

5C601

SKEENA FISHERIES

CHEMICAL REHABILITATION OF DUNALTER LAKE

October, 1986

by

S. P. Hatlevik

B.C. Ministry of Environment
Fisheries Branch
Smithers, B.C.

ABSTRACT

Dunalter Lake, although located close to Houston and adjacent to Highway 16, provides virtually no angling opportunities to the public. Past rainbow trout (Salmo gairdneri) stocking programs have failed, and the lake is over- run with suckers. Under the auspices of the Habitat Conservation Fund, a chemical rehabilitation project was approved and funding provided over a two year period.

In the first year, (1985/86) the piscicide was purchased. In the second year (1986/87) the coarse fish barriers were constructed and the chemical treatment was successfully completed in October. The lake will sit fallow until Spring, 1987 when fresh water shrimp (gammarus) will be transplanted from Lu Lake. Rainbow trout stocking will commence in Fall 1987 and the lake will be open for sport fishing in June, 1988. The potential for constructing artificial spawning pads in the inlet/outlet streams to enable Dunalter Lake to provide a self-sustaining sport fishery will be examined.

TABLE OF CONTENTS

1.0 INTRODUCTION	1
2.0 REHABILITATION PROJECT OPERATIONS	1
2.1 Pre-Treatment Preparations	1
(a) Coarse fish Distribution	1
(b) Piscicide	3
(c) Pesticide Use Permit Application	4
(d) Federal Research Permits	4
(e) Pesticide Use Permit	4
(f) Public Notification Measures	5
(g) Coarse Fish Barrier Construction	5
(h) Water Level Manipulations	6
(i) Bioassay Results	8
(j) Water Chemistry Results	8
(k) Live Cages	8
(l) Manpower	9
(m) Other Government or Agency Contacts	9
(n) Other Contingencies	9
2.2 Lake Treatment	10
(a) Treatment Plan	10
(b) Application Techniques	10
(c) Live Cage Monitoring Results	11
(d) Summary of Chemical Dispersal	11
(e) Unusual Aspects of Treatment	11
3.0 POST TREATMENT CONSIDERATIONS	12
(a) Budget Summary	12
(b) Stocking Plans	12
(c) Future Activities	13
(d) Concluding Comments	13
(e) Photographic Documentation	14

LIST OF FIGURES

Fig. 1	Location of Dunalter Lake	2
Fig. 2	Location of Barrier Sites and Treatment Area	7

LIST OF TABLES

Table 1	Morphemetry of Dunalter Lake (August, 1982)	3
Table 2	Dissolved Oxygen and Temperature of Dunalter Lake, October 9, 1986	4

LIST OF APPENDICES

1. (a) Noxfish label - Canadian
(b) Noxfish label - United States
2. Bathymetric Map
3. Pesticide Use Permit Application
4. Pesticide Use Permit
5. Public Opinion Survey
6. Newspaper Advertisement
7. Sport Fishing Closure
8. Approval/Licencing from Water Management Branch

1.0 INTRODUCTION

Dunalter (Irrigation) Lake is located on Highway 16 about ten km northwest of the municipality of Houston (Fig. 1). It has a community campground developed by the Houston residents on the west end of the lake and a children's summer camp (Rock Nest Ranch) on the north west portion.

The lake contains remnant populations of resident cutthroat trout (Salmo Clarki), longnose suckers (Catostomus catostomus), and very limited stocked rainbow trout. Present spawning habitat for trout varies from marginal to non-existent depending on the annual flow regimes of intermittent inlet and outlet streams. On the other hand, longnose suckers, which have less stringent spawning habitat requirements, have been observed spawning in the gravels at the public beach (Hatlevik, 1985). Given an abundance of spawning habitat and the fact that suckers have much higher fecundities than trout of similar sizes, the former have gradually taken over the lake to the point where angler success for trout has become extremely poor. It is estimated that Dunalter Lake currently provides less than 100 angler days annually. This figure is expected to increase dramatically with the successful reinstatement of a monoculture trout fishery.

2.0 REHABILITATION PROJECT OPERATIONS

2.1 Pre-Treatment Preparations

- (a) Coarse Fish Distribution - Longnose suckers were distributed throughout Dunalter Lake. In some springs, during high run-off years, they were observed spawning in the intermittent

