PEACE/WILLISTON
FISH & WILDLIFE
COMPENSATION
PROGRAM

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Fish Habitat Enhancement Potential And Stocking Assessment Of Upper Manson Lake

A. R. McLean
1991

PWFWCP Report No. 121

The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

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Website: *www.bchydro.bc.ca/environment/initiatives/pwcp/*

This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

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UPPER MANSON LAKE

WATERSHED: Parsnip River

DATE OF SURVEY: July 4. 5. 1991

FIELD CREW LEADER: A.R. McLean

FIELD ASSISTANT: J. Dionne

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FISH AND WILDLIFE BRANCH

REPORT PREPARED BY: A.R. McLean

Lake: **UPPER MANSON**

INTRODUCTION

A standard fisheries baseline reconnaissance of Upper Manson Lake was carried out by the Fish and Wildlife Branch (Prince George) in August of 1979. The report is on file at the Ministry of Environment, Fish and Wildlife Branch, Prince George.

Upper Manson Lake (Plate #1) was investigated in July of 1991 by the Peace Fisheries Compensation Program to identify potential fisheries enhancement projects.

LOCATION

Location:	85 km northwest of Mackenzie		
Elevation:	873 m +/-		
Latitude/Longitude:	55°39'00":124°22'40"	U.T.M.:	10.4133.61679
Management Unit:	7-28	N.T.S. Map No.:	93-N/9 (edition 1)
Drainage:	Manson R. --> Lower Manson L. --> Manson R. --> Williston Reservoir (Parsnip Reach) --> Peace R.		

Plate 1: Panoramic view of Upper Manson Lake, looking north northwest, taken from middle of lake.

Lake: **UPPER MANSON**

METHODS

Two sinking monofilament gill nets (approx. 14 and 6 hour sets) and two minnow traps (approx. 19 and 15 hour sets) were set to determine relative abundance and identification of fish species in Upper Manson Lake (See Appendix 1 for net set details) (See figure 1 for net set locations).

Sportfish species were sampled for length, weight, sex, maturity, stomach contents and parasite/disease presence (Appendix 2). Scale samples were collected for age determination. The total catch and size range of coarse fish species captured during the investigation was also recorded.

The fisheries enhancement potential of any inlets or outlets was determined through visual observation and recording of physical data, using standard methodologies outlined in the Fish/Habitat Inventory and Information Program (1987 Stream Survey Field Guide).

On site anglers were interviewed opportunistically. Salmonid catch per unit effort information was recorded from these anglers and angling undertaken by program staff.

The benchmark set during the initial study (1979) was located (figure 1). Any change in water level was measured using an eslon tape, in combination with a abney level.

Photo documentation of the investigation was also completed (see figure 1 for photo locations).

