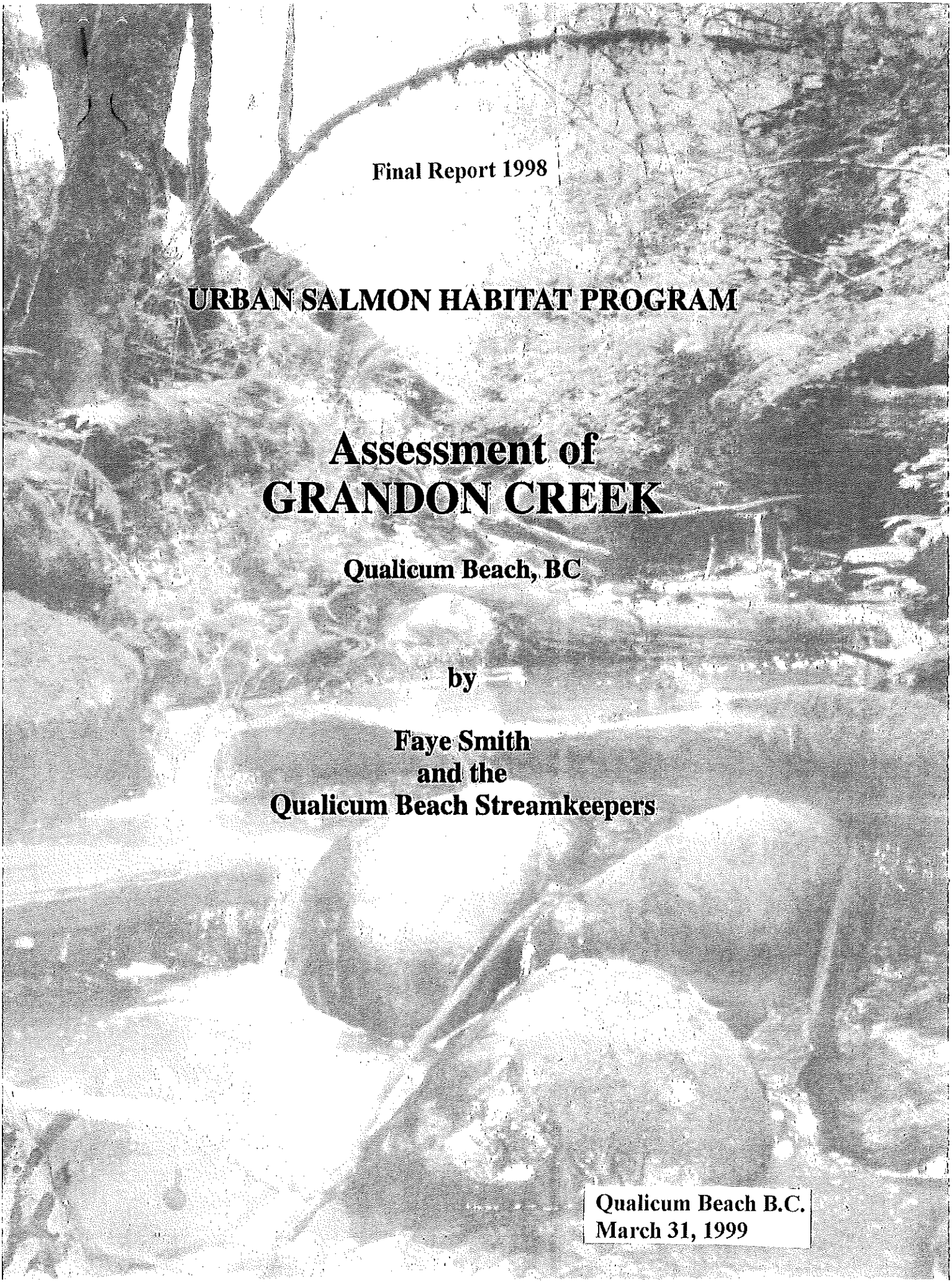

Final Report 1998

URBAN SALMON HABITAT PROGRAM

Assessment of GRANDON CREEK

Qualicum Beach, BC

by

Faye Smith
and the
Qualicum Beach Streamkeepers

Qualicum Beach B.C.
March 31, 1999

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INTRODUCTION

This report represents a habitat, riparian and fisheries assessment of Grandon Creek that was conducted during the summer and fall months of 1997 and 1998 by the Qualicum Beach Streamkeepers.

Grandon Creek is located on the west side of the town centre of Qualicum Beach less than one km from the Little Qualicum River. The creek originates in agricultural land south of the Town of Qualicum Beach and flows through the Town to the ocean over approximately five km of mostly gently sloping terrain. Much of the surrounding land downstream of the farms is designated a Conservation area by the Town and consists of natural mixed forest. Residents and tourists can enjoy a one km walk along a Town-built nature trail beside the creek between West Crescent Road and Hoy Lake Road. The final stretch before the ocean runs between two residences and then the creek enters a new box culvert (1997) under the highway and spills out onto the beach in a rip rap lined mini estuary. The presence of resident cutthroat trout is evident throughout most of the stream. Local history proclaimed it as an important salmon spawning stream until, many years ago, the Town installed the culvert under West Crescent Road which proved to be a barrier to fish migration. The only salmon spawning grounds now exist in the few meters between the old Island Highway and West Crescent Road. Because the offending culvert under West Crescent Road is scheduled to be replaced by a better one in the near future, the Qualicum Beach Streamkeepers group feels that Grandon Creek could once more be an important salmon spawning stream.

The Creek first became a focus of interest in 1992 as a result of the investigation of shellfish pollution along the shore in Qualicum Beach. This interest quickly shifted from the beach to the creek itself as habitat problems for fish became apparent. The present study was done by the Qualicum Beach Streamkeepers to discover the areas of the stream that would benefit from restoration activity.

The Qualicum Beach Streamkeepers came together after a workshop given by fisheries biologist consultant Dave Clough in 1995. Since then, the group has been involved in mapping, public education, signage, inventory, assessment and restoration on Beach Creek and Grandon Creek. Mapping and ground-truthing has also been carried out by the Streamkeepers on surrounding streams such as Whiskey Creek, Harris Creek, Crocker Creek and Hamilton Creek. The ultimate goal of the group is to preserve, protect and restore as many streams as possible in the Qualicum Beach area for salmon and trout spawning and rearing.

Consultant Dave Clough continues to be a major source of technical support to the group. He has assisted with planning of activities, applications, electrofishing, inventory, restoration work, public education as well as report writing. The Streamkeepers have also benefited from the workshops, help and advice given by Ministry of Environment biologists George Reid and Tracy Michalski and other staff and Fisheries and Oceans Community Advisor, Bryan Allen. Because the work often requires approvals from the municipality, Streamkeepers are in frequent contact with the Town of Qualicum Beach Engineer, Bob Weir, Public Works Superintendent, Don Alberg, Parks Superintendent, Dan Harford and Town Councilor, Teunis Westbroek. All have been most cooperative.

METHODS

The procedures for implementing the study of Grandon Creek were outlined in a workshop given by Gordon Stewart and the Ministry of Environment for the Urban Salmon Habitat Program in August of 1997. The Streamkeepers were given the USHP Assessment and Mapping Procedures for Vancouver Island (T. A. Michalski, G. E. Reid, and G. E. Stewart, 1997) manual which was followed during the study.

Surveys began on August 12, 1997 and finished prematurely on September 27, 1997 when it became impossible to tell a pool from a riffle due to early heavy rains and high flows. Reaches 1 to 4 were covered in the survey with the remaining Reaches 5 and 6 to be completed in 1998. (Reach 5 which is about 1 km long is a continuation of the forested conservation area and Reach 6 which is about 2 km long consists of private farmland.)

The Streamkeepers involved with the survey were Doug Taylor, Betty Drew Brook, Ron Speller, Mike Thomson, Barbara Joughin, Norm Burrow and Faye Smith.

RESULTS

The first four of the six reaches on Grandon Creek identified by the Streamkeepers were completed in 1997. The survey started at the mouth and continued southward to the culvert coming in from Arbutus Road. Reaches five and six were inventoried in 1998. All data was entered on the Excel Spreadsheets provided by the Ministry of Environment

Reach Summary:

Reach 1. This 157 m reach begins at the mouth of Grandon Creek on the shore of Qualicum Beach (photo 1). The survey was done before the installation of a new box culvert under the old Island Highway (photo 2). The creek is channelized between two houses and has no overhead cover and little instream cover (photos 3 & 4). There is a long (approximately 77 meter) culvert under West Crescent Road which has a steep grade and makes a sharp turn midway (photo 5) making fish passage upstream impossible. The Town Public Works Department cut large holes in the manhole at the midway point (photo 6) to let more light in but it is doubtful that it will help much because of the gradient and style of culvert. The reach ends at the inlet of the culvert 157 meters upstream of the mouth.

Reach 2. The entrance of the long culvert under West Crescent Road marks the beginning of Reach 2 (photo 7). This Reach ends 523.5m upstream where there is an increase in gradient (photo 8).

Reach 3. Reach 3 begins at the gradient change (photo 9) and goes upstream to the entrance of a culvert going under the E & N Railway tracks. This culvert joins at an angle with one under Hoylake Road to make a total length of approximately 56m. At the 29m mark there is an old decaying road with culverts under it (photo 10).

Reach 4. This Reach starts at the inflow of the culvert under the railway line (photo 11) and continues through natural forest to the point at which a culvert from a subdivision on Arbutus Road comes in at 911.6m. This culvert (photo 12) has frequently brought unacceptable levels of silt into Grandon Creek after heavy rain during various stages of construction in the subdivision. There is an intermittent tributary coming in from the east slope at about the 100m mark.

Reach 5. Reach 5 on Grandon Creek starts at the inflow of a culvert coming from Arbutus Road, approximately 2 km from the ocean. This reach is part of the Conservation corridor owned by the Town of Qualicum Beach that runs from West Crescent Road near the mouth to the start of the agricultural land about 3 km upstream. The riparian zone is all natural forest. The inventory was started by Bob and Betty Drewbrook, Doug Taylor and Faye Smith on June 6, 1998 and continued on the 17th and 24th of June. The last 300m was completed by Doug Taylor with Faye helping out at the 800 metre assessment. Right at the start of this reach there is a buildup of gravels behind and on top of some LWD which forms a kind of berm. There are several logjams and debris piles along the way.

Reach 6. This reach begins at the Simon farm at the edge of the forested area and runs to the headwaters on the Evans farm (previously Turner Meadows). The Streamkeepers were not granted access to the Simon farm or to the Redman farm across Parker Road. The Evans farm, which we were allowed to inventory on May 23rd, 1998, starts at the power line. The owner, Patrick Evans, was very cooperative, and it seems he had been involved in some stream projects in the Courtenay area. His farm is plagued with flooding in the winter--made worse by the direct drainage from the new Inland Highway.

Because this area is entirely ditched, Bob and Betty Drew Brook, Ron Speller and Faye Smith just made notes on every 100m up to 835m. The remaining 500m was not walked because it just presented more of the same, with very little or no riparian area. Some of the ditches were so deep we did not go into them.

HABITAT ASSESSMENT

In general, the habitat (Fig. 1) in Grandon Creek is quite good, mainly because of the natural forest which surrounds most of the creek from the beginning of Reach 2 until the end of Reach 5. This forested strip of land is held by the Town of Qualicum Beach as a Conservation area. The higher winter flows in 1997 have washed out some LWD especially on Reach 2 and there is a decided scarcity of pools in some areas. Once the culvert under West Crescent Road is replaced (in the near future) almost 1km more of habitat will become available to salmon.

Reach 1. The habitat in Reach 1 (Fig. 2) was studied from the entrance of the culvert going under the highway, 41.9m, (photo 13) upstream to the outlet of the culvert under West Crescent Road, 75.1m (photo 14). This segment, which lies between two residences on small lots, is the only area of this creek where salmon have spawned since the installation of the culvert under West Crescent Road. There is very little instream cover, no crown cover and only two pools (photo 15). There are no erosion sites. The Qualicum Beach Streamkeepers intend to improve the rearing habitat by adding anchored logs (3) and by hand digging some pools.

Reach 2. The residences at the top of the banks are mostly responsible for the erosion which is quite prevalent in Reach 2 (photos 16 to 20). Trees have been cut down to make way for houses and views, and yard waste has been tossed over the banks which has killed the natural vegetation allowing runoff to trickle directly into the Creek (photo 21). There are gravel bars which often divide the creek and gravels have filled in some of the pools (photo 22). The fast winter flows have swept away much of the naturally occurring LWD (Fig. 3). In 1996, the Streamkeepers anchored logs in 5 spots to provide more cover and deepen pools (photo 23).

Over the coming year, the Streamkeepers will plant native trees and shrubs along the banks of this Reach to prevent further erosion of silts into the Creek. They will also machine excavate some pools where access is possible and increase the amount of instream cover in 12 sites with logs and boulder clusters.

Reach 3. The presence of large boulders, cascades and faster flows in the first part of this Reach set it off from the rest of the Creek (photos 24 and 25) (Fig. 4). Some areas may be possible to develop as side cannels. There is some erosion resulting from the emptying of a drainage ditch along Hoylake Road (photo 26) just at the end of the Reach at the outflow of the E & N/Hoylake Road culvert. The Streamkeepers have identified the need for future instream cover in 4 sites and access to side channels where possible.

Reach 4. Reach 4 has had less impact from urbanization than the other Reaches of Grandon Creek (Fig. 5). The natural forest surrounding it is intact except for a development site at the top of the east bank which was clearcut to the edge about 5 years ago (photo 27). The Town has subsequently taken measures to make sure that the developer replants that area and adheres to the provisions of the Land Development Guidlines when development begins. Because of the low summer flows this Reach would benefit from a few more pools (photo 28). The Streamkeepers have identified future work ti increase the summer wetted volume and stabilize existing LWD in 3 sites (photo 29).

Reach 5. This reach is part of the Conservation Corridor of the Town. It has the highest percent pool area of all six reaches. The LWD count was only 1 per channel width as an average but many of the best habitat sites are in this 1.1 km long reach. Spawning habitat is available in many areas but degraded by a high sediment load from upstream ditching in Reach 6.

Reach 6. This reach is ditched through farmland its entire length. Unfortunately property owners restricted access to one of three farms along the stream. This reach represents only the Evans Farm area where 835 m were measured there is

approximately 2.0 km of length. The habitat quality is poor for spawning but some of the deep ditches may support good numbers of trout if water quality remains high in summer.

RIPARIAN ASSESSMENT

The riparian zones of Reaches 2, 3 and 4 of Grandon Creek consist of natural forest with only Reach 1 lacking in adequate vegetation because of the residences on both sides (Fig. 1). The meandering of the stream has created some widening of the valley floor, but in general, the slopes of both sides of the Creek are fairly steep (photos 30 and 31). Stability is lowest in Reaches 2 and 3. There is no livestock access in these Reaches.

Reach 1. The riparian zone of this Reach consists of rip rap rock and some shrub (Fig. 2). The Streamkeepers have spoken to the newest landowner on the right bank about planting to benefit the stream and it is expected that was accomplished in the Spring of 1998 (photo 32).

Reach 2. While the riparian zone is moderately good in Reach 2 (Fig. 3), the crown canopy consists mostly of mature alder and every storm brings one or two down (photos 33 and 34). The Streamkeepers are going to plant as many conifers as they can, especially cedars. There are several slide areas that must be dealt with in the coming year as well as drainage problems (photo 35).

Reach 3. In this Reach, the riparian zone is similar to Reach 2 (Fig. 4) and the same action will be taken. One area of particular concern though is the runoff from the ditch on Hoylake Road (photo 36). The Streamkeepers will work with the Town of Qualicum Beach to try to improve the drainage situation.

Reach 4. There is plenty of riparian vegetation on both banks of this Reach (Fig. 5) (photo 37) and one expects that nature will be able to work unimpeded here for the most part. The Streamkeepers will be monitoring the proposed subdivision development on the right bank if or when it gets started.

Reach 5. This reach also is relatively unimpeded by man. There is a primarily older second growth riparian zone in a steep sided valley. There are only a few erosion sites in this reach. This reach exits the Town of Qualicum Beach Conservation Corridor and is significantly altered as it enters ditched farm areas.

Reach 6. This reach is typified by a farming area with grass fields and shallow depth shrub riparian zone with flat slopes. Fortunately there was no livestock access as the fields are primarily used for silage production.