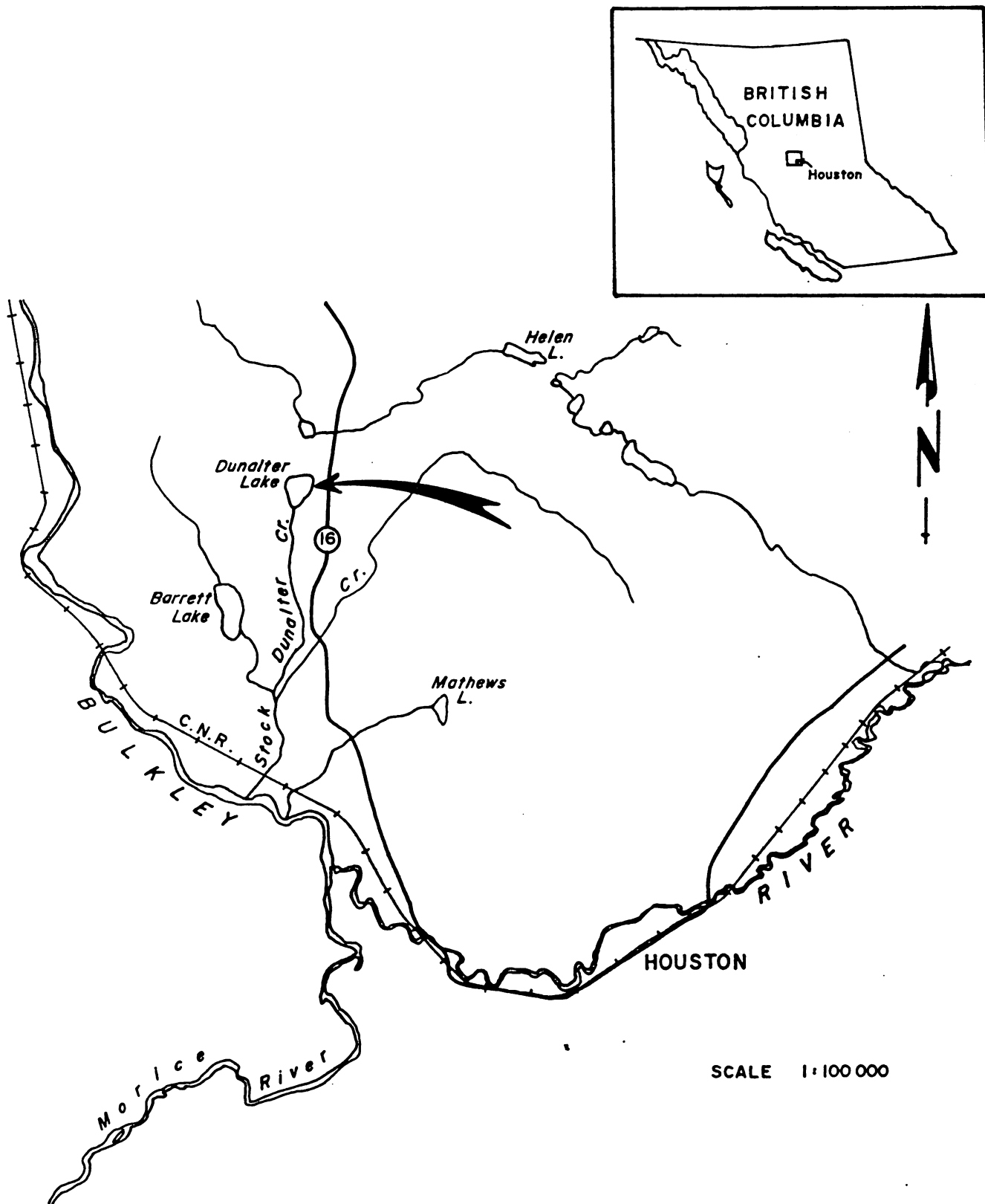


Fig. 1 LOCATION OF DUNALTER LAKE

inlet stream at the north end of the lake. However, during the time of treatment in October the stream was completely dry and, therefore, devoid of suckers.

- (b) Piscicide - the piscicide used was Noxfish 5% unsynergized rotenone, which is registered (P.C.P. Act No. 14558) and approved for use in Canada. The lake was treated at a concentration of 1.5 p.p.m. The total quantity of piscicide applied was 610 U.S. gallons or 508 Imperial gallons. Six days prior to treatment, the lake level was surveyed and referenced to a bench mark established in the 1982 Branch survey. The lake water volume was then calculated to be 1,259,000 cubic meters. Morphometry and lake volumes of various depth strata were calculated. (Table 1.)

TABLE 1. MORPHOMETRY OF DUNALTER LAKE (August, 1982)

Surface	22.5 hectares (55.6 acres)
Volume	1,237,600 cubic meters
Shoreline perimeter	1,913 metres
Maximum depth	18 metres
Mean depth	5.5 metres

Lake volume by strata

<u>Depth Interval (m)</u>	<u>m³</u>	<u>Acre ft.*</u>	<u>Percent</u>
0-2	356,143	288.7	29
2-4	231,021	187.3	18
4-6	180,594	146.4	15
6-8	145,444	117.9	12
8-10	113,381	91.9	9
10-12	86,142	69.8	7
12-14	64,725	52.5	5
14-16	43,298	35.1	4
16-18	16,860	13.7	1
<u>TOTALS</u>	<u>1,237,608</u>	<u>1,003.3</u>	<u>100</u>

*Values are \pm 5 percent due to digitizing error.

A bathymetric map is included (Appendix 2). Dissolved oxygen and water temperature were measured immediately prior to the chemical treatment (Table 2).

TABLE 2. DISSOLVED OXYGEN & TEMPERATURE OF DUNALTER LAKE, Oct. 9, 1986.

<u>Depth (meters)</u>	<u>Temperature(C°)</u>	<u>Dissolved Oxygen (Mg/l)</u>
0	10.5	9.4
1	10.5	9.2
2	10.5	8.7
3	10.5	8.2
4	10.5	6.8
5	10.5	6.2
6	10.2	4.8
7	9.8	4.0
8	8.0	3.0
9	6.5	2.5
10	6.0	2.0
11	5.5	1.0
12	5.0	1.0
13	5.0	1.0
14	4.9	.8
15	4.9	.8
16	4.9	.6
17 (bottom)	4.9	.5

PH surface 6.5

secchi disc 2 meters

- (c) Pesticide Use Permit Application - an aquatic pesticide use permit application was submitted to the Pesticide Control Branch in November 1, 1985. A copy of this form is appended (Appendix 3).
- (d) Federal Research Permits were not required.
- (e) Pesticide Use Permit - a copy of the pesticide use permit is included in Appendix 4.

(f) Public Notification Measures

1. A land title search was made to determine who lived near Dunalter Lake, or would be affected by a decision to rehabilitate the lake. In August 1984, a Fact Sheet and a Survey Form with an addressed and stamped reply envelope was sent to all property owners and interested groups (rod & gun clubs, chambers of commerce, etc.) to solicit their opinions about the proposed chemical treatment (Appendix 5). A total of 31 questionnaires were mailed. Of the 19 who replied, 14 were in favour of the project, 3 were uncertain and wanted more information, 2 had no opinion, and none were opposed.
2. A notification of our intention to treat Dunalter Lake with rotenone was placed in the Houston newspaper "Houston Today" and the Smithers newspaper "The Interior News" for two issues on March 24 and April 26, 1985 (Appendix 6).
3. Dunalter Lake was closed to angling from September 1, 1986 to May 31, 1988. Fisheries Public Notice No 86-47 was posted June 13, 1986 (Appendix 7).

(g) Coarse fish barrier construction

1. Outlet Stream - the outlet stream which flows into the Bulkley River required a fish barrier to prevent potential re-infestation by coarse fish from areas downstream. Construction of this barrier was contracted and the work was supervised by Water Management management staff.