Manson Lakes - Upper

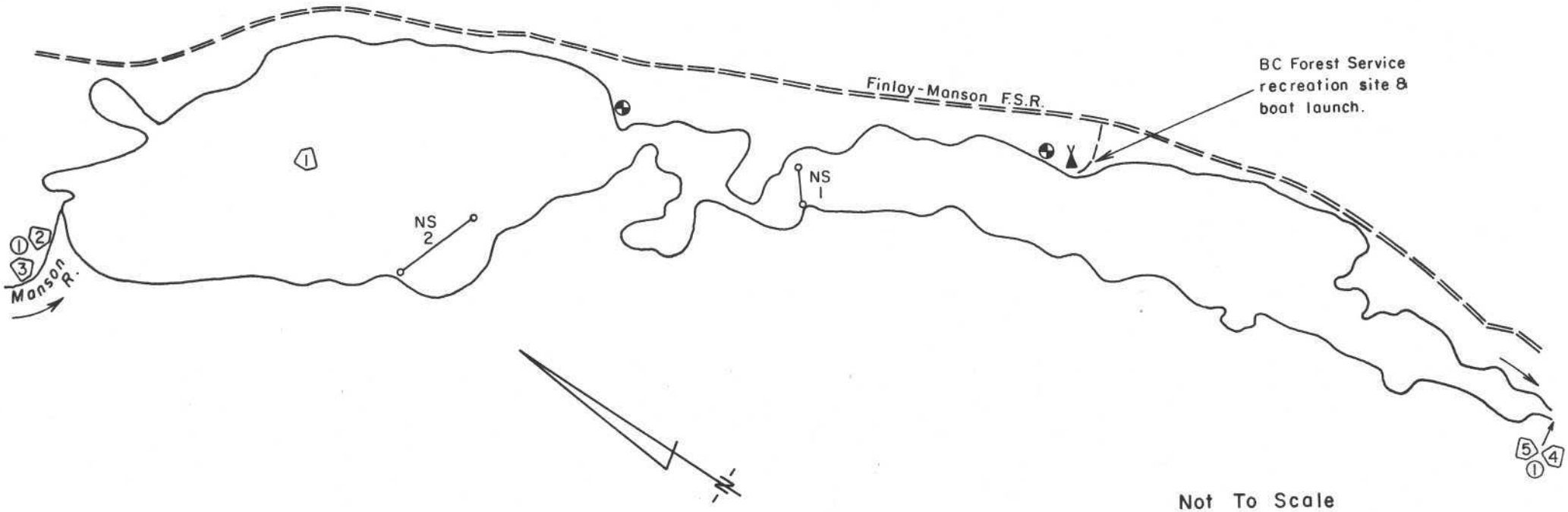

Figure I

Lake: **UPPER MANSON**

RESULTS & DISCUSSIONS

Two overnight net sets yielded 9 rainbow trout, 3 lake trout, 1 bull trout, 1 lake whitefish, 10 mountain whitefish, 6 pygmy whitefish, 3 longnose sucker, 6 coarse sucker, and 4 peamouth chub (table 2). Two minnow traps yielded 1 burbot and 1 redside shiner (table 3).

TABLE 2
LAKE CATCH SUMMARY

Species	Net Site Number				Angled	Other	Total	Number Sampled	Number Preserved	Size Range (cm)
	1	2	3	4						
rainbow trout	1	8			11		20	11		13.1 - 35.0
lake trout	3				1		4	4		28.7 - 49.0
bull trout	1				1		2	2		29.0 - 40.0
lake whitefish	1						1	1		39.2
mountain whitefish	7	3			2		12	8		11.7 - 14.5
pygmy whitefish	4	2					6	6		13.2 - 33.5
longnose sucker	3						3			10.0 - 23.8
peamouth chub	3	1					4			9.5 - 10.0
coarse sucker	2	4					6			32.0 - 40.8

TABLE 3
MINNOW TRAP CATCH

#	Hours	Depth (m)	Substrate	Species	Size Range (cm)
1	19	0.7	cobble	1 burbot 1 redside shiner	19.5 8.5
2	15	0.7	organics	nil	

Bait: Sardines

Lake: **UPPER MANSON**

DRAINAGE

Manson R. - inlet (Plate #2, #3)

Manson River flows into the north end of Upper Manson Lake. The initial 200 m of the river was investigated. Approximately 200 m upstream of the lake, the average wetted width was 10 m (estimate), average depth was 1.3 m, average gradient was 0.1 %, and water temperature was 10°C. Good rearing habitat was noted throughout the inlet creek (LOD, undercut banks). The only spawning habitat observed was in the initial 100 m of the inlet. However, the spawning substrate was covered with a layer of organics.

See point sample card for additional information (Appendix 3).

Plate #2: Upstream view of inlet (Manson R.), taken 200 m upstream from lake.

Plate #3: Downstream view of inlet (Manson R.), taken 200 m upstream from lake.

Unnamed Channel

Unnamed channel is located between the 2 basins of Upper Manson Lake. The channel had an approximate length of 100 m (estimate), average wetted width of 30 m, average depth of 0.6 m, and gradient of 0.2%. Moderate spawning and rearing habitat was noted.

See point sample card for additional information (Appendix 3).

Manson R. - outlet (Plate #4, #5, #6)

The outlet is located at the south end of Upper Manson Lake. The initial 200 m of the river was investigated. Approximately 55 m downstream from the lake, the average wetted width was 20 m and average depth was 0.9 m. Low amounts of spawning habitat was noted. Substrate in the river was covered with a layer of organics and moss. Good rearing habitat was observed (LOD, boulders, undercut banks, overstream vegetation) throughout.

See point card for additional information (Appendix 3).