FISHERIES ASSESSMENT

There were two electrofishing projects on Grandon Creek in 1997. The first one, on September 10, was carried out by fisheries technician, John Ebell, for the purpose of removing fry from the construction site of the new culvert under the Island Highway. He was assisted by Faye Smith, Hugh Stanhope and Doug Taylor. The Creek was netted off (photo 38) to prevent the captured fry from swimming back downstream. Although the old culvert and approximately 6m above were electrofished, most of the fry were found in the large pool at the beach (photo 39). The results were as follows: 27 coho fry, 45 cutthroat trout fry, 45 sculpins and 3 crayfish. All the creatures were transferred to the pool at the mouth of the culvert under West Crescent Road. The net was removed on September 16 a few days after completion of the new culvert.

On October 14, 1997, Tracy Michalski and Lew Carswell, assisted by Gloria, electrofished 3 sites in Reach 2 (Fig. 6) (photo 40). They used the two pass method of electrofishing. Thirty-two cutthroat trout were weighed and measured.

Sightings of spawners were reported on December 6, 1997. Streamkeeper Ron Speller counted 10 or 11 of what he thought were coho at the mouth of the new culvert under the Highway (photo 41). One of the residents beside the Creek in Reach 1 also stated that she saw two pairs of spawners in that part of the Creek sometime in December. She was not certain of the species. In 1998 with more experience, the Streamkeepers were able to easily identify 60 Chum Salmon during the November/December period. Coho were not sighted but likely present as they were observed in adjacent Beach Creek.

WATER QUALITY TESTS

Water quality; chemicals and coliform, was tested in 4 sites on Grandon Creek on September 23, 1997 by MB Labs of Victoria (Fig. 7a). Site 1 was at the mouth (photo 42), site 2 was in Reach 3 near the Railway culvert at Hoylake Road (photo 43), site 3 was at the inflow of the Arbutus culvert in Reach 4 (photo 44) and site 4 was just upstream of site 3 (photo 45).

These sites were tested again for coliform only on December 11 when the Environment Canada mobile lab was in the area. Because it had to leave before the testing was complete, the Regional District of Nanaimo arranged to have the last two tests analyzed by French Creek PCC Water Analysis. this was done on December 18 and 19, 1997 (Fig. 7b). No water quality tests were done in 1998.

STREAM MAPPING

The maps used in this survey of Grandon Creek were a topographical map (1:2,000) (fig. 8a) and a TRIM map (1:20,000) (Fig. 8b). One traced map is included for easy viewing (Fig. 8c). A G.P.S. map inventory of this creek using the DFO Stream Habitat Inventory Mapping method is in the planning stage.

DISCUSSION

The assessments of Reaches 1 to 4 were done in 1997 and reach 5 and 6 done in 1998. Restoration in reaches 1 - 4 began in 1998 while inventory of the upper reaches was conducted. The following descriptions covers our assessment and action as written in 1997 and what followed in 1998.

Grandon Creek, once it leaves the farms at the headwaters (Reach 6) , flows through natural forest until almost the mouth. Reach 1 at the mouth, which is quite short, is the most impacted by urbanization. Here the Creek is channelized between two residences and lined with rip rap. Because there is no crown cover, the Streamkeepers have arranged with the residents to do some planting on the bank to provide summer shade. Trees, shrubs, potting soil and hand tools were used as identified in 1997 and undertaken in 1998. Maintenance work continues with this area under partnership with the adjacent property owner.

Reaches 2 and 3, although nicely wooded, show some effects of urbanization because of the houses at the top of the banks. There are drainage problems, trees have been cut down and yard waste has been tossed over the bank causing erosion, some quite severe. The Town-built trail also contributes to some erosion.. In order to stabilize the banks and keep fines out of the Creek, Streamkeepers have planted grass, trees and shrubs at the erosion sites as well as consulted with a bioengineer to find out the most effective way of improving slope drainage. An action plan is underway on bioengineering of the slide for spring 1999.

On Reaches 1, 2 and 3 there is a lack of good rearing habitat, so the Streamkeepers are creating pools and adding instream cover. In 1997 three cover/scour logs were added. In 1998 another 7 log structures were added. This work is not finished as we cautiously assess our placements under advice from MOELP and consultants.

The reach 5 inventory indicates that upstream sediment is a problem. Reach 6 has not only a sediment source problem for downstream areas but also is a flooding concern to the property owners. This upper reach also has areas not yet inventoried as property owners denied access. It is hoped that future consultation with property owners will allow us to inventory the area and determine restoration potential. Currently it appears to need some spawning habitat and a summer water quality assessment.

Following up on these activities, the Streamkeepers will monitor the plantings weekly (or more often if weather requires) to see if the plants need watering. Any installations will be checked for effectiveness and durability at different times of the year. Fisheries assessments will be carried out each summer at the affected habitat sites and minnow traps will be set at various times throughout the year.

There are three culverts; under the Old Highway at the beach, West Crescent Road and Hoy Lake Road. The lowest one has a new box culvert (1997), good for fish passage, while the second and third are barriers to fish going upstream due to length, grade and bad angles. The second culvert is due for replacement by the Town of Qualicum Beach in the next year or so. The Streamkeepers have been in contact with Bob Weir, Town Engineer, about making the new one fish friendly. With that objective, Mr. Weir has been consulting with Mr. Jim Bomford of the Ministry of Environment, Lands & Parks and a preliminary plan for the new culvert has been arrived at. Once the new fish friendly culvert is in place, spawning coho will be able to utilize approximately 750m of Grandon Creek. The third culvert is buried under tons of fill as the ravine is very deep where the train tracks and Hoy Lake Road cross so it is unlikely that it can be replaced any time soon. Upstream then is the domain of the resident cutthroat trout.

Because Grandon Creek flows through the Town of Qualicum Beach it has to accept much of the Town's storm drain runoff from roads, parking lots and buildings. This causes a great volume of water in the winter months which widens the channel and moves gravel and debris downstream. Since this water is not being held in the ground for slow release in the summer months, the Creek has very little water in July and August. The Qualicum Beach Streamkeepers are looking into the feasibility of constructing a wetland on Reach 4 or Reach 5. It is hoped that this would hold back some of the winter flow and release water in the summer months, providing more space for fish to live.

The farms in Reach 6, as viewed from Parker Road, would appear to require extensive riparian planting. This will require some difficult awareness and education work with the farm owners and may need to be traded off by looking at their needs (better drainage).

In conclusion, Grandon Creek is well worth doing whatever is necessary to restore it to the best possible habitat for fish. Its value as a haven for wildlife and people in a growing area like Qualicum Beach is inestimable and it must be preserved for future generations.

PROJECT BUDGET - 1997

Materials/Supplies	Equipment supplies	$882.78	
	water quality tests	$597.26	
Contractors and Consultants	DR Clough Consulting	$500.00	
Training	DR Clough Consulting	$250.00	
Administration	photos/office/postage	$218.40	
	insurance	$375.00	
Total Spent			$2,823.44
Total USHP Funding			$3,000.00
Balance			$ 176.56

PROJECT BUDGET - 1998

Beginning Balance

From 1997 Budget	$ 2,000.00	
USHP 1998	$ 9,345.00	
Total		$11,345.00

Contracted/Professional Services

DR Clough	$1,006.16	
Carex Environmental	$ 636.65	
Jake's Contracting	$ 603.48	
Copcan Contracting	$2,570.14	
		$4,816.43

Administration

Office	$ 886.44	
Telephone & Installation	$ 311.14	
Phone bills	$ 252.65	
Corp. Registry	$ 175.50	
Community Events	$ 239.16	
Insurance	$ 809.21	
		$2,674.10

Materials/Supplies

Plants	$ 1,217.98	
Camera	$ 256.40	
Photos & Film	$ 320.57	
Equipment	$ 1,664.75	
		$3,459.70

Workshops

New Directions DFO	$ 224.50	
Stormwater Management	$ 35.00	
Watershed Plan	$ 150.00	
		$ 409.50
Total Expenses		$11,342.48
Balance		$ 2.52

REFERENCES

Michalski, T.A., G.E. Reid, G.E. Stewart, 1997. **Urban Salmon Habitat Program Assessment And Mapping Procedures for Vancouver Island**. Ministry of Environment, Lands and Parks, Fisheries Section.

Clough, D.R., 1997. Pers. comm. **Fisheries Biologist**. DR Clough Consulting, Lantzville, BC

APPENDIX A - MAPS

Map 1. Grandon Creek Reach Inventory

Map 2. Grandon Creek Restoration Plans 1998

APPENDIX B - HABITAT, RIPARIAN, FISHERIES AND WATER QUALITY DATA

Fig. 1 Data Summary Sheet
Fig. 2 Reach 1 Habitat and Riparian Assessment Data
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Fig. 8 Fisheries Assessment Summary 1996/1997
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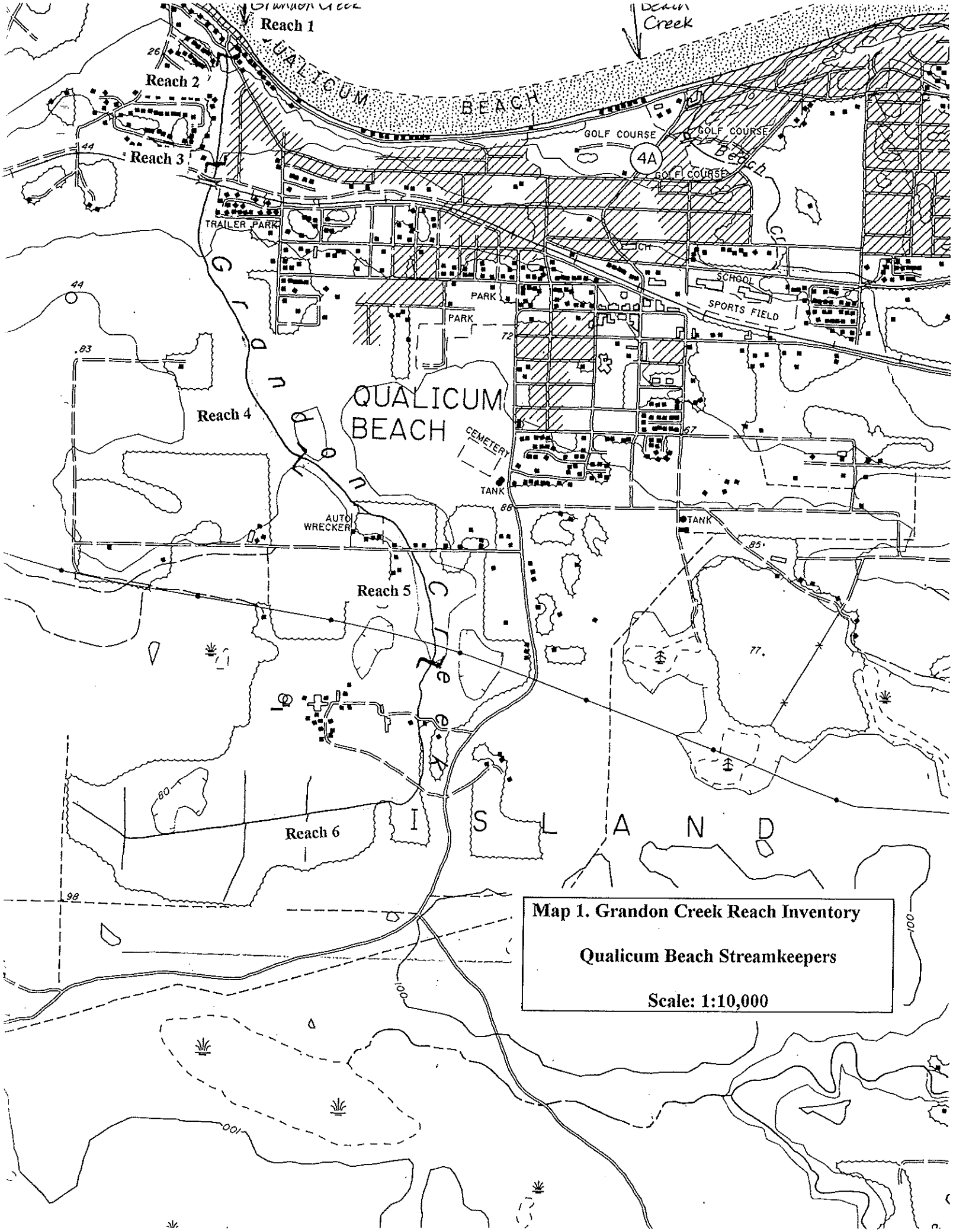
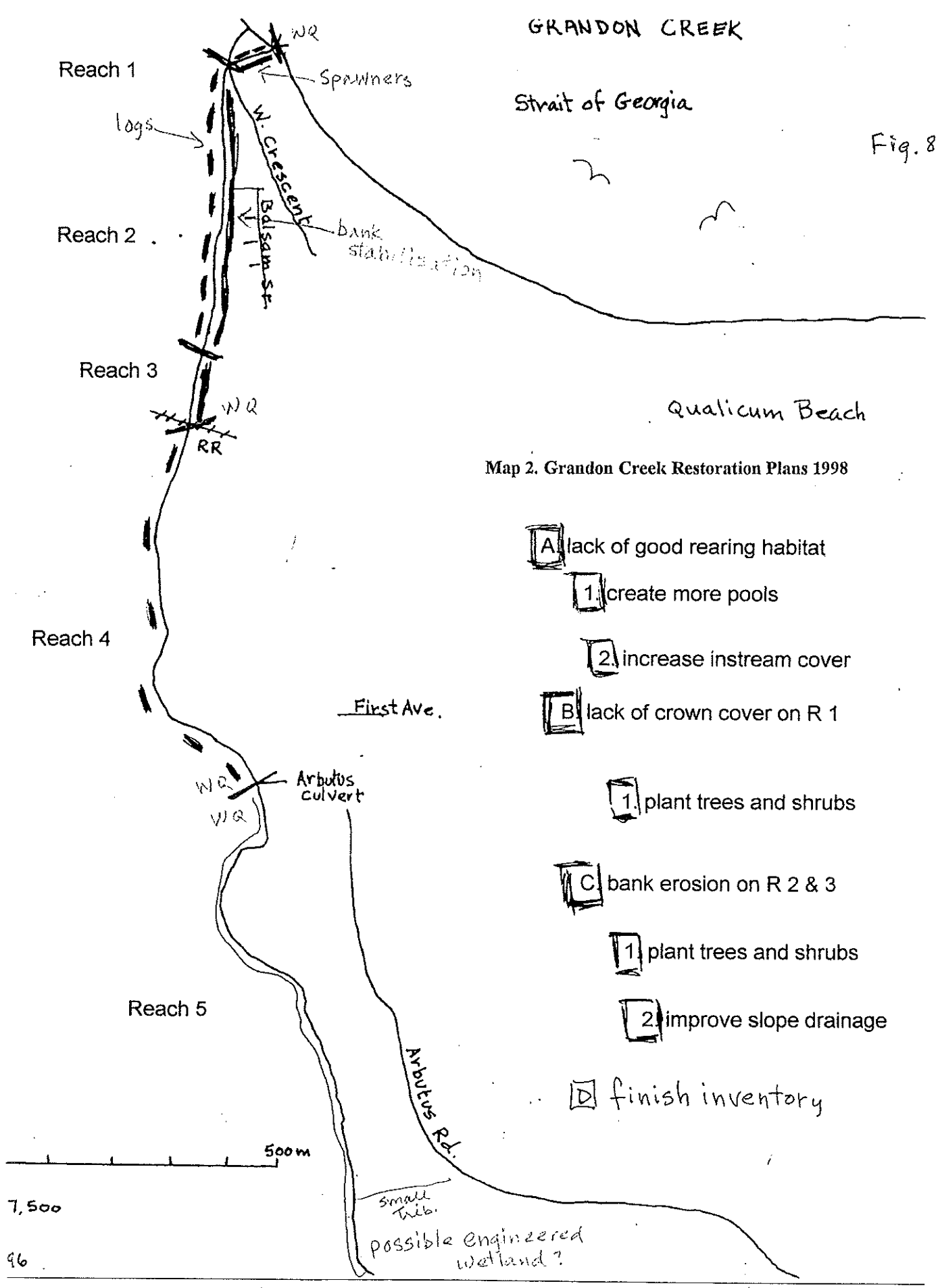
Fig. 12 Water Quality Sep. 24, 1997 (page 3)
Fig. 13. Water Quality; 1997 Fecal Coliform (page 1)
Fig. 13. Water Quality; 1997 Fecal Coliform (page 2)
Fig. 13. Water Quality; 1997 Fecal Coliform (page 3)