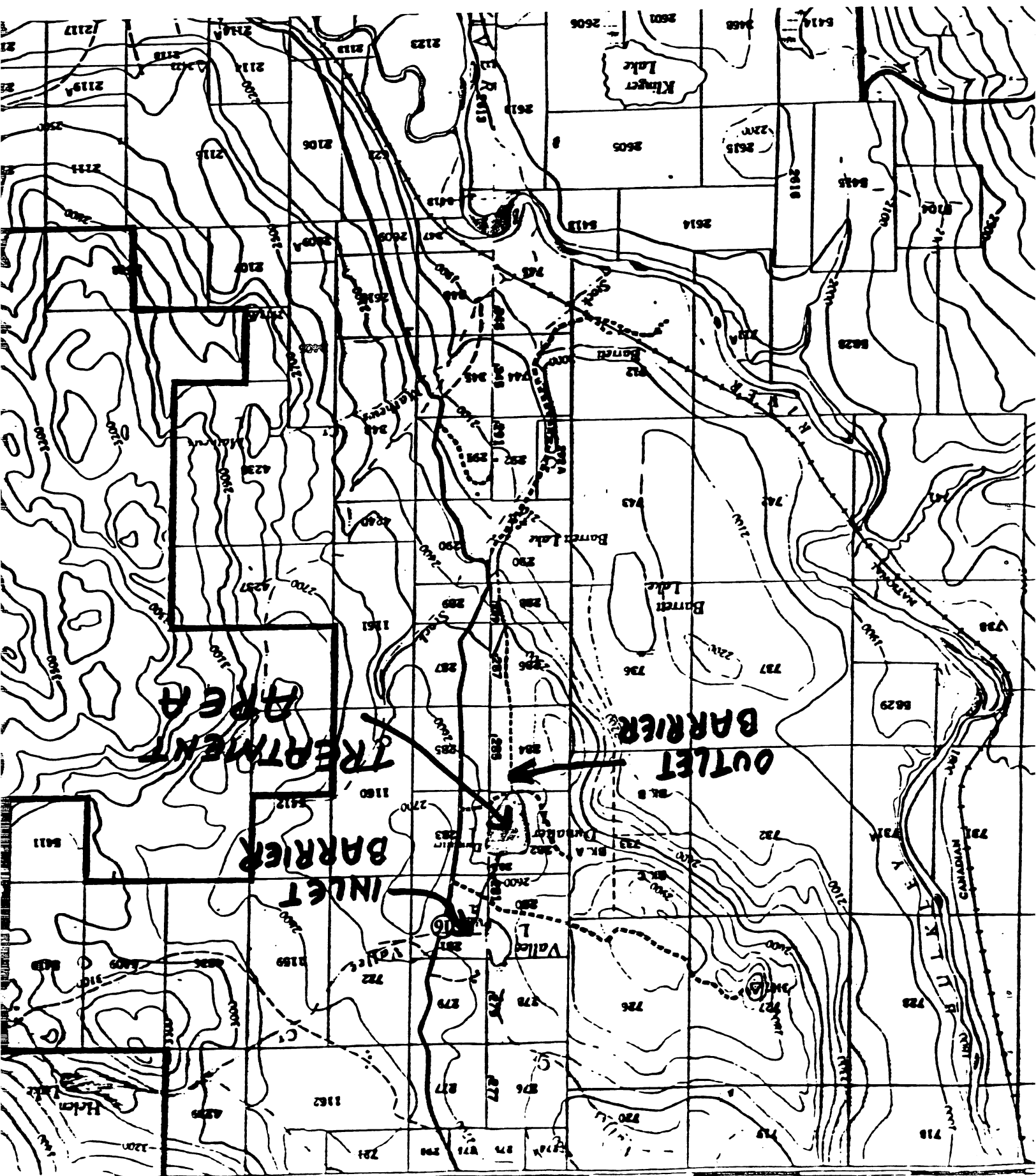
Rough timbers were placed into an appropriate site on the stream channel to create a retaining crib. A small caterpillar (John Deere 450 C) was then used to push in vertical bracing poles, and to backfill the "crib". A water fall approximately 1 meter in height and impossible for suckers to negotiate was created. Photographs of the barriers appear in the photograph section at the end of this report. Fig. 2 shows locations of the inlet and outlet stream barriers.

2. Inlet Stream - the inlet "stream" was simply a drainage ditch dug to divert water from nearby Vallee Creek into Dunalter Lake where it is stored for drawdown later in the year for agricultural purposes. A 16 foot culvert (16" dia.) was installed in the drainage ditch at the junction with Vallee Creek. It was fitted with a slide valve and fine mesh screen to prevent coarse fish entry from Vallee Creek.

3. Approval and licencing from Water Management Branch for barrier construction and instream work was received in November, 1985 (Appendix 8).

(h) Water Level Manipulations - prior water rights had long-since been allocated to a nearby ranch to store and use water from Dunalter Lake for livestock watering and irrigation purposes. Consequently, it was considered inadvisable to attempt to manipulate water levels.

Figure 2. Location of Barrier Sites and Treatment Area



- (i) Bioassay Results - bioassays were done one week prior to treatment. Fish were captured from Dunalter Lake using gill nets and baited minnow traps. Using standard Branch procedures (Taylor, 1984) plastic bags were filled with water and rotenone added to obtain concentrations of 1, 1.5, and 2 ppm. Six suckers of varying sizes were put into each bag including a fourth bag which contained only water for the control group. Within one hour, fish began to show signs of stress, especially those at 2 ppm. After several hours of observation it was concluded that a concentration of 1.5 ppm would ensure a complete fish kill in Dunalter Lake.
- (j) Water Chemistry Results - Water chemistry monitoring results were discussed previously (Part b).
- (k) Live Cages - the day before treatment, fish from Dunalter Lake were caught and put into pens in the lake and held for several hours to ensure they survived the trauma of being captured. A live cage station was set up at the center (deepest part) of the lake. This consisted of a rope anchored with a 5 pound anchor and minnow traps, with entrances pinched closed, tied at depths of 17 meters, 8 meters, and just below the surface. Five suckers were placed into each cage the night before treatment. Before piscicide application began, all cages were inspected. All suckers in the bottom and 8 meter cages

were dead. As the lake had not yet turned over, it was suspected they died of lack of dissolved oxygen. Subsequent measurements at 8 meters and the bottom revealed D.O. concentrations of 2.5 ppm and .5 ppm respectively. Suckers held in a larger cage tied to the dock also survived.

- (l) Manpower - the rehabilitation was carried out by four certified applicators and two assisting personnel. Among these six, one was from out-of-region (Cranbrook), two were from Prince George, and the remainder from Smithers.

- (m) Other Government or Agency Contacts - prior to treatment day, the following provincial government agencies were notified: Pesticide Control Branch (Prince George), Conservation Officer Service (Smithers), and Water Management Branch (Smithers). The Federal Department of Fisheries and Oceans were notified several weeks in advance. Other groups in Houston and Smithers also contacted about the rehabilitation were the hospitals, the R.C.M.P., and the fire departments. Discussions and correspondence occurred with Lands Branch and Department of Agriculture. In addition, the residents of the summer camp on the lake and the ranch with water rights for livestock and irrigation were notified.

- (n) Other Contingencies - there were no provisions to provide drinking water because no one was previously obtaining drink-

ing water from Dunalter Lake. As already mentioned, residents around the lake were notified and advised to keep their pets and livestock away from the lake for a few weeks. The day before treatment began, the lake was posted to inform the public about the rehabilitation.