Lake: **UPPER MANSON**

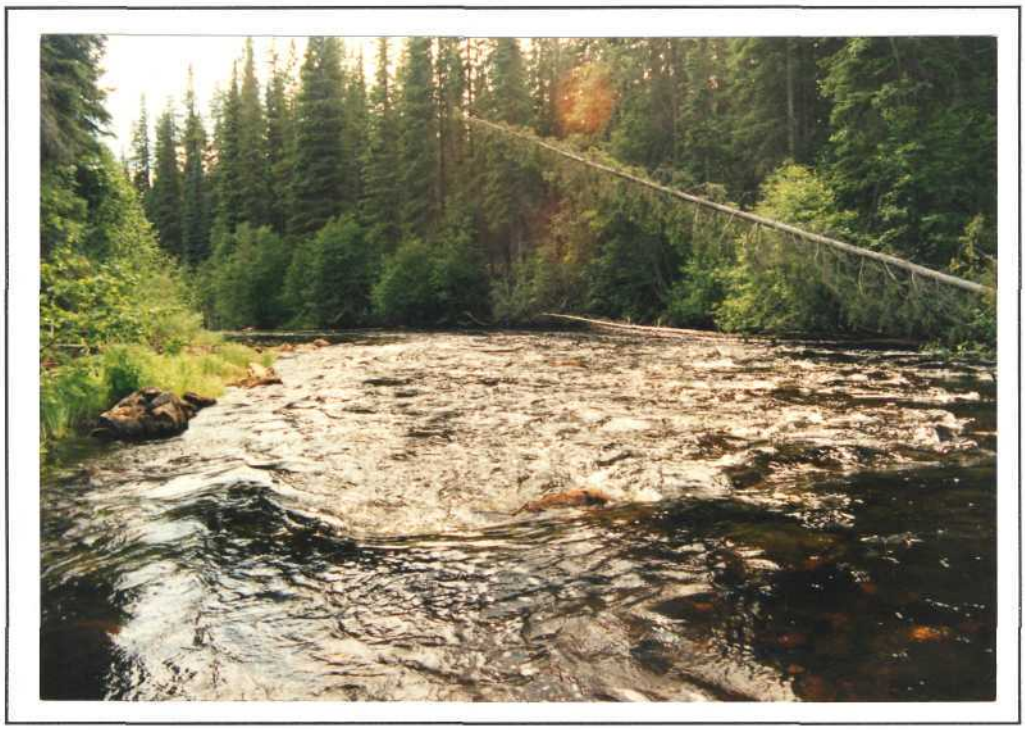

Plate #4: Downstream view of outlet (Manson R.] taken approx. 55 m downstream from lake.

Plate #5: Upstream view of outlet (Manson R.) taken approx. 100 m downstream from lake.

Plate #6: Downstream view of outlet (Manson R.) taken approx. 100 m downstream from lake.

ANGLER USE AND CATCH PER UNIT EFFORT

Local anglers interviewed on site indicated that fishing pressure is high, with angling emphasis on lake trout. Two people fishing for 6 hours yielded 11 rainbow trout, 1 lake trout, 1 bull trout and 2 mountain whitefish. Catch per unit effort was measured at 1.25 fish per hour.

BENCHMARK

Upper basin:

The original benchmark set in 1979 was located in a 47 cm diameter spruce tree, 1.9 m from the lake's edge. The benchmark was originally set 2.0 m above water level. The benchmark is currently 1.85 m above current lake level. A 15 cm rise in lake level is apparent. The benchmark was re-painted (orange).

Lake: **UPPER MANSON**

Lower basin:

The original benchmark set in 1979 was located in a 31 cm diameter spruce tree, 4.0 m from lake's edge. The benchmark was originally set 2.0 m above water level. The benchmark is currently 1.86 m above current lake level. A 14 cm rise in lake level is apparent. The benchmark was re-painted (orange).

MISCELLANEOUS COMMENTS

Redds were observed in the channel separating the 2 basins of the lake.

RESORTS AND CAMPSITES

A B.C. Forest Service Recreation Site is located along the east shore of the lake. The site is complete with picnic tables, firepits, and a boat launch. The Recreation Site is classified as a moderate use site, with 1,067 user days recorded in 1991 (Pers. Comm., J. Ladds, B.C. Forest Service).

Lake: **UPPER MANSON**

FISHERIES MANAGEMENT COMMENTS

Two overnight net sets yielded 9 rainbow trout (average length 24 cm, average weight 174.1 grams), 3 lake trout, 1 bull trout, 10 mountain whitefish, 1 lake whitefish, 6 pygmy whitefish, 4 peamouth chub, 6 coarse sucker, and 3 longnose sucker (indicative of the 1979 netting results). Two minnow traps yielded 1 burbot and 1 redside shiner. Two people angling for 6 hours yielded 11 rainbow trout, 1 lake trout, 1 bull trout and 2 mountain whitefish. The low densities of rainbow trout captured during the investigation may be related to the limited littoral area in Upper Manson Lake. The lake is divided into two basins by a channel 100 m in length. Moderate spawning and rearing habitat was noted in the channel. Numerous spawning redds were observed in the channel, egg to fry survival is likely. The inlet and outlet are sections of the Manson River. The spawning habitat noted in the Manson River during the investigation, was covered with a layer of organics and/or moss, which will impact egg to fry survival. However, good spawning habitat is assured further downstream. (See report, A Fisheries Evaluation of Lower Manson Lake, on file at B.C. Environment, Prince George, B.C.). Good rearing habitat was noted in the inlet and outlet. A high use (Pers. Comm., J. Ladds, B.C. Forest Service) B.C. Forest Service Recreation Site is located on the east shore of the lake.