Map 1. Grandon Creek Reach Inventory

Qualicum Beach Streamkeepers

Scale: 1:10,000

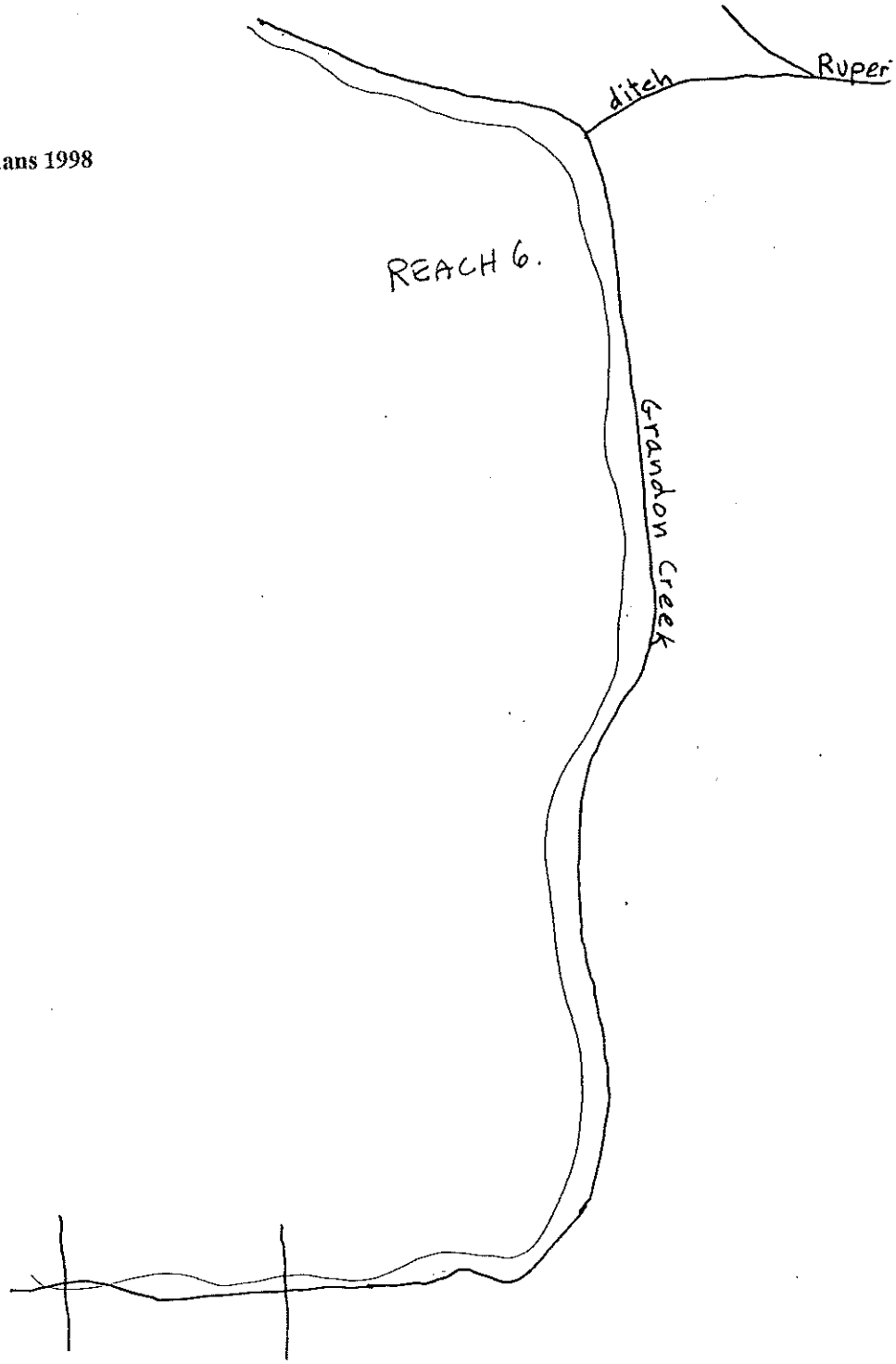


Map 2. Grandon Creek Restoration Plans 1998

- A lack of good rearing habitat
  - 1. create more pools
  - 2. increase instream cover
- B lack of crown cover on R 1
  - 1. plant trees and shrubs
- C bank erosion on R 2 & 3
  - 1. plant trees and shrubs
  - 2. improve slope drainage
- D finish inventory

GRANDON CREEK RESTORATION PROJECTS 1998

Map 2. Grandon Creek Restoration Plans 1998



Habitat Data, Fish Population Data and Riparian Data Summaries and Ratings

Stream Name Grandon Creek **Watershed Code** none

Habitat Parameter	1	Ratings	2	Ratings	3	Ratings	4	Ratings	5	Ratings	6	Ratings	Total
Percent Pool Area	16.39	5	35.87	5	13.46	5	21.72	5	42.86	3	5.15	5	28
Large Woody Debris/Bankfull Channel Width	0.00	5	2.41	1	0.68	5	2.03	1	0.91	5	0.00	5	22
Percent Cover in Pools	18	3	40	1	20	3	34	1	65	1	59	1	10
Average Percent Boulder Cover	18	3	15	3	10	3	8	5	5	5	0	5	24
Percent Crown Cover	2.50	5	72.50	1	80.00	1	72.00	1	68.13	3	21.83	5	16
Substrate (Percent Fines)	0.00	1	30.00	5	30.00	5	26.00	5	83.13	5	60.00	5	26
Erosion Sites	0	1	6	3	4	1	1	1	2	1	0	1	8
Obstructions	0	0	1	1	0	0	1	1	9	9	0	0	11
Altered Stream Sites	0	1	4	1	0	1	0	1	0	1	0	1	6
% Wetted Area (Wetted Area/Total Area)	66.25	5	43.27	5	60.64	5	59.16	5	70.09	3	76.69	3	26
Dissolved Oxygen	5.00	3	10.00	1	8.00	1	3.00	5	.		.		10
pH	8.90	5	7.60	1	7.40	1	7.40	1					8
Totals		37		28		31		32		36		31	195
Off-Channel Habitat	0	5	3	5	0	5	0	5	2	5	0	5	30

Fish Data

Reach	1	2	3	4	5	6	Total
Fry Capacity	626	2226	413	3414	4463	2849	13991
Actual Pop.	0.00	0.00	0.00	0.00	0.00	0.00	0

Fry Densities

Species	Coho		Coho	Coho	Coho	Coho	Coho		Coho		Coho		Total
Site One													0
Site Two													0
Species													
Site One													0
Species													
Site Two													0
Species													
Site One													0
Species													
Site Two													0

Riaparian Ratings

Reach	1	2	3	4	5	6	Total
Land Use	20	4	2	20	28	56	130
Livestock Access	0	0	0	0	0	0	0
Slope	18	6	2	36	34	66	162
Stability	16	12	6	72	98	90	294
Totals	54	22	10	128	160	212	586

Reach1 Habitat and Riparian Assessment Data

Reach 1

Stream Name	Grandon Creek	Watershed Code	none	Date	97/8/13	Reach Name	1.00			Discharge Depth #1	0.18	Velocity	
Water Quality Information					Field Crew	Faye,Betty,I Ron, Doug						T1 0.00	Site Length
Dissolved Oxygen	5.00	pH	8.90	Total Dissolved Solids	100.00	Temp C	20.00	Chainage at Beginning of Reach	0.00	Discharge Depth #2	0.20	T2 0.00	0.00
Velocity (m/s)	#DIV/0!	Average Depth (at flow site)	0.24	Wetted Width (at flow site)	4.20	Discharge (m3/s)	#DIV/0!	Chainage at End of Reach	167.40	Discharge Depth #3	0.33	T3 0.00	

Habitat Information (All Pool and Cross Section Data)

Habitat Type	Start (chainage at start)	Finish (chainage at end)	Unit Length	Mean Wetted Width	Pool Area	Reach Area	%Pool Area	Average Depth (m)	Gradient	Bankfull Width(m)	Percent Wetted Area	Substrate Perc/Substr					PercePercent Instrercent				
												Bed	Bld	Cob	Grv	ld	Bld / Bold L	Bold LWD	Cut	bld	LWD
Pool	41.90	66.60	24.90	1.60	39.84			0.20	2.00	2.80		0	30	60	10	0	25				
Pool	74.20	75.10	0.90	3.70	3.33			0.25	2.00	5.20		0	15	80	5	0	10				
Reach 1 Totals and Averages		167.40	25.80	2.65	68.37	417.11	16.39	0.23	2.00	4.00	68.25	0	23	70	8	0	18	0	0	0	0

Habitat Type	PercentCrown Cover	Large Woody Debris	LWD/bank-full channel width	Erosion Sites (length)	Altered Stream Sites (length)	Obstructions (number)	Off-Channel Habitat (length)	Off-Channel Habitat (width)	Off-Channel Habitat (bank side)	Land Use		Vegeta/Vege Type		Riparian Slope		Stability		Vegetation Depth		Livestock Access		Photos	Comments
										Right	Left	Left	type L	Right	Left	Right	Left	Right	Left	Right	Left		
Pool	0.00	0			0					R	R	Sh	Sh	75	75	Low	Low	2	0			1,2,3,14	old chann
Pool	6.00	0				1				R	R	Sh	Sh	55	80	Med	Med	2	2			4,5	culverts
										0	0	0	0			0	0						
										0	0	0	0			0	0						
Reach 1 Totals and Averages	2.50	0	0.00	0	0	1	0			10	10			8	10	8	8			0	0		

Reach 2

Stream Name	Grandon Creek	Watershed Code	none	Date	97/8/16-30	Reach Name	2.00			Discharge Depth #1	0.02	Velocity T1		Site Length	
Water Quality Information					Field Crew		Ron,Betty,Faye,Mike,Barb								
Dissolved Oxygen	10.00	pH	7.60	Total Dissolved Solids	110.00	Temp C	17.00	Chainage at Beginning of Reach	0.00	Discharge Depth #2	0.04	T2			
Velocity (m/s)	#DIV/0!	Average Depth (at flow site)	0.03	Wetted Width (at flow site)	1.30	Discharge (m3/s)	#DIV/0!	Chainage at End of Reach	523.50	Discharge Depth #3	0.04	T3			

Habitat Information (All Pool and Cross Section Data)

Habitat Type	Start (chainage at start)	Finish (chainage at end)	Unit Length	Mean Wetted Width	Pool Area	Reach Area	%Pool Area	Average Depth (m)	Gradient	Bankfull Width(m)	Percent Wetted Area	Substrate Perc Bed	Bld	Cob	Grvel	Bld	Percent Instrercent Bold I	Bold LWD	Cutbold LWD	Percent Crown Cover	Large Woody Debris	LWD/bank-full channel width	Erosion Sites (length)	Altered Stream Sites (length)	Obstructions (number)	Off-Channel Habitat (length)	Off-Channel Habitat (width)	Off-Channel Habitat (bank side)	Land Use Right	Land Use Right	Vegetation Type Right	Vegetation Type Left	Riparian Slope Right	Riparian Slope Left	Stability Right	Stability Left	Vegetation Depth Right	Vegetation Depth Left	Livestock Access Right	Livestock Access Left	Photos	Comments
Pool	24.00	28.40	4.40	1.40	6.16																								0	0	0	0			0	0					5,7 WQ	c/t trout
Pool	30.60	37.90	7.30	2.30	16.79																		4						0	0	0	0			0	0					8 E	
Pool	49.30	56.20	6.90	2.50	17.25																10			20					0	0	0	0			0	0					9,10 LWD	altered/lake
Pool	61.00	63.30	2.30	2.00	4.60																								0	0	0	0			0	0						
Pool	78.50	80.50	2.00	2.10	4.20																								0	0	0	0			0	0						
Pool	94.10	97.30	3.20	4.00	12.80																								0	0	0	0			0	0						
Pool	100.80	107.00	6.20	2.70	16.74																7								0	0	0	0			0	0						
Pool	129.00	131.90	2.90	2.00	5.80																								0	0	0	0			0	0					11	
Pool	134.40	142.30	7.90	6.20	48.98																4		19						0	0	0	0			0	0					12,13,14	2 Estes
Pool	148.30	153.40	5.10	2.80	14.28																3								0	0	0	0			0	0						
Pool	161.70	165.30	3.60	2.40	8.64																3					3	1	L	0	0	0	0			0	0						
Pool	167.00	172.20	5.20	2.20	11.44																4				1				0	0	0	0			0	0						
Pool	189.80	195.90	6.10	5.10	31.11																10								0	0	0	0			0	0					11	debris
Pool	197.90	205.50	7.60	2.60	19.76																3								0	0	0	0			0	0						
Pool	227.00	229.70	2.70	2.80	7.56																12								0	0	0	0			0	0						
Pool	232.50	234.70	2.20	1.80	3.96																6								0	0	0	0			0	0						
Pool	248.50	256.90	8.40	4.00	33.60			0.30	4.00	5.90		0	0	40	30	30		20	5		75.00	15							0	0	0	0			0	0						
Pool	281.80	288.50	6.70	5.20	34.84																15								Nat	Nat	Br	Br	5	60	Med	Med	30	30	0	0	12	
Pool	291.50	295.40	3.90	3.50	13.65																12								0	0	0	0			0	0						E noted
Pool	307.60	351.40	43.80	2.40	105.12																16								0	0	0	0			0	0						
Pool	316.70	319.20	2.50	1.90	4.75																3								0	0	0	0			0	0						
Pool	324.00	330.00	6.00	2.30	13.80																2								0	0	0	0			0	0						
Pool	337.60	343.70	6.10	2.50	15.25																								0	0	0	0			0	0						
Pool	346.30	352.20	5.90	1.80	10.62																2		2						0	0	0	0			0	0						
Pool	374.50	378.20	3.70	3.60	13.32																2								Nat	Nat	Mix	Br	9	9	Med	Med	30	30	0	0	14	R/B
Pool	447.30	453.10	5.80	3.80	20.30																3								0	0	0	0			0	0						
Pool	461.10	465.00	3.90	2.20	8.58			0.23	4.00	7.20		0	20	40	10	30	15		5		70.00	30		1		6	1	L	0	0	0	0			0	0						
Pool	512.10	515.00	2.90	2.30	6.67																9					10	1	R/B	0	0	0	0			0	0					15-18	
Pool	521.10	523.50	2.40	2.10	5.04																16		6						0	0	0	0			0	0					1	2 sites
																					6								0	0	0	0			0	0					19,20,E2	
																													0	0	0	0			0	0					1	
Reach 1 Totals and Averages		523.50	177.60	2.63	503.40	1463.85	33.93	0.27	4.00	6.55	43.27	0	10	40	20	30	15	20	5	0	0	72.50	182	2.28	8	4	1	3			2	2			2	4	8	6			0	0		

Reach 3

Stream Name	Grandon Creek	Watershed Code	none	Date	97/8/30	Reach Name	3.00			Discharge Depth #1	0.06	Velocity T1	###	Site Length	
Water Quality Information				Field Crew		Faye,Mike,Norm,Ron,Barb									
Dissolved Oxygen	8.00	pH	7.40	Total Dissolved Solids	110.00	Temp C	14.00	Chainage at Beginning of Reach	0.00	Discharge Depth #2	0.20	T2	###	4.00	
Velocity (m/s)	0.13	Average Depth (at flow site)	0.17	Wetted Width (at flow site)	1.90	Discharge (m3/s)	0.04	Chainage at End of Reach	96.60	Discharge Depth #3	0.23	T3	###		

Habitat Information (All Pool and Cross Section Data)

Habitat Type	Start (chainage at start)	Finish (chainage at end)	Unit Length	Mean Wetted Width	Pool Area	Reach Area	%Pool Area	Average Depth (m)	Gradient	Bankfull Width(m)	Percent Wetted Area	Substrate Percebust Bed	Bld	Cob	Grv	xd	Bld	PercePercent Instrorcent Bold L	Bold LWD	Cutbold LWD			PercentCrown Cover	Large Woody Debris	LWD/bankfull channel width	Erosion Sites (length)	Altered Stream Sites (length)	Obstructions (number)	Off-Channel Habitat (length)	Off-Channel Habitat (width)	Off-Channel Habitat (bank side)	Land Use Right	Land Use Left	Vegeta Type	Vege type L	Riparian Slope Right	Riparian Slope Left	Stability Right	Stability Left	Vegetation Depth Right	Vegetation Depth Left	Livestock Access Right	Livestock Access Left	Photos	Comments
Pool	7.80	12.10	4.30	1.90	8.17			0.17	9.00	4.70		0	30	25	15	30		10	10				60.00	13								Nat	Nat	Br	Br	17	7	Med	Med	30	30			23-25	
Pool	23.10	29.10	6.00	3.80	22.80																			1																				
Pool	37.40	40.10	2.70		0.00																										0	0	0	0			0	0					1,2,3	old CV
																									4		1				0	0	0	0			0	0					4,5	E & RRCV
																															0	0	0	0			0	0						
Reach 1 Totals and Averages		96.60	13.00	2.86	37.05	275.31	13.46	0.17	9.00	4.70	60.84	0	30	25	15	30		10	10	0	0	0	60.00	14	0.68	4	0	1	0			1	1			1	1	3	3			0	0		