2.2 LAKE TREATMENT

- (a) Treatment Plan - because the lake was so small it was not considered necessary to section it into quadrants. One person dispensed the piscicide from a supply trailer with a 12 volt pump: two people were assigned to work the perimeter of the lake spraying with back-pack pumps; two people were assigned to car-top boats; and the sixth person served as photographer, assistant rotenone dispenser, and eyewash station attendant.
- (b) Application Techniques - the bulk of the piscicide was applied with two aluminum car-top boats each equipped with cradles and two 10 gallon drums with shut-off valves and garden hose. By gravity feed, the chemical flowed out of the drums through the hose and into the lake where it was mixed by outboard propeller action. Application started at the perimeter of the lake as close to shore as possible and gradually proceeded to the center of the lake. In the deepest part of the lake weighted 3/4 inch diameter, 50 foot length industrial hoses were used to dispense rotenone at greater depths.
- We attempted to set up a pump spray system utilizing a

venturi-effect to dispense rotenone greater distances from the boat into the weed beds. However, these efforts failed because the required venturi T-fitting was not locally available. As noted previously, the inlet "stream" was dry, and, therefore, did not require treatment.

- (c) Live Cage Monitoring Results - at the end of the first treatment day, the fish in the live cages at the center of the lake and those in the pens close to shore were checked. All fish were dead.
- (d) Summary of Chemical Dispensed - the entire available supply of piscicide (508 Imperial gallons) was put into the lake. About 60 gallons were dispensed by long weighted hose into the deepest portion of the lake.
- (e) Unusual Aspects of Treatment - the 12 volt electric pump used for dispensing the rotenone from the trailer into the boats ceased to function after about seven drums had been dispensed. Apparently, the rotenone affected the rubber O-ring seal, on the side plate, causing it to stretch thereby losing its seal. Then the next day, with only one drum left to dispense, the hand pump quit working. Again, it was suspected that rotenone affected the internal working parts. There were no safety mishaps such as spills or splashes.

3.0 POST-TREATMENT CONSIDERATIONS

(a) Budget Summary

Total Budget Allotment (1985 & 1986) \$22,600

Chemical

Chemical Purchase 15,000
Shipping (Kamloops to Houston) 639 \$15,639

Barrier Construction

Contract for cat, gravel truck 1,200
Materials-cement, timbers, gravel,
cable, etc. 936 \$ 2,136

Equipment, Material Purchase, Rentals

-coveralls, raincoats, gloves, goggles,
waders, hardware, film, rentals, misc. \$ 1,750

Contract - Motorhome rental (temporary office/
first aid station/lunch room) \$ 210

Out of Region Personnel Travel \$ 405

Regional Travel & Expense \$ 131

Total Spent to Date \$20,271

Anticipated Future Expenditures:

HCF Public Information Sign 350
Film Processing 100
Regional Travel 100 550

Total Expenditures \$20,821

Anticipated surplus returned to HCF \$ 1,779

(b) Stocking Plans - an application to transplant fresh water shrimp (gammarus) from Lu Lake into Dunalter Lake is currently before the Transplant Committee. If approved, this would be completed in Spring 1987. Stocking would begin in late 1987 with 5,000 "fall fingerling rainbow trout". The objective is

to produce fish ranging in size from .75 kg to 1 kg. Periodic readjustment of the stocking rate may be required to achieve this objective. The lake will remain closed to angling until June 1, 1988.

(c) Future Activities - a public information sign, briefly explaining the project and its benefits, will be put up at Dunalter Lake in Spring 1987. Additionally, the feasibility of constructing artificial spawning pads for the inlet/outlet streams will be examined. Transplanted rainbow trout will be ready to spawn in Spring 1990. It would be very desirable to provide adequate spawning habitat by that date so that Dunalter Lake could become a self-sustaining sport fishery. A water sampling program is currently underway to determine detoxification rates. This will be reported separately after sampling is completed in Spring 1987.

(d) Concluding Comments - there were no special logistical problems encountered in this project. The services of out of region personnel experienced in lake rehabilitations were extremely valuable.

Unfortunately, the operation was not inspected by the Pesticide Control Branch. Commitments elsewhere prevented them from sending a staff member from Prince George.

(e) Photographic Documentation - the next few pages provide a pictorial documentation of the project.

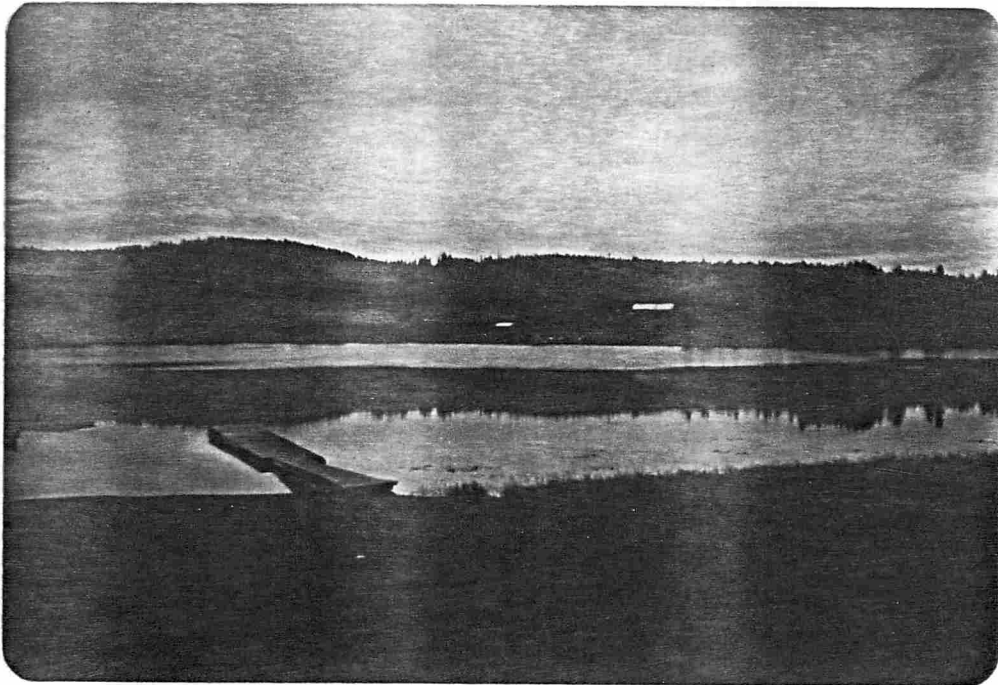


Photo 1. Dunalter Lake, before the start of treatment.