No physical enhancements were identified or are necessary at this time. Monitoring of native sportfish stocks should be continued. A fisheries evaluation may be warranted in the future as a kokanee population may result from the Manson River kokanee stocking program initiated in 1990.

Lake: UPPER MANSON

APPENDIX 1

Lake: **UPPER MANSON**

NETTING RECORD

Number of panels: 6
Individual panel length: 15.2 m
Mesh sizes experimental order: 25, 76, 51, 89, 38, 64 mm

NETTING SITE #1

Type:	Sinking monofilament		
Date Set:	July 4, 1991	Time:	2035 hrs
Date Lifted:	July 5, 1991	Time:	1015 hrs
Net Dimensions:	Length: 91.4 m	Depth:	2.4 m
Shallow End Mesh Size:	25 mm	Depth:	0.75 m
		Substrate:	cobble/organics
Deep End Mesh Size:	64 mm	Depth:	6.5 m
		Substrate:	organics

NETTING SITE #2

Type:	Sinking monofilament		
Date Set:	July 4, 1991	Time:	1045 hrs
Date Lifted:	July 4, 1991	Time:	1 645 hrs
Net Dimensions:	Length: 91.4 m	Depth:	2.4 m
Shallow End Mesh Size:	25 mm	Depth:	1.0 m
		Substrate:	cobble/organics
Deep End Mesh Size:	64 mm	Depth:	8.5 m
		Substrate:	

APPENDIX 2

Lake: **UPPER MANSON**

INDIVIDUAL FISH DATA

Date Captured: July 5, 1991

Method of Capture: sinking monofilament gillnet

M - Male
F - Female
? - Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

EG - Egg
FR - Fin Ray
HD - Head
ML - Milt
OT - Otolith

SC - Scale
ST - Stomach
TG - Fish Tag
WF - Whole Fish

Species	Fork Lgth. (cm)	Weight (grams)	Sex	Gonadal Maturity	Sample Type	Age (yr.)	Stomach Contents				Comments
							Plankton	Insects	Fish	Other	
rainbow trout	13.1	20	M	IMM	SC	2 +				tapeworms detritus	
rainbow trout	13.7	21	M	IMM	sc	1 +					
rainbow trout	14.8	25	M	IMM	sc	2 +		unidentified insects			
rainbow trout	16.5	25	M	IMM	sc	2 +		unidentified insects			
rainbow trout	22.3	120	F	IMM	sc	3		unidentified insects		tapeworms	
rainbow trout	26.8	210	F	IMM	sc	4 +				detritus	
rainbow trout	26.3	220	F	MG	sc	3		beetles		tapeworms detritus	
rainbow trout	30.0	320	F	MG	sc	4		insects beetles		detritus	
bull trout	29.0	260	F	MG	OT	7				tapeworms	
lake trout	28.7	210	?	IMM	OT	7				tapeworms	
lake trout	43.9	870	F	MG	OT	10			2 unidentified	tapeworms	
lake trout	43.9	.920	F	MG	OT	11			1 unidentified		
mountain whitefish	11.7	16	M	IMM	sc	1 +				unidentified material	
mountain whitefish	12.3	26	?	?	sc	2 +					
mountain whitefish	12.8	18	?	?	sc	2 +		unidentified insects			
mountain whitefish	13.0	20	?	?	sc	2 +					
mountain whitefish	13.6	28			sc	2 +					
mountain whitefish	13.8	28	M	IMM	sc	2 +				empty	
mountain whitefish	14.0	29	?	?	sc	2 +				empty	
mountain whitefish	14.5	30	-		sc	2 +					
pygmy whitefish	13.2	21	?	?	sc	2 +				empty	
pygmy whitefish	21.3	110	M	IMM	sc	3				empty	
pygmy whitefish	26.3	210	F	MG	sc	4				empty	
pygmy whitefish	31.3	400	F	MT	sc	7				empty	
pygmy whitefish	32.2	430	F	MT	sc	9				snails	
pygmy whitefish	33.5	460	F	MG	sc	8		unidentified insects			
lake whitefish	39.2	860	M	MT	sc	6				snails	