Reach 4

Stream Name	Grandon Creek	Watershed Code	none	Date	97/9/3-27	Reach Name	4.00					Discharge Depth #1	0.03	Velocity T1	8.50	Site Length			
Water Quality Information						Field Crew	Doug,Ron,Betty,Faye,Mike												
Dissolved Oxygen	3.00	pH	7.40	Total Dissolved Solids	120.00	Temp C	14.00	Chainage at Beginning of Reach	0.00			Discharge Depth #2	.02	T2	8.70		1.00		
Velocity (m/s)	0.12	Average Depth (at flow site)	1.62	Wetted Width (at flow site)	2.30	Discharge (m3/s)	0.41	Chainage at End of Reach	911.50			Discharge Depth #3	3.00	T3	8.60				

Habitat Information (All Pool and Cross Section Data)

Habitat Type	Start (chainage at start)	Finish (chainage at end)	Unit Length	Mean Wetted Width	Pool Area	Reach Area	%Pool Area	Average Depth (m)	Gradient	Bankfull Width(m)	Percent Wetted Area	Substrate Percentages Bed	Bld	Cob	Grv	fd	Bld	Percent Instream Cover Bold	L'Bold	LWD	Cutbld	LWD	Percent Crown Cover	Large Woody Debris	LWD/bank-full channel width	Erosion Sites (length)	Altered Stream Sites (length)	Obstructions (number)	Off-Channel Habitat (length)	Off-Channel Habitat (width)	Off-Channel Habitat (bank side)	Land Use Right	Land Use Left	Vegetal Type Right	Vegetal Type Left	Riparian Slope Right	Riparian Slope Left	Stability Right	Stability Left	Vegetation Depth Right	Vegetation Depth Left	Livestock Access Right	Livestock Access Left	Photos	Comments
Pool	15.20	18.20	3.00	2.30	6.90			0.03	2.00	4.90		0	25	50	25	0	10						60.00	0								Nat	Nat	Br	Mix	100	60	Med	Med	30	30			21,22,23	
Pool	28.60	32.70	4.10	1.70	6.97																			6																				
Pool	38.90	42.80	3.90	3.60	14.04																			5								0	0	0	0			0	0					LB of
Pool	76.80	80.60	4.70	3.10	14.57																			144								0	0	0	0			0	0					
Pool	104.70	109.70	5.00	2.00	10.00																			10								0	0	0	0			0	0					
Pool	114.90	118.20	3.30	2.20	7.26																			1								Nat	Nat	Br	Mix	6	26	Low	Med	30	30			24 U/S	7 fish(10cm)
Pool	158.90	173.30	4.40	2.90	12.76																			6								0	0	0	0			0	0					
Pool	176.50	180.10	3.60	2.30	8.28																			4								0	0	0	0			0	0					
Pool	189.40	194.40	5.00	2.30	11.50			0.10	3.00	4.80		0	15	70	5	10	10		5				80.00	7								Nat	Nat	Mix	Mix	90	1	Low	Med	30	30			25U/S	
Pool	201.00	203.60	2.60	1.30	3.25																			11								0	0	0	0			0	0					poss.OCH
Pool	223.20	225.60	2.30	2.70	6.21																			6								0	0	0	0			0	0					poss.OCH
Pool	236.50	239.50	3.00	2.20	6.60																			36								0	0	0	0			0	0					poss.OCH
Pool	261.20	268.80	7.60	1.80	13.68																			11								0	0	0	0			0	0					poss.OCH
Pool	284.50	292.30	7.80	2.80	20.28																											Nat	Nat	Mix	Mix	60	25	Med	Med	30	30			1	
Pool	303.50	305.00	1.50	2.00	3.00																											0	0	0	0			0	0					
Pool	313.30	321.20	7.90	2.60	20.54																											0	0	0	0			0	0					
Pool	336.60	339.00	2.40	2.00	4.80																											0	0	0	0			0	0					
Pool	346.90	347.80	1.90	2.10	3.99																											0	0	0	0			0	0					
Pool	362.90	367.60	4.70	2.90	13.63																											0	0	0	0			0	0					
Pool	371.90	378.90	7.00	2.70	18.90																											0	0	0	0			0	0					
Pool	387.00	389.10	2.10	1.60	3.36																											0	0	0	0			0	0					
Pool	397.00	399.90	2.90	2.60	7.25																											0	0	0	0			0	0					
Pool	402.50	404.80	2.30	2.70	6.21																											0	0	0	0			0	0					
Pool	417.20	419.80	2.60	1.60	4.16			0.15	2.00	4.80		0	5	35	20	40	5						60.00	1								0	0	0	0			0	0					
Pool	433.80	435.20	1.40	1.70	2.38																			10								Nat	Nat	Mix	Mix	8	10	Med	Med	30	30			15,16	
Pool	490.00	491.20	1.20	2.00	2.40																			1								0	0	0	0			0	0					
Pool	516.60	518.40	1.80	1.90	3.42																			2								0	0	0	0			0	0					
Pool	531.60	534.70	3.10	2.80	8.68																			7								0	0	0	0			0	0					
Pool	553.40	583.40	10.00	7.00	70.00																			5								Nat	Nat	Mix	Mix	29	43	Low	Low	30	30				
Pool	572.30	573.80	1.50	5.50	8.25																			12								0	0	0	0			0	0					
Pool	578.10	580.10	2.00	2.00	4.00																			8								0	0	0	0			0	0					
Pool	582.80	584.90	2.10	6.00	12.60																			2								0	0	0	0			0	0					
Pool	605.00	609.00	4.00	1.70	6.80																											0	0	0	0			0	0					
Pool	611.80	613.10	1.30	1.70	2.21			0.10	2.00	3.50		10	10	10	40	30	5		5				60.00	0								0	0	0	0			0	0					
Pool	617.90	619.90	2.00	1.70	3.40																			6								Nat	Nat	Mix	Mix	8	25	Med	Med	30	30			12,13	
Pool	622.60	624.40	1.80	1.40	2.52																			3								0	0	0	0			0	0					
Pool	627.00	629.00	2.00	1.50	3.00																			2								0	0	0	0			0	0					
Pool	630.30	631.10	0.80	2.70	2.16																											0	0	0	0			0	0					
Pool	635.70	640.50	4.80	2.00	9.60																			4								0	0	0	0			0	0					
Pool	644.40	2.30																						1								0	0	0	0			0	0					
Pool	650.30	655.10	4.80	3.00	14.40																			2								0	0	0	0			0	0					
Pool	664.80	667.70	2.90	2.30	6.67																			8								0	0	0	0			0	0					
Pool	678.70	1.50																						4								0	0	0	0			0	0			14,15	logjam	
Pool	701.60	704.00	2.40	2.00	4.80																			3								0	0	0	0			0	0					
Pool	706.80	707.90	1.10	2.90	3.19																			4								0	0	0	0			0	0					
Pool	718.90	720.40	1.50	3.00	4.50																			1								Nat	Nat	Mix	Mix	5	40	Med	Low	30	30				
Pool	726.00	728.60	2.60	2.40	6.24																			4								0	0	0	0			0	0					
Pool	731.60	734.50	2.70	1.50	4.05																											0	0	0	0			0	0					
Pool	735.00	737.60	2.60	1.70	4.26																			2								0	0	0	0			0	0					
Pool	739.70	740.90	1.20	1.50	1.80																											0	0	0	0			0	0					
Pool	749.40	750.00	0.60	1.70	1.02																			1								0	0	0	0			0	0					
Pool	764.10	767.40	3.30	2.40	7.92																			3								0	0	0	0			0	0			18	braided	
Pool	777.70	785.00	7.30	2.00	14.60																			7								0	0	0	0			0	0			17 @ 760m	bridge	
																								8								0	0	0	0			0	0					

Reach 4

Habitat Type	Start (chainage at start)	Finish (chainage at end)	Unit Length	Mean Wetted Width	Pool Area	Resch Area	%Pool Area	Average Depth (m)	Gradient	Bankfull Width(m)	Percent Wetted Area	Substrate Percentage Bed	Bld	Cob	Grv fd	Bld	Percent Instrercent Bold	L'Bold	LWD	Cutbild	LWD	PercentCrown Cover	Large Woody Debris	LWD/bank-full channel width	Erosion Sites (length)	Altered Stream Sites (length)	Obstructions (number)	Off-Channel Habitat (length)	Off-Channel Habitat (width)	Off-Channel Habitat (bank side)	Land Use Right	Land Use Left	Vegeta Type	Vege frpe Left	Riparian Slope Right	Riparian Slope Left	Stability Right	Stability Left	Vegetation Depth Right	Vegetation Depth Left	Livestock Access Right	Livestock Access Left	Photos	Comments
Pool	788.50	791.20	2.70	2.50	6.75																		2																				
Pool	809.80	818.90	9.10	2.30	20.48			0.33	3.00	3.10		0	16	30	5	50		20	10			80.00	10							0	0	0	0			0	0						algae@804m
Pool	826.10	829.90	3.80	4.60	17.48																		5		4					Nat	Nat	Mix	Mix	30	8	Low	Med	30	30			18,19	
Pool	869.30	876.10	6.80	2.80	19.04																		34				1			0	0	0	0			0	0					20 E	log jam
Pool	881.30	884.70	3.40	2.30	7.82																		3		2					0	0	0	0			0	0					21	log jam
Pool	907.40	910.00	2.60	3.30	8.58																		7							0	0	0	0			0	0						E 889.2
Pool	910.20	911.60	1.40	2.80	3.92																		5							Nat	Nat	Mix	Mix	25	40	Med	Med	30	30				
																														0	0	0	0			0	0						
Resch 1 Totals and Averages		911.60	198.00	2.50	494.32	2275.88	21.72	0.14	2.40	4.22	59.16	2	14	39	19	26	8	20	7	0	0	72.00	438	2.03	1	0	1	0				0	0	0	0			0	0				
																														10	10			20	16	38	34			0	0		

Reach 5

Stream Name	Grandon	Watershed Code		Date	98/6/8	Reach Name	5.00		Discharge Depth #1	Velocity T1	
Water Quality Information	Reach 5			Field Crew		Faye,Betty,Doug,Bob					Site Length
Dissolved Oxygen	.	pH		Total Dissolved Solids		Temp C	Chainage at Beginning of Reach	0.00	Discharge Depth #2	T2	
Velocity (m/s)	#DIV/0!	Average Depth (at flow site)	#DIV/0!	Wetted Width (at flow site)		Discharge (m3/s)	#DIV/0!	Chainage at End of Reach 1117.20	Discharge Depth #3	T3	

Habitat Information (All Pool and Cross Section Data)

Habitat Type	Start (chainage at start)	Finish (chainage at end)	Unit Length	Mean Wetted Width	Pool Area	Reach Area	%Pool Area	Average Depth (m)	Gradient	Bankfull Width(m)	Percent Wetted Area	Substrate Percent Bed	Bld	Cob	Grv	Fine	Percent Instream Cover Bold	LWD	Cutbk	Veg	Other	PercentCrown Cover	Large Woody Debris	LWD/bankfull channel width	Erosion Sites (length)	ARered Stream Sites (length)	Obstructions (number)	Off-Channel Habitat (length)	Off-Channel Habitat (width)	Off-Channel Habitat (bank side)	Land Use Right	Land Use Left	Vegetation Type Right	Vegetation Type Left	Riparian Slope Right	Riparian Slope Left	Stability Right	Stability Left	Vegetation Depth Right	Vegetation Depth Left	Livestock Access Right	Livestock Access Left	Photos	Comments
Pool	0.00	1.50	1.50	1.10	1.65			0.10	2.00	5.40					5	95		10				95.00	4				1																#10ds #11us	4.3m gr.berm
Pool	7.90	12.40	4.50	3.40	15.30																		6							0	0	0	0			0	0				#12	gr.berm
Pool	20.80	23.10	2.30	3.10	7.13																		3		6					0	0	0	0			0	0				#13	erosion
Pool	38.30	43.60	5.30	3.30	17.49																		6		4					0	0	0	0			0	0				#14 er.	fish
																							10							0	0	0	0			0	0					
Pool	95.10	100.00	4.90	2.60	12.74																																					15 ds,16,17	poss c/o
Pool	104.00	109.30	5.30	2.30	12.19																						20	2	L	Nat	Nat	Mix	Mix	0	0	Low	Low	30	30					
Pool	137.70	141.50	3.80	4.00	15.20																									0	0	0	0			0	0					
Pool	148.30	155.70	7.40	3.00	22.20																		13							0	0	0	0			0	0				#18	poss c/o
																							5							0	0	0	0			0	0					
Pool	177.20	182.80	5.60	3.00	16.80																																					#19 183m	log jam
																							8							0	0	0	0			0	0					
Pool	209.10	233.10	24.00	2.00	48.00			0.13	3.00	3.40			5	10		85	5	5				70.00	9				1				Nat	Nat	Mix	Mix	37	50	Med	Med	30	30			20 ds 21 us	pipe
Pool	237.00	241.50	4.50	2.70	12.15																		5							0	0	0	0			0	0					bridge
Pool	251.10	255.10	4.00	2.10	8.40																		2							0	0	0	0			0	0					
Pool	257.90	260.80	2.90	3.80	11.02																		6				1			0	0	0	0			0	0				#22 u/s	log jam
Pool	264.30	275.00	10.70	2.00	21.40																		5							0	0	0	0			0	0					poss.och 272
Pool	277.10	282.90	5.80	2.70	15.66																		2							0	0	0	0			0	0					
Pool	288.80	297.60	7.70	3.00	23.10																		3							0	0	0	0			0	0					
Pool	300.00	301.50	1.50	2.40	3.60																		5							Nat	Nat	Br	Mix	95	30	Low	Low	30	30			23 ds 24 us	poss och
Pool	313.90	316.90	3.00	3.90	11.70																		12							0	0	0	0			0	0				#1 och	log jam
Pool	335.40	340.30	4.90	3.00	14.70																		10				1			0	0	0	0			0	0					debris
Pool	387.40	395.20	7.80	1.50	11.70																		10				1			0	0	0	0			0	0					log jam
Pool	397.80	402.10	4.30	3.80	16.34			0.30	2.00	3.00					50	50		10	20			95.00	8								Nat	Nat	Br	Br	2	25	Med	Med	30	30			#2 ds#3us	
Pool	409.10	415.20	6.10	3.10	18.91																		5							0	0	0	0			0	0					
Pool	420.60	426.60	6.10	2.80	17.08																									0	0	0	0			0	0					
Pool	429.70	432.80	3.10	2.80	8.68																		3				1			0	0	0	0			0	0					log jam
Pool	442.30	450.40	8.10	2.40	19.44																									0	0	0	0			0	0					
Pool	451.50	459.00	7.50	2.10	15.75																		7				1			0	0	0	0			0	0				#4	poss och
Pool	461.40	470.10	8.70	2.20	19.14																		6				1			0	0	0	0			0	0					log jam
																																											log jam
Pool	497.40	502.20	4.80	2.40	11.52																		7							Nat	Nat	Mix	Mix	45	45	Low	Low	30	30			5 ds 6 us	log jam
Pool	508.70	518.10	9.40	2.60	24.44																									0	0	0	0			0	0					
Pool	521.70	528.80	7.10	1.80	12.78																		1							0	0	0	0			0	0					bridge 524m
Pool	537.00	541.40	4.40	4.10	18.04																		7							0	0	0	0			0	0					
Pool	543.90	554.10	10.20	2.50	25.50																		7							0	0	0	0			0	0					
Pool	554.50	556.80	2.30	1.90	4.14																		2							0	0	0	0			0	0					
Pool	559.20	569.90	10.70	2.10	22.47																		7							0	0	0	0			0	0					
Pool	575.90	581.00	5.10	1.80	9.18																		6							0	0	0	0			0	0					
Pool	581.40	589.00	7.60	2.50	19.00																		3							0	0	0	0			0	0					
Pool	593.70	606.40	12.70	1.60	20.32			0.17	1.50	3.30						100		10	5			85.00	4								Nat	Nat	Mix	Mix	0	0	Low	Low	30	30			7 ds 8 us 9	poss och
Pool	611.70	619.80	8.10	2.30	18.63																		3							0	0	0	0			0	0					
Pool	622.10	632.40	10.30	4.30	44.29																		5							0	0	0	0			0	0					lg.bould.jam
Pool	639.20	659.30	20.10	2.40	48.24																						1			0	0	0	0			0	0					swd--trail
Pool	661.20	664.90	3.70	1.40	5.18																									0	0	0	0			0	0					clean swd
Pool	671.10	679.60	8.50	2.10	17.85																									0	0	0	0			0	0					
Pool	681.50	687.70	6.20	2.10	13.02																		1							0	0	0	0			0	0					
Pool	692.00	700.00	8.00	3.60	28.80																									0	0	0	0			0	0					fence
Pool	700.00	713.20	13.20	2.90	38.28																		3							Nat	Nat	Mix	Mix	50	60	Low	Low	15	30			10 ds11 us	12 side ch,13 entr.

