should cause a back eddy in the channel mouth and remove bar gravel from accumulating in the future.