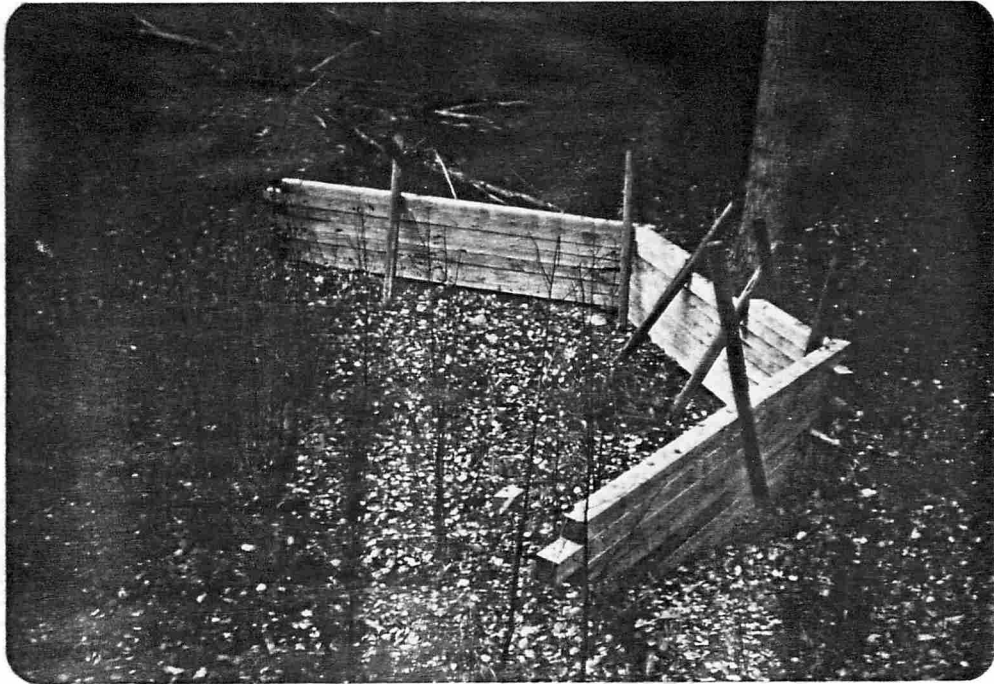


Photo 2. Fish barrier on outlet stream. The crib has been constructed, and after the poles are pushed in, is ready for back-filling.



Photo 3. Back-filling the crib-outlet stream fish barrier.



Photo 4. Fish barrier-inlet stream. A screened culvert has been placed into the drainage ditch connecting Vallee Creek to Dunalter Lake.

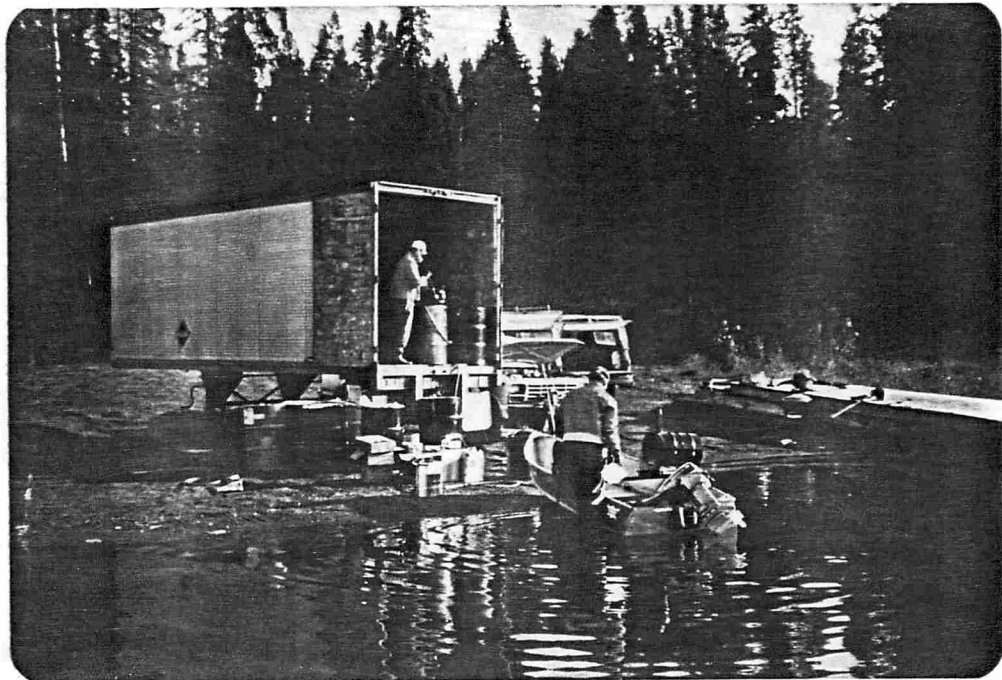


Photo 5. Dispensing rotenone from the storage trailer.

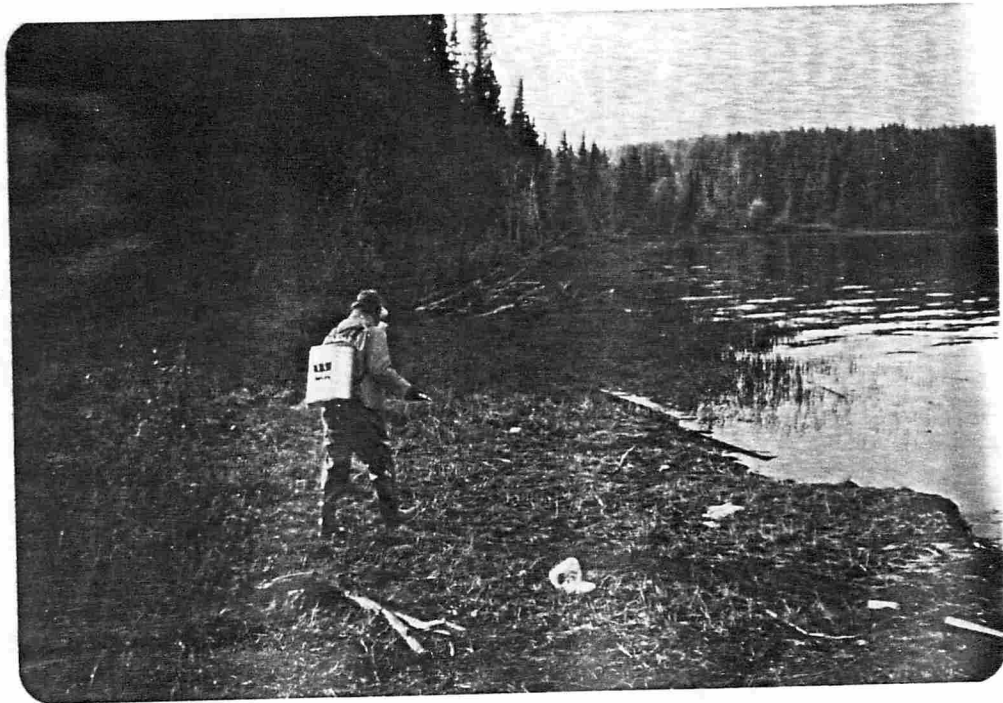


Photo 6. Applying chemical along shoreline with back-pack spray pump.