Reach 5

Habitat Type	Start (chainage at start)	Finish (chainage at end)	Unit Length	Mean Wetted Width	Pool Area	Reach Area	%Pool Area	Average Depth (m)	Gradient	Bankfull Width(m)	Percent Wetted Area	Substrate Percent					Percent Instream Cover					PercentCrown Cover	Large Woody Debris	LWD/bankfull channel width	Erosion Sites (length)	Altered Stream Sites (length)	Obstructions (number)	Off-Channel Habitat (length)	Off-Channel Habitat (width)	Off-Channel Habitat (bank side)	Land Use		Vegetation Type		Riparian Slope		Stability		Vegetation Depth		Livestock Access		Photos	Comments
												Bed	Bld	Cob	Grv	Fine	Bold	LWD	Cutbk	Veg	Other									Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left		
Pool	714.50	719.40	4.90	1.60	7.84																									0	0	0	0			0	0					
Pool	720.00	727.00	7.10	1.60	11.36																		1							0	0	0	0			0	0					stump
Pool	735.80	742.30	6.70	1.60	10.72																									0	0	0	0			0	0					
Pool	746.30	766.90	20.60	1.80	37.08																		1							0	0	0	0			0	0					
Pool	777.50	789.20	11.70	1.80	21.06																									0	0	0	0			0	0					fence
Pool	791.10	801.00	9.90	2.00	19.80																									0	0	0	0			0	0					
Pool	801.10	807.80	6.70	2.40	16.08			0.23	1.00	3.60						100				5		95.00	2		16					Nat	FC	Br	Br	3	5	Med	Low	30	5			13 ds14 us	#15 logjam
Pool	819.10	829.20	10.10	2.30	23.23																		2							0	0	0	0			0	0					
Pool	830.10	835.90	5.80	2.40	13.92																		3							0	0	0	0			0	0					
Pool	841.60	845.60	4.00	2.50	10.00																		8							0	0	0	0			0	0					
Pool	870.20	877.40	7.20	2.60	18.72																		3							0	0	0	0			0	0					
Pool	881.80	888.60	6.80	2.70	18.36																		5							0	0	0	0			0	0					
Pool	891.90	901.60	9.70	2.80	27.16			0.26	0.00	3.40				15	45	40				5	90	15.00	6							Nat	Nat	Sh	Sh	5	3	Med	Med	30	30				
Pool	911.50	916.10	4.60	3.00	13.80																		6							0	0	0	0			0	0					
Pool	921.20	925.20	4.00	3.20	12.80																		2							0	0	0	0			0	0					
Pool	931.20	937.80	6.40	3.40	21.76																		8							0	0	0	0			0	0					cut alder
Pool	940.30	945.20	4.90	3.60	17.64																									0	0	0	0			0	0					
Pool	952.60	955.50	2.90	3.90	11.31																		2							0	0	0	0			0	0					
Pool	999.30	1003.40	4.10	4.10	16.81			0.35	0.00	4.70						100		15	10	15		80.00	3							Nat	Nat	Br	Br	5	5	Med	High	30	30			2 fish	
Pool	1018.00	1022.80	4.80	3.90	18.72																		2							0	0	0	0			0	0					
Pool	1027.10	1030.20	3.10	3.60	11.16																									0	0	0	0			0	0					
Pool	1047.40	1049.80	2.40	3.30	7.92																		4							0	0	0	0			0	0					
Pool	1077.80	1083.20	5.40	3.00	16.20																									0	0	0	0			0	0					
Pool	1099.20	1103.10	3.90	2.70	10.53			0.16	0.00	3.60					5	95		50		25		10.00	2							Nat	Nat	Br	Br	6	4	Med	Low	30	30				
Pool	1111.90	1117.20	5.30	2.80	14.84																									0	0	0	0			0	0					1136.6fence
																														0	0	0	0			0	0					
																														0	0	0	0			0	0					
Reach 1 Totals and Averages		1117.20	478.80	2.66	1275.23	2975.53	42.86	0.21	1.19	3.80	70.09		5	13	28	83	5	17	10	34	0	68.13	269	0.91	2	0	9	2			12	16			18	16	48	50			0	0		

Reach 6

Stream Name: Grandon | Watershed Code: | Date: May 23/98 | Reach Name: 6.00 | Discharge Depth #1: | Velocity T1: | Site Length:

Field Crew: FayeBettyRonBob

Water Quality Information

Dissolved Oxygen: . | pH: | Total Dissolved Solids: | Temp C: | Chainage at Beginning of Reach: 0.00 | Discharge Depth #2: | T2:

Velocity (m/s): #DIV/0! | Average Depth (at flow site): #DIV/0! | Wetted Width (at flow site): | Discharge (m3/s): #DIV/0! | Chainage at End of Reach: 835.00 | Discharge Depth #3: | T3:

Habitat Information (All Pool and Cross Section Data)

Habitat Type	Start (chainage at start)	Finish (chainage at end)	Unit Length	Mean Wetted Width	Pool Area	Reach Area	%Pool Area	Average Depth (m)	Gradient	Bankfull Width(m)	Percent Wetted Area	Substrate Percent Bed	Bld	Cob	Grv	Fine	Percent Instream Cover Bold	LWD	Cutbk	Veg	Other	PercentCrown Cover	Large Woody Debris	LWD/bank-full channel width	Erosion Sites (length)	Altered Stream Sites (length)	Obstructions (number)	Off-Channel Habitat (length)	Off-Channel Habitat (width)	Off-Channel Habitat (bank side)	Land Use Right	Land Use Left	Vegetation Type Right	Vegetation Type Left	Riparian Slope Right	Riparian Slope Left	Stability Right	Stability Left	Vegetation Depth Right	Vegetation Depth Left	Livestock Access Right	Livestock Access Left	Photos	Comments
Pool	0.00	1.00	1.00	1.90	1.90			0.20	0.50	0.40						100				50		5.00	0	0							FG	FG	Gr	Gr	90	12	Low	Low	2	1			1 us 283 ds	farm ditch
Pool	100.00	101.00	1.00		0.00																									FG	FG	Gr	Gr	9	9	Low	Low	2	1			4 ds	
Pool	200.00	201.00	1.00	1.50	1.50			0.20	0.50	2.60				90		10				75		5.00	0	0							FG	FG	Gr	Gr	5	10	Low	Low	2	1			5 ds	cv 157-163
Pool	300.00	301.00	1.00	1.80	1.80																									FG	FG	Br	Gr	90	20	Low	Low	2	1			6 ds	
Pool	400.00	401.00	1.00	2.00	2.00			0.20	0.50	4.00				30		70				60		20.00	0	0							FG	FG	Sh	Br	90	90	Low	Low	2	2			7 350	some cover
Pool	500.00	501.00	1.00	2.00	2.00																									FG	FG	Sh	Br	90	90	Low	Low	4	4			8 across	
Pool	600.00	601.00	1.00	3.00	3.00			0.20	0.50	3.50		100										95.00	0	0							FG	FC	Br	Br	90	90	Low	Low	30	3			9 across	
Pool	700.00	701.00	1.00	3.00	3.00				0.50	3.50		100										5.00	0	0							FG	FG	Sh	Gr	90	90	Low	Low	2	1			10 across	cv 674-87
Pool	800.00	835.00	35.00	3.00	105.00			0.20		3.50		100								50		1.00	0	0							FG	FG	Gr	Sh	90	90	Low	Low	2	2			11 across	same to Laburnum
																														0	0	0	0			0	0						
																														0	0	0	0			0	0						
Reach 1 Totals and Averages		835.00	43.00	2.28	97.83	1999.83	5.15	0.20	0.50	2.97	76.69	100		60		60	0	0	0	59	0	21.83	0	0.00	0	0	0	0			27	29			37	29	45	45			0	0		

Fig. 8 Fisheries Assessment Summary 1996/1997

Comparison Instream Structures 1996 and 1997 Fish Data Grandon Creek

Comparison of Fish Populations Estimates (fish/m2)

	Site 1 Treated	Site 2 Treated	Site 3 Untreated	Ave. Treated/untreated
1996	0.22	0.52	0.46	T= 0.37 / UT= 0.46
1997	0.3	0.23	0.19	T= 0.26 / UT= 0.19

Comparison of Population & Biomass per Area (m2) Treated to Untreated Sites -Grandon C

	Totals	Site 1 Treated	Site 3 Untreated	Difference
1996	Population (fish/m2)	0.22	0.46	-0.24
	Biomass (gms/m2	0.68	8.08	-7.4

	Totals	Site 2 Treated	Site 3 Untreated	Difference
1966	Population	0.52	0.46	0.06
	Biomass	3.01	8.08	-5.07

	Totals	Site 1 Treated	Site 3 Untreated	Difference
1997	Population	0.3	0.19	0.11
	Biomass	5.74	3.86	1.88

	Totals	Site 2 Treated	Site 3 Untreated	Difference
1997	Population	0.23	0.19	0.04
	Biomass	5.11	3.86	1.25

Fig. 9 Fisheries Assessment 1997; 29-43m. Grandon 1.xls

Fisheries Assessment Data

Stream Name	Grandon Creek	Watershed Code	S3	Field Crew	Tracy, Lew, Gloria	
Reach Number	Reach #1	Site location (m)	29m-43m	Capture Method	Electrofishing Date	Oct. 14/97

Site One

Species	First Pass Length (cm)	Weight (grams)	Second Pass Length (cm)	Weight (grams)	Site Width	Site length
Coho					2.9 m	14 m
"						
"						
Averages						

Species	First Pass Length (cm)	Weight (grams)	Second Pass Length (cm)	Weight (grams)
Cutthroat	6.80	4.30	5.00	1.30
"	5.80	2.70	15.50	55.10
	6.30	2.80		
	6.40	2.60		
	5.90	2.10		
	19.70	94.50		
	6.00	2.30		
	8.00	6.60		
	8.90	9.10		
	6.40	2.60		
	15.50	47.20		
"				
Averages	8.70	16.07	10.25	28.20

Species	First Pass Length (cm)	Weight (grams)	Second Pass Length (cm)	Weight (grams)
"				
"				
Averages				

Species	Population
Coho	
Cutthroat	
Total Pop.	0.00

Fig. 10 Fisheries Assessment 1997, 59 - 73 m.

GRANOON1.XLS

Fisheries Assessment Data

Reach Number	Reach #1	Site location (m)	59m-73m	Field Crew	Tracy, Lew, Gloria	
Site Two				Capture Method	Electrofishing Date	Oct. 14/97

Species	First Pass Length (cm)	Weight (grams)	Second Pass Length (cm)	Weight (grams)	Site Width	Site length
Coho					3.7m	14.3m
"						
"						
Averages						

Species	First Pass Length (cm)	Weight (grams)	Second Pass Length (cm)	Weight (grams)
Cuttroat	4.80	1.10	13.90	42.00
"	5.50	2.40		
	12.90	29.30		
	5.50	1.30		
	5.70	2.40		
	6.30	2.40		
	7.50	4.50		
	18.40	70.20		
	17.60	88.30		
	5.20	1.70		
	13.00	24.80		
"				
Averages	9.31	20.76	13.90	42.00

Species	First Pass Length (cm)	Weight (grams)	Second Pass Length (cm)	Weight (grams)
"				
"				
Averages				

Species	Population
Coho	
Cuttroat	
Total Pop.	0.00

Fig. 11 Fisheries Assessment 1997, 90 - 100 m.

GRANDON 2.XLS

Fisheries Assessment Data

Stream Name	.	Watershed Code	0.00	Field Crew	Tracy, Lew, Gloria	
Reach Number	0.00	Site location (m)	90m-100m	Capture Method	Electrofishing Date	Oct. 14/97

Site One

Species	First Pass Length (cm)	Weight (grams)	Second Pass Length (cm)	Weight (grams)	Site Width	Site length
Coho					3.7m	10m
"						
"						
Averages						

Species	First Pass Length (cm)	Weight (grams)	Second Pass Length (cm)	Weight (grams)
Cuttroat	5.40	1.80	5.70	2.00
"	6.30	3.80		
	6.00	1.50		
	13.90	22.80		
	12.40	20.70		
	19.60	87.40		
"				
Averages	10.60	23.00	5.70	2.00

Species	First Pass Length (cm)	Weight (grams)	Second Pass Length (cm)	Weight (grams)
"				
"				
Averages				

Species	Population
Coho	
Cuttroat	
Total Pop.	0.00

Fig. 12 Water Quality Sep. 24, 1997 (page 1)

Client/Code

Qualicum Beach Streamkeepers
Faye Smith
221 Elizabeth Ave.
Qualicum Beach, BC
V9K 1G8
TEL: 250 752-9297
FAX: 250 752-0531

Date 24Sep97 9:43a No. W36764
Source unknown
Type of Sample water
No. of Samples 8

Comments Arrival temp.: 19.0C
To be invoiced.

Site Code	Date	Time	CFU/100 ml TC	CFU/100 ml NC	CFU/100 ml FC	CFU/100 ml NC
Beach Creek Violetta	23Sep97	11:30a	120,000	6,440,000	6,200	12,400
Beach Creek E.Crescent Brown Prop	23Sep97	11:30a	3,000	260,000	36	38
Beach Creek Control	23Sep97	11:30a	2,000	180,000	2	344
Beach Creek Mouth	23Sep97	11:30a	4,600	100,000	36	120
Grandon Creek Hoylake Rd.	23Sep97	12:30p	6,000	40,000	12	14
Grandon Creek Arbutus Culvert	23Sep97	12:30p	2,800	100,000	8	196
Grandon Creek Control	23Sep97	12:30p	5,600	40,000	38	10
Grandon Creek Mouth	23Sep97	12:30p	10,600	60,000	68	1,900

TC = total coliform bacteria
FC = fecal coliform bacteria
NC = non-coliform bacteria

Comments:

For Results:
Total or Fecal Coliforms present greater than 0 CFU/100mL:
Coliform numbers exceed safe limits for drinking water.
Water is not suitable for drinking without treatment.

Total Non-coliform bacteria equal to or greater than 200 CFU/100mL:
The number of organisms present exceed recommended guidelines for drinking water. Treatment is strongly recommended.