Lake: **UPPER MANSON**

INDIVIDUAL FISH DATA

Date Captured: July 5, 1991

Method of Capture: angled

M - Male
F - Female
? - Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

EG - Egg
FR - Fin Ray
HD - Head
ML - Milt
OT - Otolith

SC - Scale
ST - Stomach
TG - Fish Tag
WF - Whole Fish

SPECIES	Fork Length (cm)	Weight (grams)	Sex	Gonadal Maturity	Sample Type	Age (yr)	Stomach Contents				Comments
							Plankton	Insects	Fish	Other	
rainbow trout	32.0	310	-	-	SC	4					
rainbow trout	34.5	470	-	-	SC	5					
rainbow trout	35.0	-		-	SC	4					
bull trout	40.0	660		-	SC	4+					
lake trout	49.0	1,100	-	-	SC	5+					

AGE DETERMINATION COMPLETED BY:
Margaret MacDonald, Box 243, Midway, B.C.

LAKE TROUT AGE DETERMINATION COMPLETED BY:
North/South Consultants Ltd., 2nd Floor,
1474 Chevrier Blvd., Winnipeg, Manitoba, RsT 1Y7

Lake: UPPER MANSON

APPENDIX 3

Lake: **UPPER MANSON**

System Name: **Manson River** **inlet**

Site Location: 200 m upstream from Upper Manson Lake

Date:	July 4, 1991	Time:	1230 hrs
Channel Width:	11 m (estimate)	Water Temp.:	10°C
Wetted Width:	10 m (estimate)	Stage (flow):	moderate
Max. Depth:	1.5 m (estimate)	Velocity:	0.5 m/sec
Avg. Depth:	1.3 m (estimate)	Field Gradient:	0.1 %
Turbidity:	1.5 m	Colour:	gin clear

Flood Signs:

Height: 0.4 m

Type: n/a

Substrate Breakdown:

Fines	Small Gravel	Large Gravel	Cobble
95 %	5 %	--	--
Boulder	**Bedrock**		
-- %	-- %		

Substrate Compaction: low Sand: 10 %

Banks:

	Form	Height	Stability
Right	straight	1.5 m	stable due to rooted vegetation
Left	straight	0.6 m	stable due to rooted vegetation

Comments:

Good rearing habitat noted throughout (LOD, undercut banks).
No spawning habitat observed at sample site.
The initial 100 m of the inlet has moderate spawning habitat, however, gravel is covered in a layer of organics.
Some small debris jams were present on the inlet.

Lake: **UPPER MANSON**

System Name: **Unnamed channel**

Site Location:	Channel separating the 2 basins of Upper Manson Lake.		
Date:	July 6, 1991	Time:	0930 hrs
Channel Width:	30 m	Water Temp.:	14° C
Wetted Width:	30 m	Stage (flow):	moderate
Max. Depth:	0.85 m	Velocity:	0.8 m/sec
Avg. Depth:	0.6 m	Field Gradient:	0.2 % (estimate)
Turbidity:	0.8 m	Colour:	slight tannic

Flood Signs:

Height: n/a

Type: n/a

Substrate Breakdown:

Fines	Small Gravel	Large Gravel	Cobble
15 %	5 %	40 %	40%
Boulder	Bedrock		
-- %	-- %		

Substrate Compaction: low-moderate Sand: 2 %

Banks:

	Form	Height	Stability
Right	flat	1.0 m	stable due to rooted vegetation
Lett	flat	25 m	stable due to rooted vegetation

Comments:

Moderate spawning and rearing habitat throughout.
Redds were observed.

Lake: **UPPER MANSON**

System Name: **Manson River** **outlet**

Site Location: 55 m downstream from Upper Manson Lake

Date:	July 4, 1991	Time:	1600 hrs
Channel Width:	21 m	Water Temp.:	14.5° C
Wetted Width:	20 m	Stage (flow):	moderate
Max. Depth:	1.5 m	Velocity:	0.8 m/sec
Avg. Depth:	0.9 m	Field Gradient:	-- %
Turbidity:	1.5 m	Colour:	slight tannic

Flood Signs:

Height: 50 cm

Type: n/a

Substrate Breakdown:

Fines	Small Gravel	Large Gravel	Cobble
5 %	- %	15 %	75 %
Boulder	Bedrock		
5 % --	%		

Substrate Compaction: moderate Sand: 50 %

Banks:

	Form	Height	Stability
Right	straight	1.0 m	stable due to rooted vegetation
Left	straight	0.9 m	stable due to rooted vegetation

Comments:

The initial 200 m was investigated.
Low amounts of spawning habitat available.
Substrate in river covered with a layer of organics/moss.
Good rearing habitat (LOD, boulders, undercut banks, overstream vegetation).
Sample site is a riffle/glide.