Photo 7. One of the cartop boats, showing the cradles and drums set-up.

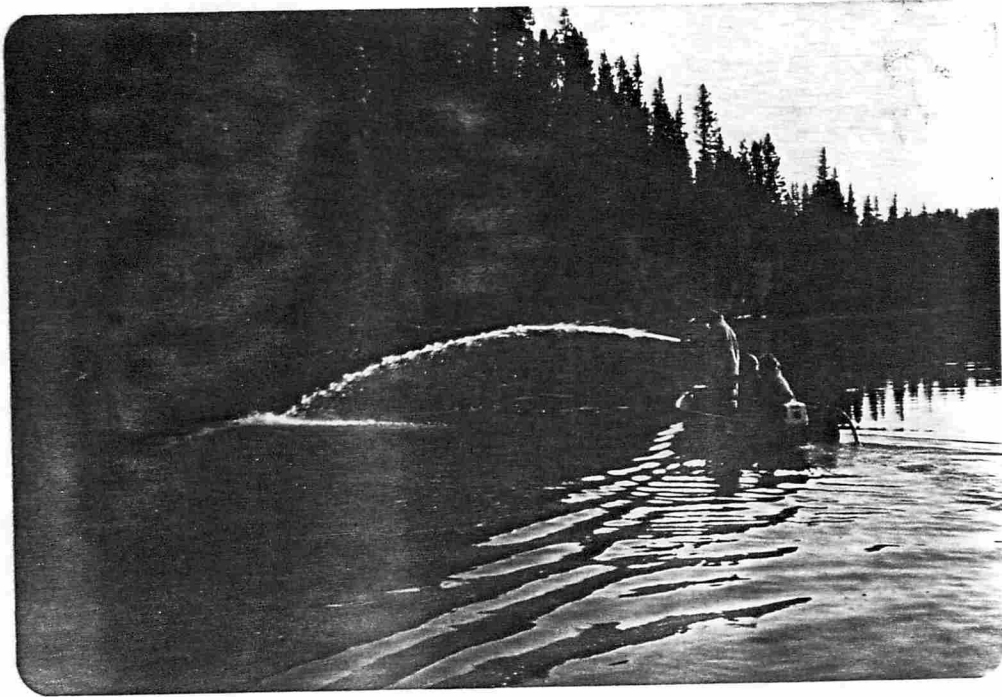


Photo 8. Applying the rotenone with the venturi-type fire pump set-up.

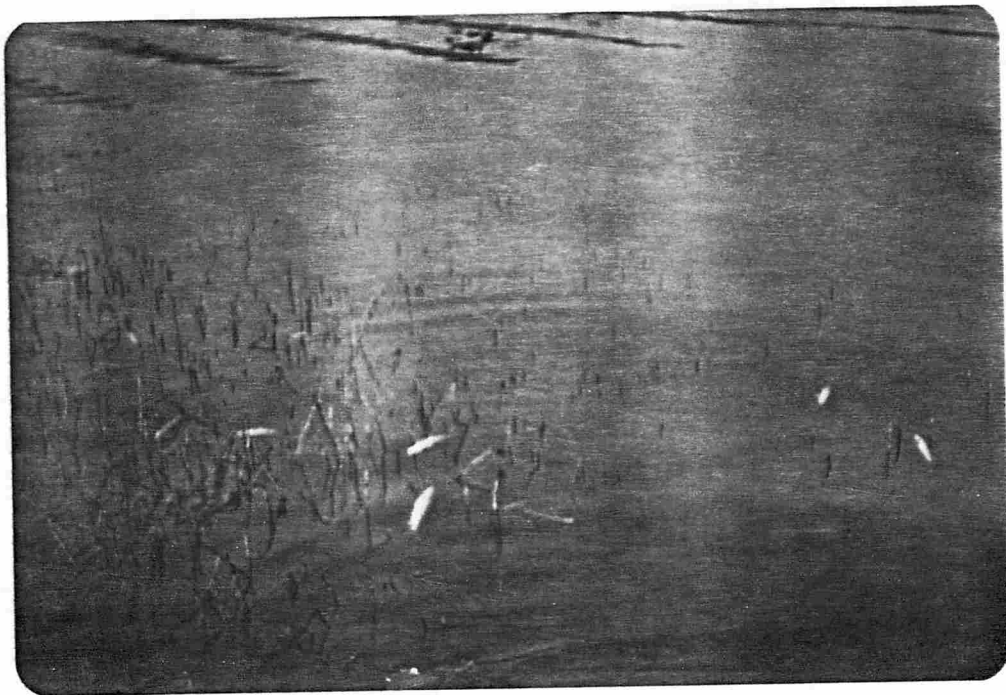


Photo 9. Dead fish several hours after rotenone application.

REFERENCES:

Hatlevik, S.P. May 9, 1985. Memo to file entitled "Dunalter Lake Fish Sampling"; Fish and Wildlife Branch, Smithers, B.C., 2 pages.

Taylor, G.D. Sept. 20, 1984. Memo to Regional Fisheries, Biologists, and Certified Piscicide Applicators outlining standard bioassay procedure for determining various toxicant concentrations of Noxfish 5% unsynergized fish toxicant for lake rehabilitation purposes; Fish and Wildlife Branch, Victoria, B.C., 2 pages.

ACKNOWLEDGEMENTS:

The following are acknowledged for their contribution to this project.

The Habitat Conservation Fund, Victoria, for providing the financial assistance which enabled the project to be undertaken.

G. Oliver, J. Bell, and R. Euchner, out-of-region Fisheries Branch Biologists and Technician, who assisted in the field application of the piscicide.

L. Williamson, Processing Clerk, Administration, who did the land status search.

T. Chamberlin and T. Webber, Biologists, Fisheries Branch, Victoria, who provided lake volume calculations.

E. Riechert, Technician, Water Management Branch, Smithers, who re-surveyed the lake level relative to the established bench mark.

R. Layfield, Draughtsman, Administration, Smithers, who helped in barrier construction, photography, and other aspects of field work.