- see next page for chemistry results -

E.K. Black
E.K. Black
Supervisor

W. Riggs
Microbiologist

Fig. 12 Water Quality Sep. 24, 1997 (page 2)

Client/Code
Qualicum Beach Streamkeepers
Faye Smith
221 Elizabeth Ave.
Qualicum Beach, BC
V9K 1G8

TEL: 250 752-9297
FAX: 250 752-0531

Date 24Sep97 9:43a No. W36764 P2
Source unknown
Type of Sample water
No. of Samples 8

Comments Arrival temp.: 19.0C
to be invoiced

SAMPLE	DATE TIME	Alkalinity (mg/L)	NH_3-N (ug/L)	E.C. (uS/cm)	TKN (mg/L)	NO_3-N (ug/L)
Beach Ck Violetta	23Sep97 11:30a	103	12.6	265	0.356	502
Beach-E.Cres.Brown	23Sep97 11:30a	41.5	84.4	111	0.306	269
Beach Ck-Control	23Sep97 11:30a	71.0	25.0	173	0.345	501
Beach Ck-Control	DUP	n/a	n/a	n/a	0.453	n/a
Beach Ck-Mouth	23Sep97 11:30a	70.5	28.6	175	0.378	496
Grandon-Hoylake Rd	23Sep97 12:30p	75.0	32.4	178	0.306	273
Grandon-Arbutus Cul.	23Sep97 12:30p	133	19.4	282	0.267	247
Grandon Ck-Control	23Sep97 12:30p	68.5	14.3	168	0.474	157
Grandon Ck-Mouth	23Sep97 12:30p	70.5	27.7	170	0.424	164
Grandon CK-Mouth	DUP	70.0	18.1	170	n/a	n/a
Lab Blank		ND	ND	2.90	0.100	3.10
S_o		0.100	0.254	0.300	0.115	0.300
REF. VALUE		200	20.0	147	1.00	100
STD ± 2SD		198 ± 16.4	20.1 ± 2.14	148 ± 8.60	1.02 ± 0.078	101 ± 10.4

.... /3

MB RESEARCH
ANALYTICAL &TESTING SERVICES P.O.BOX 2103, SIDNEY, B.C. V8L 3S6 TEL: (250) 656-1334 FAX: 656-0443

Fig. 12 Water Quality Sep. 24, 1997 (page 3)

Client/Code

Qualicum Beach Streamkeepers
Faye Smith
221 Elizabeth Ave.
Qualicum Beach, BC
V9K 1G8

TEL: 250 752-9297
FAX: 250 752-0531

Date 24Sep97 9:43a No. W36764 P3
Source unknown
Type of Sample water
No. of Samples 8

Comments Arrival temp.: 19.0C
to be invoiced

SAMPLE	DATE	TIME	NO_2-N (ug/L)	Ortho-PO_4^{3-}P (ug/L)	pH	TPO_4^{3-}-P (ug/L)	TDS (mg/L)
Beach Ck Violetta	23Sep97	11:30a	15.2	28.8	7.75	26.5	190
Beach-E.Cres.Brown	23Sep97	11:30a	0.900	3.18	7.57	1.40	78.0
Beach Ck-Control	23Sep97	11:30a	29.6	13.7	7.81	16.0	121
Beach Ck-Control	DUP		n/a	13.7	n/a	16.5	n/a
Beach Ck-Mouth	23Sep97	11:30a	4.29	26.6	8.05	27.7	138
Grandon-Hoylake Rd	23Sep97	12:30p	4.99	39.9	7.79	39.4	124
Grandon-Arbutus Cul.	23Sep97	12:30p	1.15	16.3	8.03	21.0	190
Grandon Ck-Control	23Sep97	12:30p	1.05	35.6	7.83	38.6	117
Grandon Ck-Mouth	23Sep97	12:30p	4.79	32.6	---	30.9	115
Grandon CK-Mouth	DUP		n/a	n/a	n/a	n/a	115
Lab Blank			ND	0.168	ND	ND	ND
S_o			0.300	0.150		0.150	0.700
REF. VALUE			10.5	25.0	7.00	25.0	200
STD ± 2SD			10.5 ± 1.01	25.2 ± 2.28	7.01 ± 0.072	25.4 ± 2.06	200 ± 13.5

SD = standard deviation
STD = secondary standard calibrated to primary standard reference material
S_o = standard deviation at zero analyte concentration; method detection limit is generally considered to be 3x S_o value
ND = none detected
n/a = not applicable

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Fig. 13. Water Quality; 1997 Fecal Coliform (page 1)

ENVIRONMENT CANADA
ENVIRONMENTAL PROTECTION BRANCH
SHELLFISH GROWING AREA SURVEY AND CLASSIFICATION PROGRAM

Freshwater Analysis Results

Sample Station	Date Sampled	FC/100ml MF
1	97/12/14	86
	97/12/15	56
	97/12/16	620
2	97/12/14	200
	97/12/15	92
	97/12/16	310
3	97/12/14	380
	97/12/15	250
	97/12/16	410
4	97/12/14	440
	97/12/15	230
	97/12/16	620
5	97/12/14	3900
	97/12/15	118
	97/12/16	2100
Beach 1	97/12/11	10
Beach 2	97/12/11	11
Beach 3	97/12/11	7
Beach 4	97/12/11	4

Sample Station	Date Sampled	FC/100ml MF
6	97/12/14	290
	97/12/15	104
	97/12/16	610
7	97/12/14	122
	97/12/15	96
	97/12/16	930
8	97/12/14	64
	97/12/15	72
	97/12/16	350
9	97/12/14	32
	97/12/15	130
	97/12/16	370
10	97/12/14	55
	97/12/15	100
	97/12/16	160
GC 1	97/12/11	14
GC 2	97/12/11	35
GC 3	97/12/11	0
GC 4	97/12/11	17

The samples were analyzed using the Fecal Coliform Membrane Filter (MF) Procedure as defined in Standard Methods for the Examination of Water and Wastewater, 18th edition, 1992, American Public Health Association, American Water Works Association, Water Environment Federation, Section 9222D, Pages 9-60,61.

In brief, this procedure involves filtering 100 milliliters of the sample through a sterile 0.45 micron pore size Millipore filter. In samples with large amounts of suspended sediment, smaller volumes would be filtered. The filter is then placed on a petri plate with a growth media (m FC agar) and incubated at 44.5 (±0.2) degrees Celsius for 24 (±2) hours. Colonies per plate are then counted and recorded as FC/100ml MF (fecal coliform colonies per 100 ml of sample, analyzed by the membrane filtration method). The detection limit for this test is 0 FC/100ml MF.

Freshwater samples are collected in sterile bottles using aseptic technique, and stored at < 10°C for < 24 hours before analysis. Standard QA/QC (quality assurance/quality control) procedures are followed, which includes before/after filtration control plates using m Endo LES agar for total coliforms.

The health standard for drinking water is 0 FC/100ml MF, as stated in the Guidelines for Canadian Drinking Water Quality, Department of Health and Welfare, 5th edition, 1993. The swimming water standard is 200 FC/100ml MF. This standard is based on the assumption that people may accidentally swallow some water while swimming, or may have an open cut or sore which could become infected if exposed to a high level of bacterial contamination in the water.

Fig. 13. Water Quality; 1997 Fecal Coliform (page 2)

French Creek PCC Water Analysis

Total and Fecal Coliform Bacteria Tests

Dec-97

Date	Representing	Bottle #	Location	Total Coli (24hr)	Fecal Coli (24hr)
16-Dec	Parksville	CB7	Craig Bay	700/100 ml	0/100 ml
16-Dec	Parksville	CB8	Craig Bay	100/100 ml	100/100ml
16-Dec	Parksville	CB9	Craig Bay	0/100 ml	0/100 ml
16-Dec	Parksville	CB10	Craig Bay	100/100 ml	100/100ml
17-Dec	Parksville	WC01	Whiskey Creek	0/100 ml	0/100 ml
17-Dec	Parksville	WC02	Whiskey Creek	400/100 ml	100/100 ml
17-Dec	Parksville	WC03	Whiskey Creek	1000/100 ml	800/1000 ml
17-Dec	Parksville	WC04	Whiskey Creek	0/100 ml	0/100 ml
17-Dec	Parksville	G1	Bayview Road	1300/100 ml	100/100 ml
17-Dec	Parksville	G2	Ballenas-Wall Beach	300/100 ml	100/100 ml
17-Dec	Parksville	G3	Errington School	800/100 ml	500/100 ml
17-Dec	Parksville	G4	Errington Road	2700/100 ml	400/100 ml
17-Dec	Parksville	G5	1700 Grafton Road	500/100 ml	100/ 100 ml
17-Dec	Parksville	G6	Coombs-French Creek	2100/100 ml	0/100 ml
17-Dec	Parksville	G7	Whiskey Creek	300/100 ml	100/100 ml
17-Dec	Parksville	G8	Barclay Crescent	800/100 ml	300/100 ml
18-Dec	Parksville	GC1	Not Given	200/100 ml	200/100 ml
18-Dec	Parksville	GC2	Not Given	100/100 ml	0/100 ml
18-Dec	Parksville	GC3	Not Given	0/100 ml	0/100 ml
18-Dec	Parksville	GC4	Not Given	200/100 ml	100/100 ml
18-Dec	Parksville	BC1	Not Given	100/100 ml	0/100 ml
18-Dec	Parksville	BC2	Not Given	0/100 ml	0/100 ml
18-Dec	Parksville	BC4	Not Given	0/100 ml	0/100 ml
19-Dec	Parksville	GC1	Not Given	0/100 ml	0/100 ml
19-Dec	Parksville	GC2	Not Given	100/100 ml	0/100 ml
19-Dec	Parksville	GC3	Not Given	100/100 ml	0/100 ml

Data - Analysis by
G Stocker 248-5794

Fig. 13. Water Quality; 1997 Fecal Coliform (page 3)

French Creek PCC Water Analysis

Dec-97

Total and Fecal Coliform Bacteria Tests

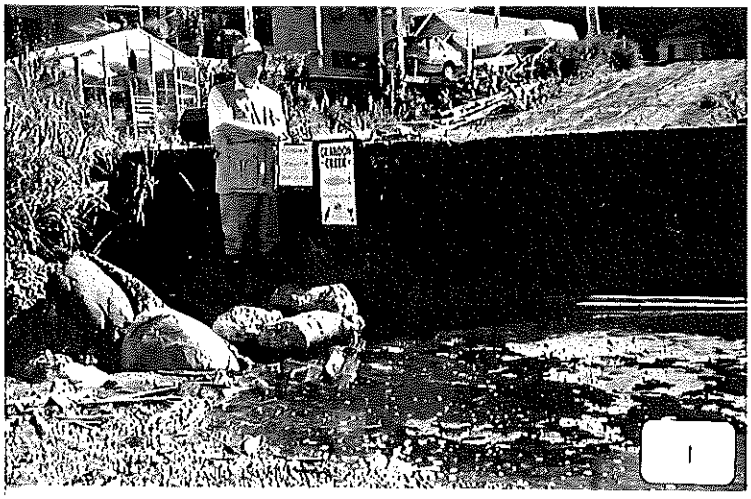
Date	Representing	Bottle #	Location	Total Coli (24hr)	Fecal Coli (24hr)
19-Dec	Parksville	GC4	Not Given	100/100 ml	100/100 ml
19-Dec	Parksville	BC1	Not Given	0/100 ml	0/100 ml
19-Dec	Parksville	BC2	Not Given	0/100 ml	0/100 ml
19-Dec	Parksville	BC3	Not Given	0/100 ml	0/100 ml
19-Dec	Parksville	BC4	Not Given	0/100 ml	0/100 ml

Data - Analysis by
G Stocker 248-5794

APPENDIX C - PHOTOGRAPHS

1997 Photos are numbered with text below. 1998 Photos have text attached.

1. start of Reach 1, mouth of Grandon Creek
2. new culvert construction at mouth of GC
3. channelized between the houses
4. no overhead cover in Reach 1
5. culvert under West Crescent Road
6. holes in manhole at half-way point of W. Crescent Rd. culvert
7. start of Reach 2 at entrance to W. Crescent Rd. culvert
8. end of Reach 2 at change of gradient
9. start of Reach 3 at gradient change
10. old roadway in Reach 3
11. start of Reach 4, entrance to Hoylake culvert
12. culvert coming in from Arbutus Rd. subdivisions
13. Reach 1, entrance to old culvert under highway
14. outflow of West Crescent Road culvert
15. Reach 1 lack of crown cover
16. Reach 2 erosion site at 24m
17. Reach 2 erosion site at 117.5m
18. Reach 2 erosion site at 117.5m
19. Reach 2 erosion site at 337.6m
20. Reach2 erosion site at 515m
21. Reach 2 erosion due to removal of vegetation below residence
22. Reach 2 gravel build-up
23. Reach 2 anchored logs at 24m placed by Streamkeepers
24. Reach 3 large boulders
25. Reach 3 boulders and cascade (over the lip in the foreground)
26. Reach 3 erosion from Hoylake ditch runoff
27. Reach 4 clearcut at Chew property in 1995 (intermittant tributary)
28. Reach 4 low summer flow
29. Reach 4 logs to be stabilzed
30. indication of bank slopes
31. indication of bank slopes
32. Reach 1 need for riparian restoration
33. Reach 2 need for conifers in riparian zone
34. Reach 2 recent blowdown of mature alder
35. Reach 2 erosion due to drainage problem
36. Reach 3 runoff from Howlake Rd. ditch
37. Reach 4 example of riparian vegetation
38. Reach 1 start of fry removal for construction of new culvert
39. Reach 1 John Ebell electrofishing to remove fry
40. Fisheries assessment 1997
41. Spawners at mouth of Grandon Creek, early December 1997
42. Water Quality Test Site 1
43. Water Quality Test Site 2
44. Water Quality Test Site 3
45. Water Quality Test Site 4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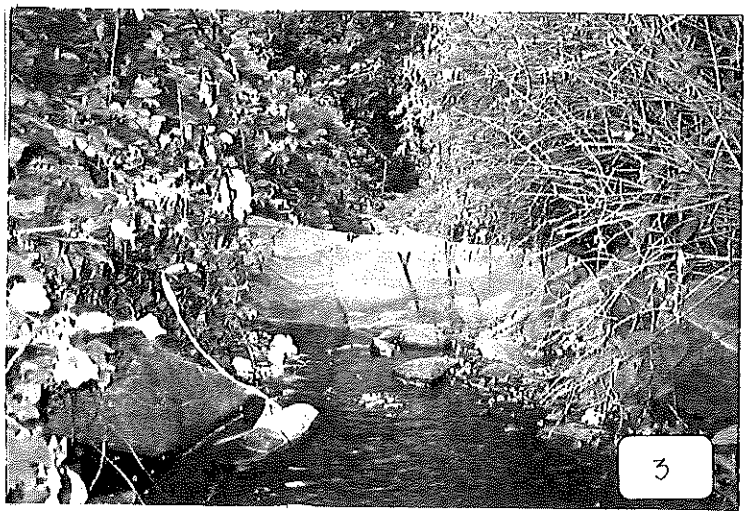
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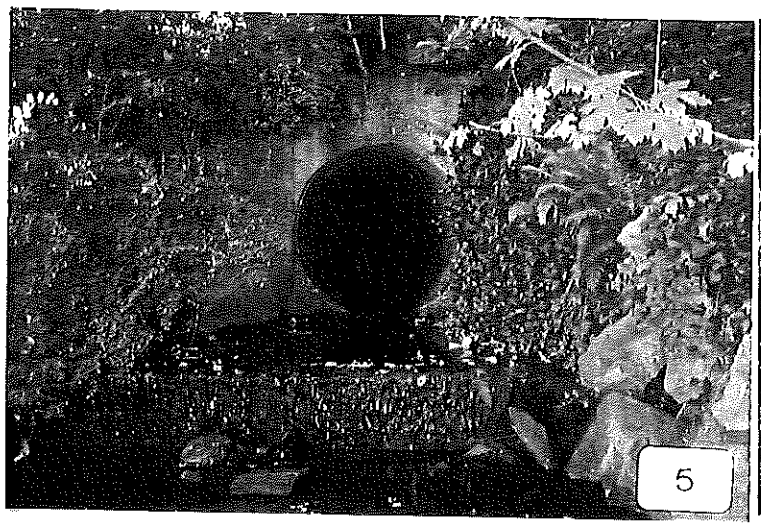
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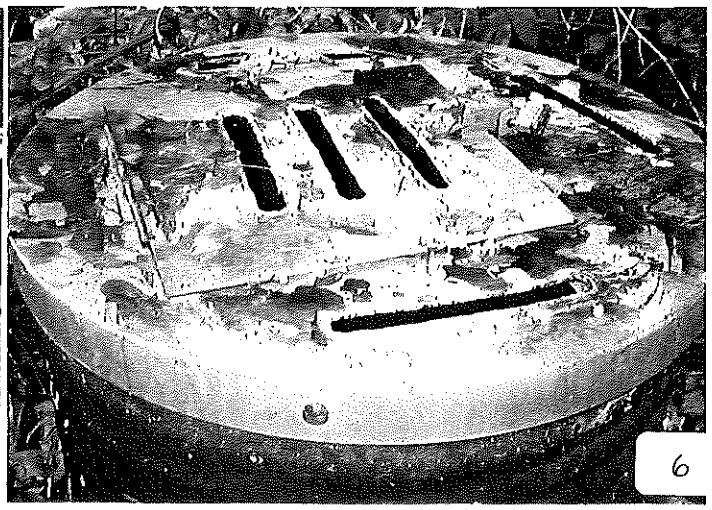
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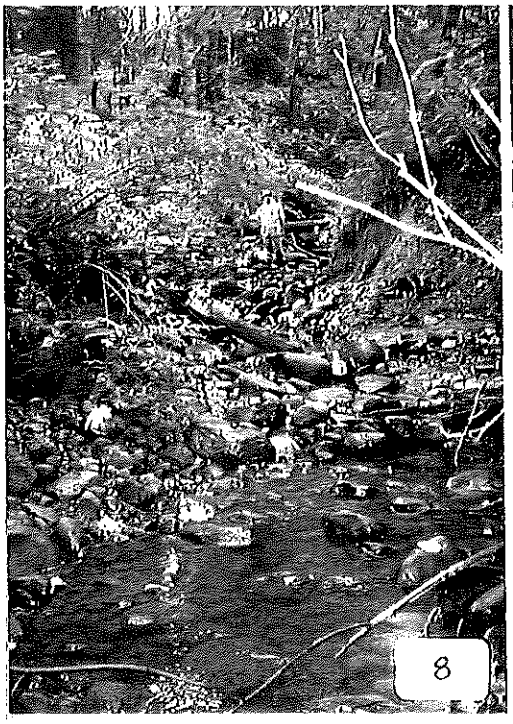
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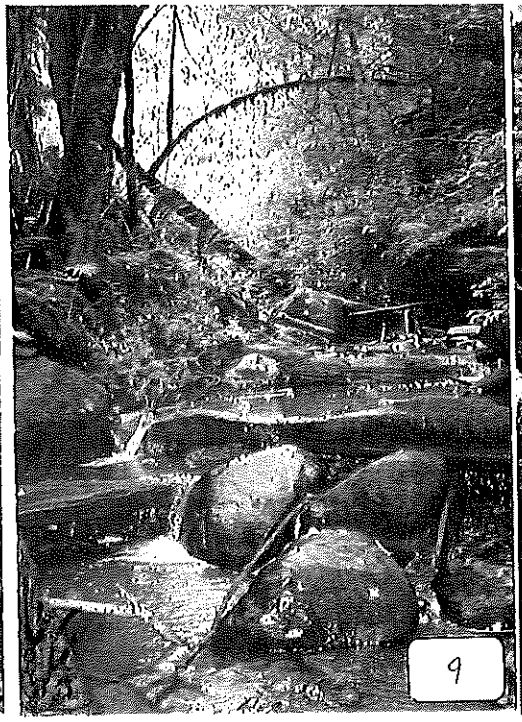
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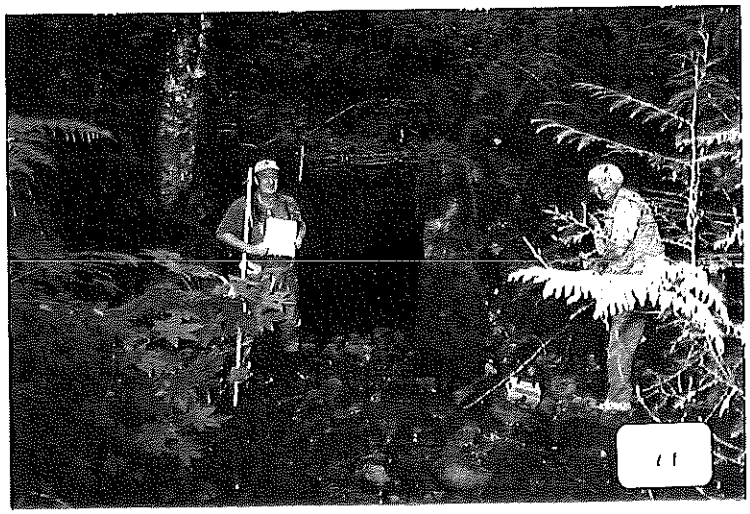
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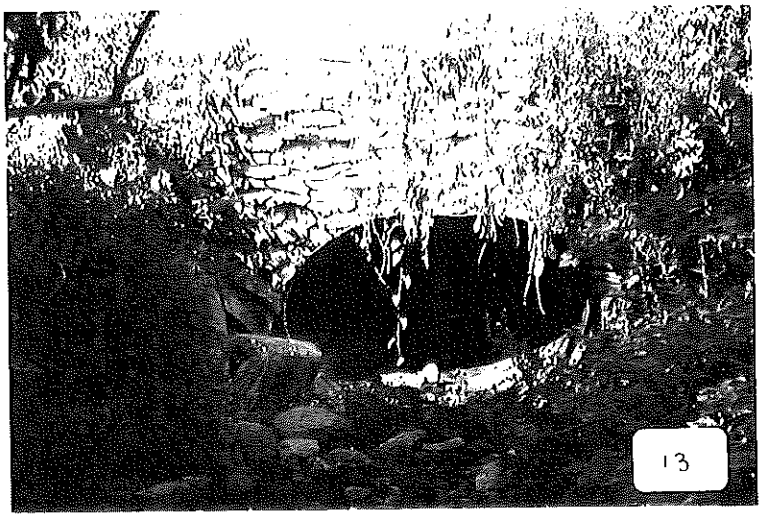
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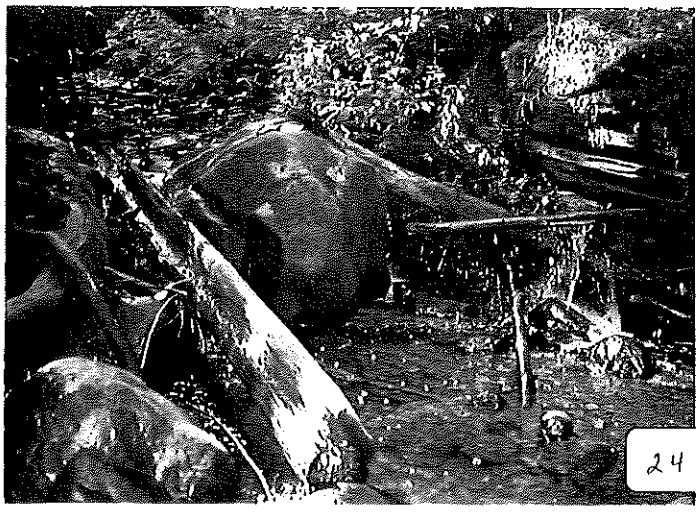
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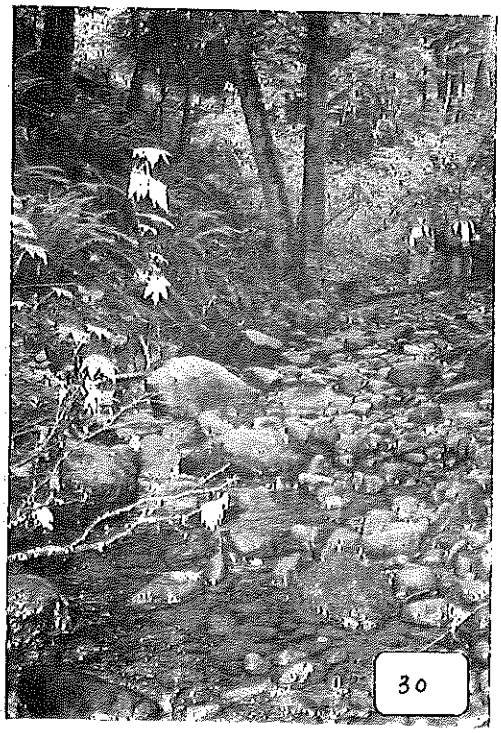
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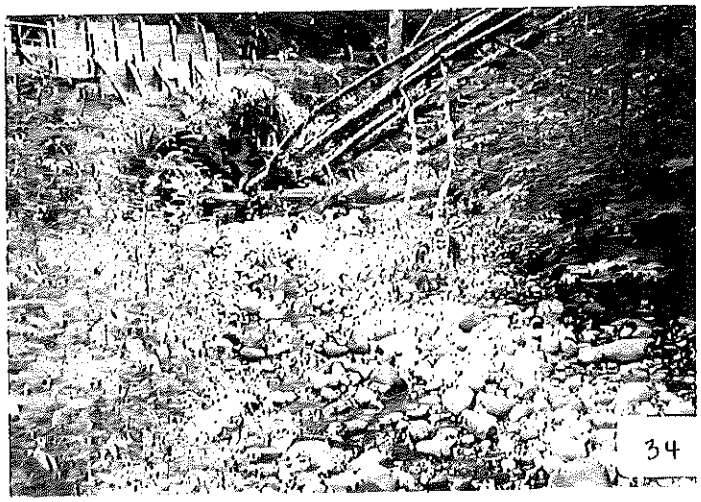
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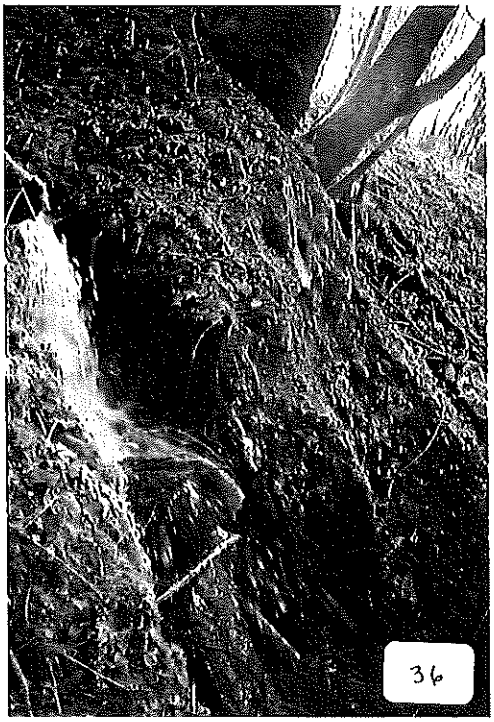
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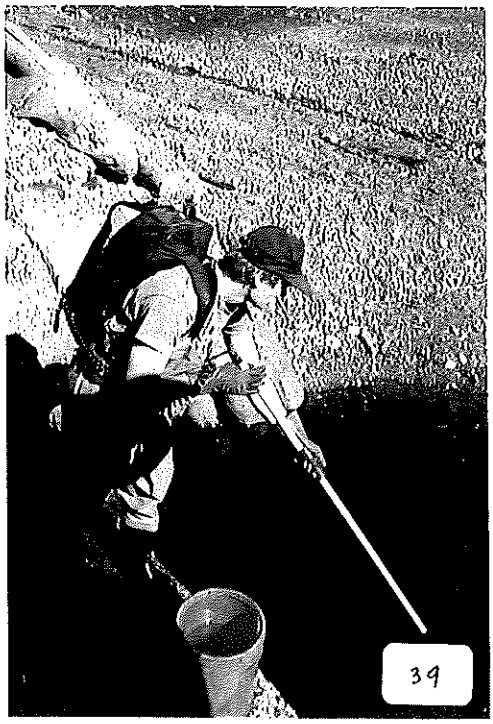
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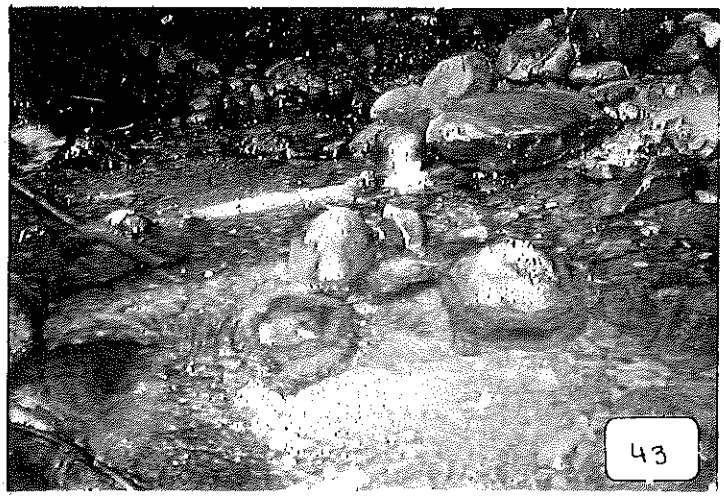
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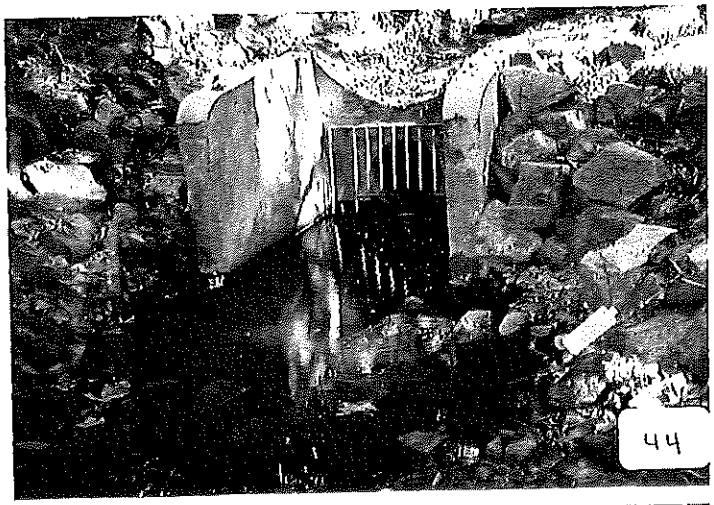
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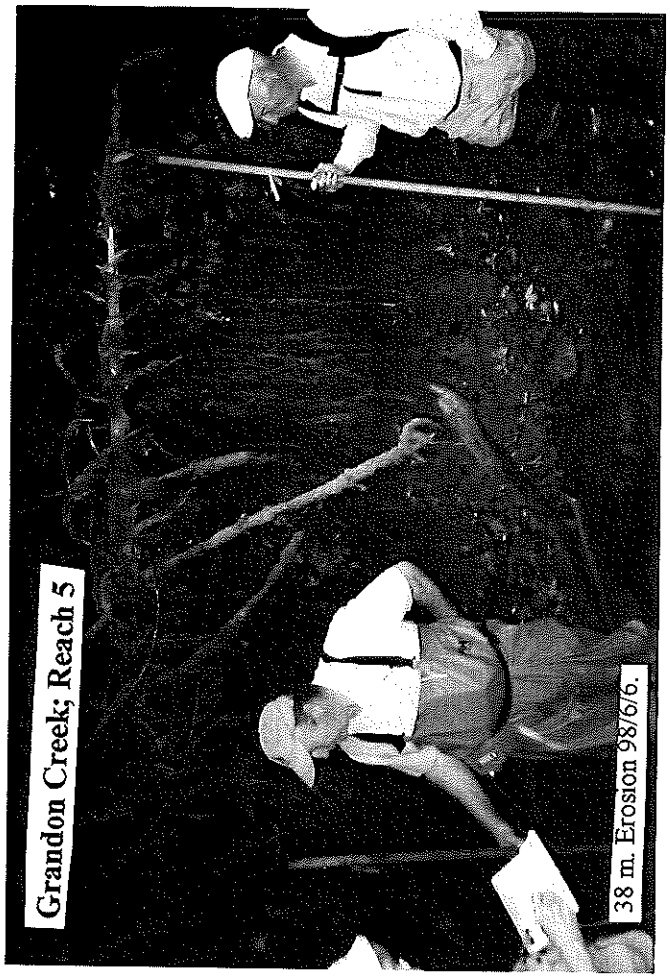
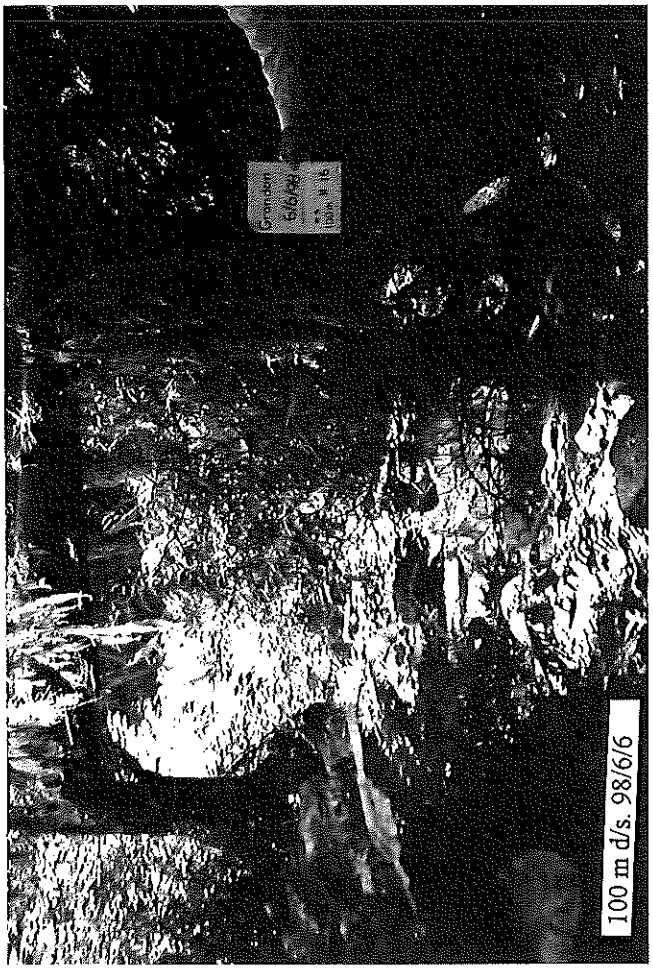
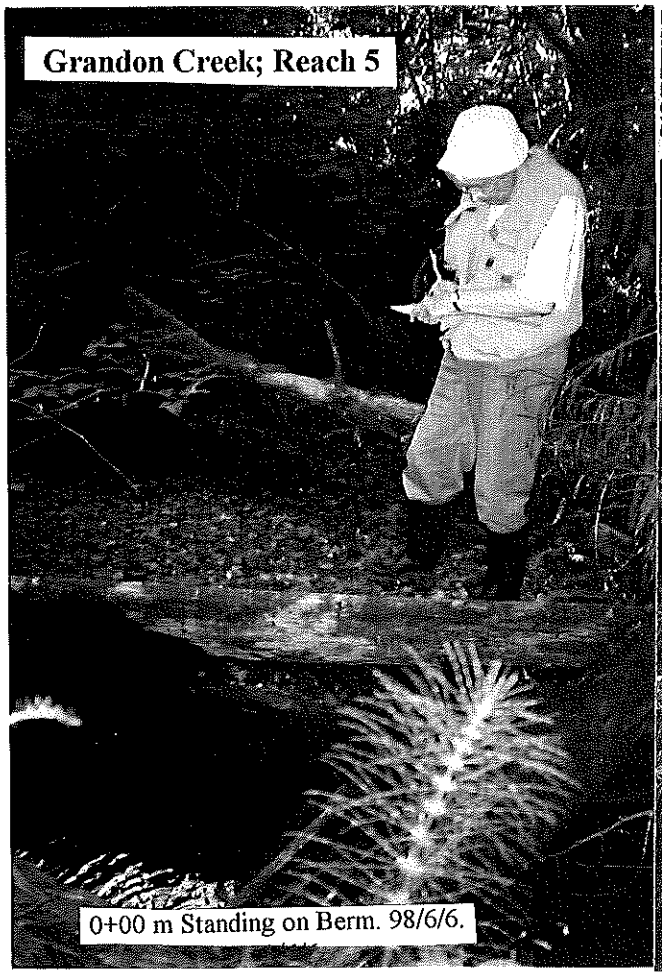
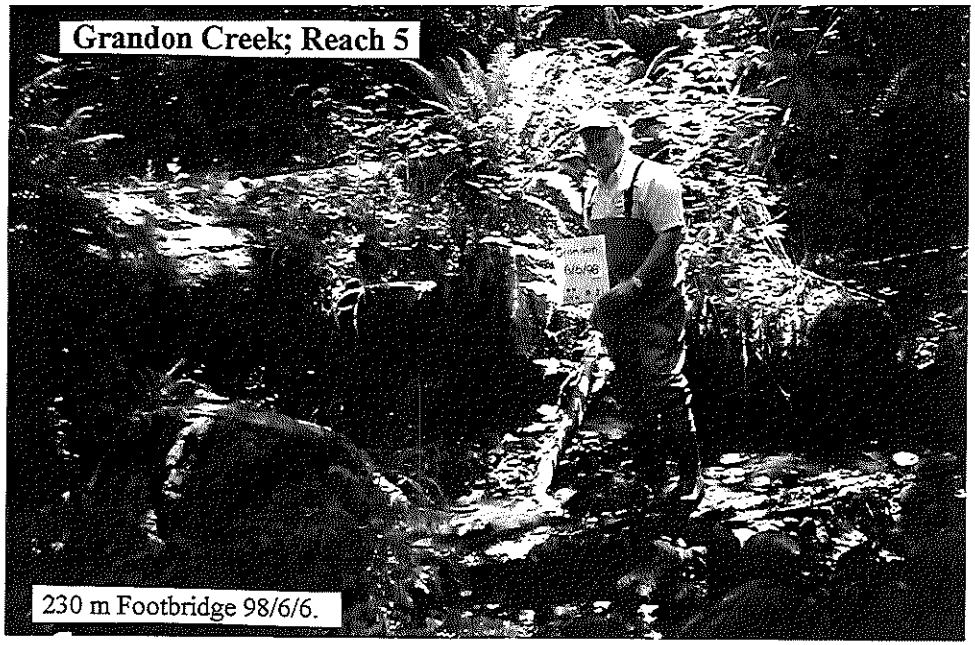
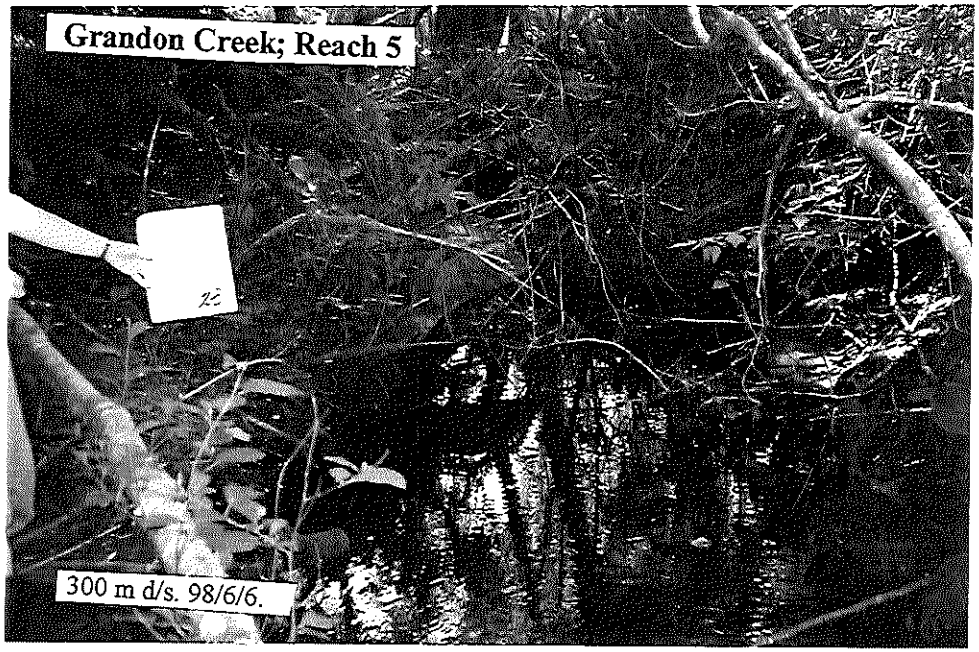