G. Taylor, R. Hooton, and W. Chudyk who reviewed and edited this report.

F. Lee, who typed this report.

Lastly, and with sorrow Larry Garinger, Engineer, Water Management Branch, Smithers, is posthumously acknowledged for his contribution in designing and supervising construction of the barriers.

APPENDIX 1

(a) Noxfish label - Canadian

(b) Noxfish label - United States

CANADIAN LABEL

NOXFISH™ Fish Toxicant

Liquid Emulsifiable

RESTRICTED

1 1

GUARANTEE
Rotenone
Other cube extractives

50
100

CAUTION



FLAMMABLE



POISON

READ THE LABEL BEFORE USING

REGISTRATION NO. 14.558 PEST CONTROL PRODUCTS ACT

NET CONTENTS

LITERS

PENICK Penick Corporation

1032 Wall Street West, Lyndhurst, NJ 07071 USA

**DIRECTIONS FOR USE
GENERAL INFORMATION**

A specially formulated product containing rotenone, to be used in the management for the eradication of fish from lakes, streams and reservoirs. Noxfish will not solidify nor show any separation at temperatures down to 40°F., and is stable for a minimum of one year when stored in sealed drums at 70°F.

DIRECTIONS

Apply this product only as specified on this label. Noxfish is registered for use by or under permit from, and after consultation with State and Federal Fish and Wildlife Agencies.

FOR USE IN PONDS, LAKES, AND RESERVOIRS

Special Instructions: Water alkalinity, temperature, and turbidity are usually different in each type water. Because these factors change the effectiveness of pesticides, consult your State Game and Fish representative before use to determine the correct concentration of this product needed for the type kill desired. Noxfish disperses readily in water both laterally and vertically, and will penetrate below the thermocline in normally stratified bodies of water. **Computation of Acre-Foot:** An ACRE-FOOT is a unit of volume of a body of water having the area of one acre and a depth of one foot. To determine acre foot in a given body of water, make a series of transects across the water body taking depths with a measured pole or weighted line. Add the soundings and divide by the number made to determine the average depth. Multiply this average depth by the total surface to find the acre foot to be treated. If number of surface acres is unknown, contact your local Soil Conservation Service, which can determine this from aerial photographs. **Amount of Noxfish Needed for Specific Uses:** To determine the approximate number of gallons of Noxfish Toxicant (5% Rotenone) needed, find your "Type of Use" in the first column of the Table below and then divide the corresponding numbers in the third column, "Number of Acre-Foot Covered by One Gallon", into the number of acre-foot in your body of water.

Type of Use	Parts Per Million of Noxfish	Number of Acre-Foot Covered by One Gallon
Selective treatment	0.10 to 0.13	30 to 24
Normal pond use	0.5 to 1.0	3.0 to 2.0
Remove bullheads or carp	1.0 to 2.0	3.0 to 1.5
Remove bullheads or carp in rich organic ponds	2.0 to 4.0	1.5 to 0.75
Prunage treatment above dam	2.0 to 5.0	1.0 to 0.50

Pre-Mixing and Method of Application: Pre-mix with water at a rate of one gallon Noxfish to 10 gallons of water. Uniformly apply over water surface or bubble through underwater lines. **Detoxification:** Noxfish treated waters detoxify under natural conditions within 1 week to 1 month, depending upon temperature, alkalinity, etc. Rapid detoxification can be accomplished by adding chlorine or potassium permanganate to the water at the same rate as Noxfish in parts per million plus enough additional to meet the chlorine demand of the untreated water. **Removal of Taste and Odor:** Noxfish treated waters do not retain a detectable taste or odor for more than a few days to a maximum of one month. Taste and odor can be removed immediately by treatment with activated charcoal at a rate of 30 ppm. for each 1 ppm. Noxfish remaining. (Note: As Noxfish detoxifies, less charcoal is required). **Re-aquating After Treatment:** Wait 2 to 4 weeks after treatment. Place a sample of fish to be stocked in wire cages in the coolest part of the treated waters. If the fish are not killed within 24 hours, the water may be restocked. **FOR USE IN STREAMS, IMMEDIATELY ABOVE PONDS, LAKES, OR RESERVOIRS**

Allow Noxfish to drain from drum directly into center of stream at a rate of 0.55-1.7 oz per minute for each cubic foot of water flowing per second in the stream (0.5-1.0 part per million Noxfish or .225-.55 ppm rotenone).

IMPORTANT: READ BEFORE PURCHASE OR USE

Purchase or use of this product shall constitute acceptance of the following terms of sale and warranty.

The Directions For Use of this product reflect the opinion of experts based on field use and tests. The directions are believed to be reliable and should be followed carefully. However, it is impossible to eliminate all risks inherently associated with the use of this product. Ineffectiveness or other unintended consequences may result because of such factors as weather conditions, presence of other materials, or the manner of use or application, all of which are beyond the control of Penick or the Seller. All such risks shall be assumed by the Buyer.

Penick warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes referred to in the Directions For Use, subject to the inherent risks referred to above. Penick makes no other express or implied warranty. In no case shall Penick or the Seller be liable for consequential, special or indirect damages resulting from the use or handling of this product. Penick and the Seller offer this product, and the Buyer and user accept it, subject to the foregoing Conditions of Sale and Warranty which may be varied only by agreement in writing signed by a duly authorized representative of Penick.

APPENDIX 1 (b)

NOXFISH® FISH TOXICANT

Liquid Emulsifiable

ACTIVE INGREDIENTS:

Rotenone 5.0%w/w
 Other Cube Extractives 10.0%
 INERT INGREDIENTS: 85.0%
 100.00%w/w

amount 150 (benzene) diluent, it keeps rotenone in solution
this doesn't use synergist any more

SPECIMEN

weight by weight } 15% a.i.

WARNING

KEEP OUT OF REACH OF CHILDREN

SEE SIDE PANEL FOR ADDITIONAL
PRECAUTIONARY STATEMENT

PCP registration no = 14558

EPA Est. 432-NJ-1

EPA Reg. No. 432-172

E-29856-P

⑦ NET CONTENTS GALLONS

⑧ - manufacturer
PENICK Penick Corporation

1050 Wall Street West, Lyndhurst, NJ 07071 USA

U.S. label

**HAZARDS TO HUMANS AND DOMESTIC ANIMALS
WARNING**

Poisonous if swallowed, or absorbed through skin. Do not get in eyes, on skin, or on clothing. Wash all contaminated clothing with soap and hot water before reuse.

ENVIRONMENTAL HAZARDS

Keep out of lakes, streams or ponds except under use conditions. Do not contaminate water by cleaning of equipment or disposal of wastes.