Grandon Creek; Reach 5
38 m. Erosion 98/6/6.


100 m d/s. 98/6/6


Grandon Creek; Reach 5
0+00 m Standing on Berm. 98/6/6.


100 m. Poss. off channel. 98/6/6


Grandon Creek; Reach 5
230 m Footbridge 98/6/6.

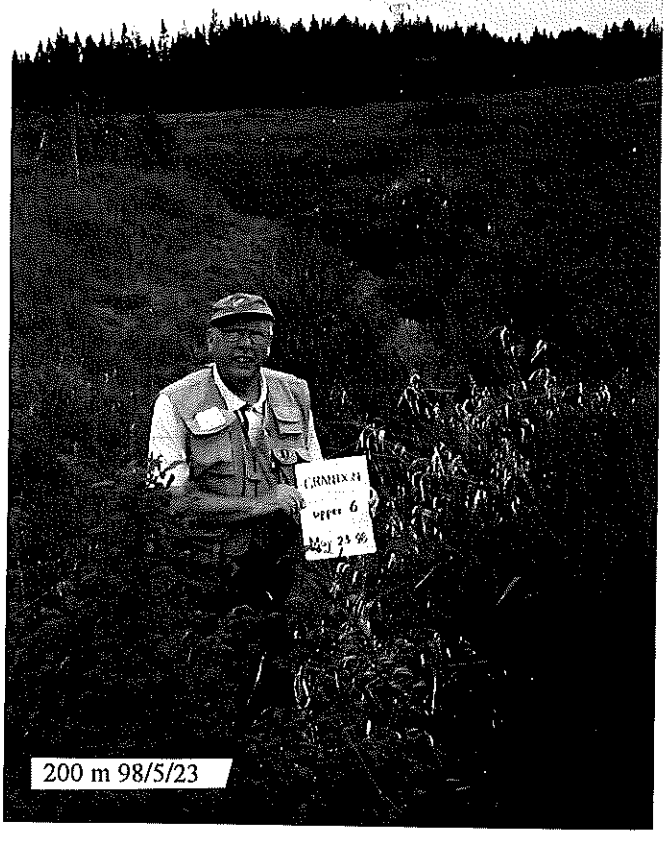

Grandon Creek; Reach 5
300 m d/s. 98/6/6.

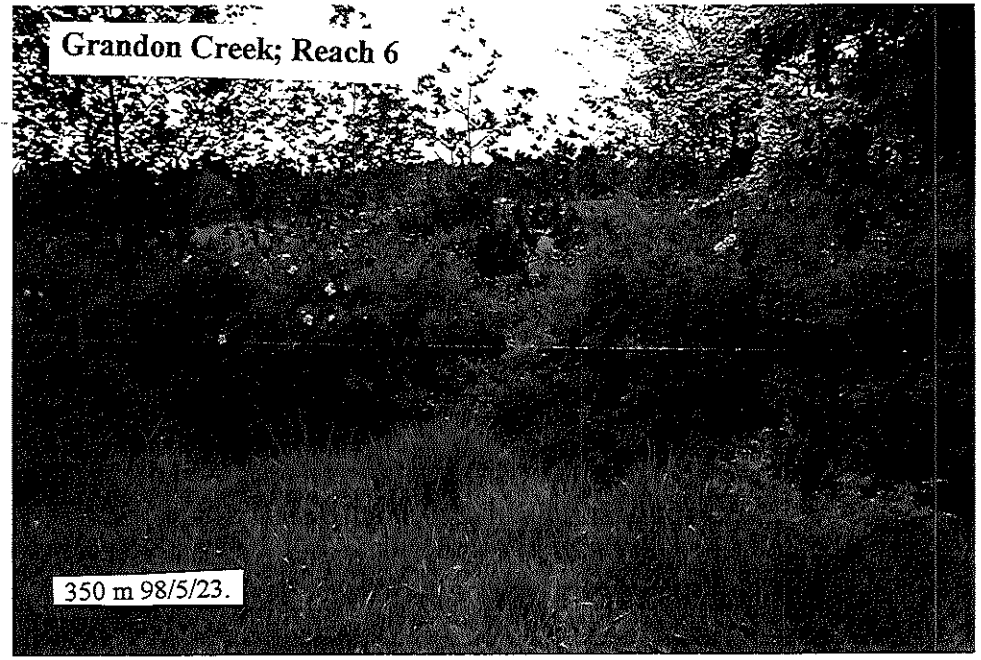

400 m. d/s. 98/6/17


313 m Off Channel?. 98/6/6

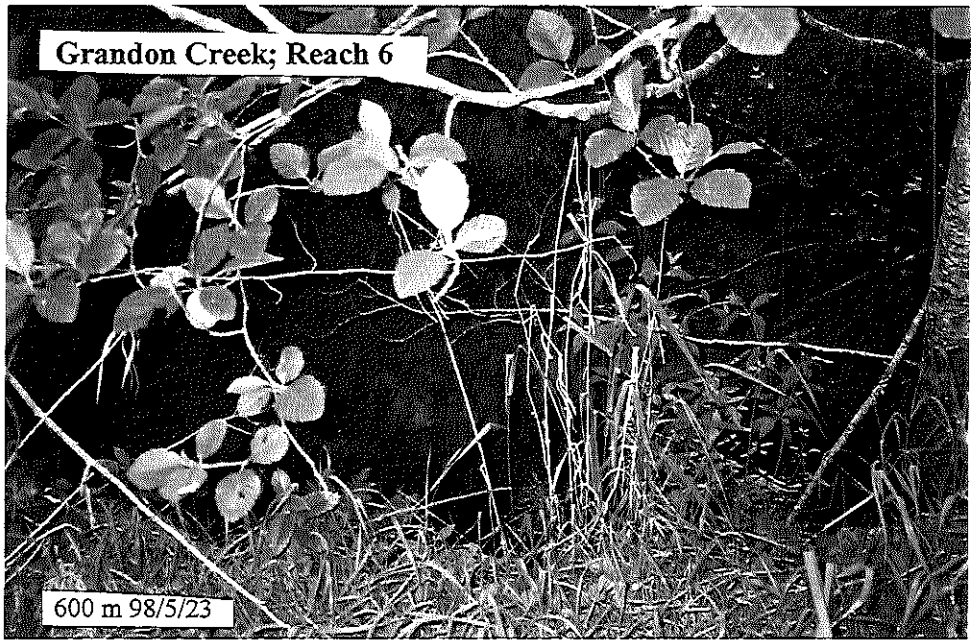
Grandon Creek; Reach 6

Grandon Creek; Reach 6



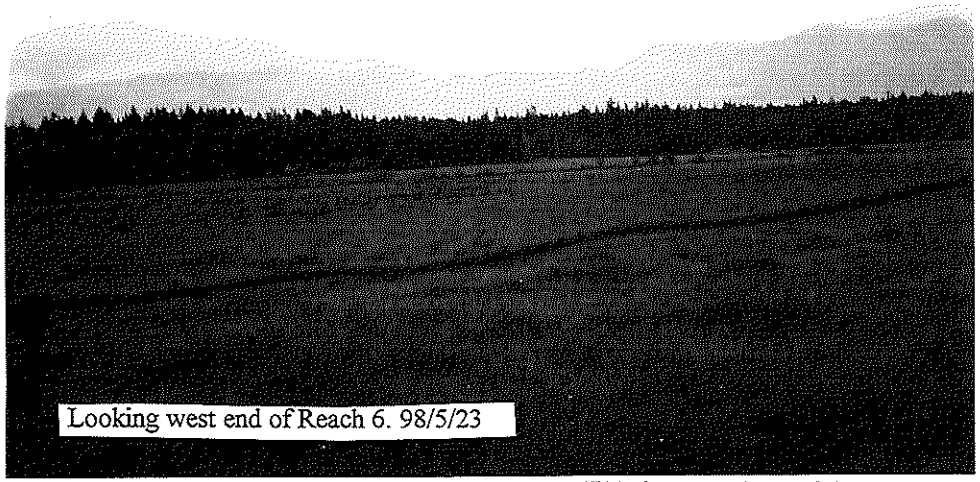

Grandon Creek; Reach 6
350 m 98/5/23.


500m 98/5/23
Grandon Creek; Reach 6


Grandon Creek; Reach 6
600 m 98/5/23

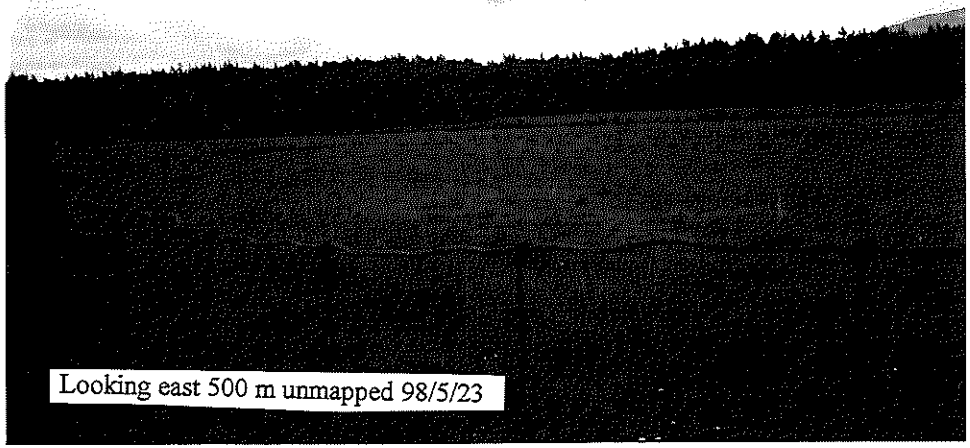

Grandon Creek; Reach 6
835 m. 98/5/23

Grandon Creek; Reach 6



Looking west end of Reach 6. 98/5/23

Grandon Creek; Reach 6



Looking east 500 m unmapped 98/5/23