PHYSICAL HAZARDS

FLAMMABLE: KEEP AWAY FROM HEAT AND OPEN FLAME.
 FLASH POINT MINIMUM 55°F.

STATEMENT OF PRACTICAL TREATMENT

If swallowed, get medical attention. If in eyes, flush with water and get medical attention. If on skin, wash immediately with soap and water.

call poison control centre

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

STORAGE & DISPOSAL

PROHIBITIONS: DO NOT CONTAMINATE WATER, FOOD, OR FEED BY STORAGE OR DISPOSAL.

PESTICIDE DISPOSAL: PESTICIDE, SPRAY MIXTURE OR RINSE WATER THAT CANNOT BE USED ACCORDING TO LABEL INSTRUCTIONS MUST BE DISPOSED OF ACCORDING TO APPLICABLE FEDERAL, STATE, OR LOCAL PROCEDURES.

CONTAINER DISPOSAL: TRIPLE RINSE (OR EQUIVALENT). THEN OFFER FOR RECYCLING OR RECONDITIONING, OR PUNCTURE AND DISPOSE OF IN A SANITARY LANDFILL, OR BY OTHER APPROVED STATE AND LOCAL PROCEDURES.

P. Kattovich

Faint, illegible text at the top of the page, possibly bleed-through from the reverse side.

Large block of extremely faint and illegible text in the middle section of the page.

Faint, illegible text at the bottom of the page, possibly bleed-through from the reverse side.

APPENDIX 2
Bathymetric Map

APPENDIX 3

Pesticide Use Permit Application



PESTICIDE USE PERMIT APPLICATION

Seven completed copies of this form and maps are required along with one copy of the map on the reverse side of this form. Shaded areas are for Pesticide Control Branch use only. For complete instructions refer to Guide to Applicants.

1. Name of Applicant Ministry of Environment, Fisheries Branch		Applicants File No.		Application No. 125-031-86188	
Address Postal Bag 5000 Smithers, British Columbia VOJ 2N0		Tel. No. 847-7290		Date Received Nov 1, 1985	
2. Name of Contractor N/A		Pest Control Service Lic. No. Presently being applied for		Comment Due JAN 3 1986	
Address N/A				Tel. No. N/A	
3. Permit Category Applied for	Use X	Special Use			
4. a. Pesticide Trade Name Noxfish Fish Toxicant	b. Active Ingredient (common name) Rotenone, other cubé extractives		a.1. Code ROT	c. P.C.P. No. 14558	d. Application Rate (kg a.i./ha) 13.6
				e. Treatment Area (ha) 23	f. Quantity (kg a.i.) 312.3
Additional Information Total active ingredients 15%; inert ingredients (aromatic 150 diluent) 85%.					
5. Target Species Longnose suckers, cutthroat and rainbow trout					
6. Purpose Coarse fish eradication; creation of rainbow trout monoculture					Purpose Code LRP
7. a. Nearest Town Houston, British Columbia					
b. Specific Location 10 km northwest of Houston Dunalter Lk.					NTS Map Ref. 93L5E
8. Application Method Backpack and power sprayers; boat and outboard powered raft.					
Method Code 99					
9. Commencement Date	Yr. 86	Mo. 09	Day 15	Completion Date	Yr. 88
					Mo. 10
					Day 31
10. Aquatic Information		a. 10 metre pesticide-free zone to be maintained on all water bodies and wells		Yes	No X
b. Distance to nearest domestic water intake or well		10 meters			
c. Additional information wells at the proposed time of treatment are not in use.					
11. Land Ownership		Public X	Private X	12. For Special Use Permit Applications	
				a. Research outline submitted	Yes No
13. Name of Project Supervisor W. E. Chudyk/S. Hatlevik				Date	
Tel. No. 847-2427				b. Research report to be submitted by	
				c. Federal authorization for unregistered use	
				Attached	
				To be provided prior to use	
Pesticide Applicator Certificate No. 04257A			Category of Certification Fish and Wildlife (Piscicides)		
14. Signature of Applicant J. C. Wightman for W. E. Chudyk				Title Fisheries Biologist	
				Date of Application November 1, 1985	

Authorization: The above pesticide use is authorized subject to the *Pesticide Control Act* and the additional conditions listed on the covering page. Permit is not valid unless signed by Administrator.

Administrator, Pesticide Control Act

Feb. 27, 1986
Date

APPENDIX 4
Pesticide Use Permit



No. 125-031-86/88

PESTICIDE USE PERMIT

February 26, 1986

British Columbia Minister of Environment
Fisheries Branch
Postal Bag 5000
Smithers, British Columbia
VOJ 2N0

Attention: W. E. Chudyk

The pesticide use as described on the attached application may be carried out in accordance with the Pesticide Control Act and subject to the additional conditions listed below.

Public Notification

- A. The permittee shall publish all or part of the permit in one or more newspapers with local distribution. The published notice shall contain the following information:
- permit number,
 - name, address and telephone number of the permit holder,
 - purpose of pesticide use,
 - location and area of treatment site,
 - pesticide common name,
 - project commencement and completion dates, and
 - information on where copies of the permit and map of the treatment area may be examined in detail.
- B. A copy of this permit and maps of the treatment area shall be posted in a public access area of the premises of the permittee.
- C. The **effective date** of this permit is the day the above public notification requirements have been met and the pesticide use may not be carried out before 16 days following the effective date.
- D. The above public notification requirements shall be met within 30 days of the permit issuance date.
- E. Public access areas of the lake shall be posted with signs advising the public that the treatment has been carried out and such signs shall be maintained until such time as the lake is reopened for fishing.

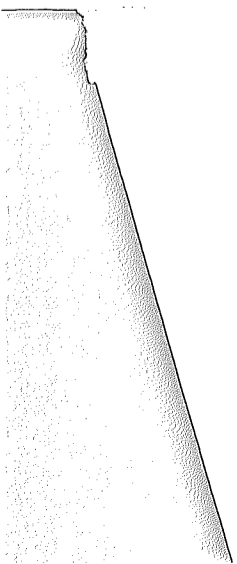
Restrictions

- F. Personnel shall remain on site to prevent the removal of dead and dying fish by members of the public.
- G. Agency notification shall be provided to the following at least 2 weeks prior to the commencement of the project.
- 1) Fisheries & Oceans Canada, Box 578, Smithers, B.C. V0J 2N0 Written notification is required.
- H. All personnel involved in the project shall be notified of the terms and conditions of the permit.
- I. **Follow-up reports** shall be provided to this office on the actual quantities of pesticide used and area treated prior to December 31 of each year in which the permit is effective. Forms are provided for this purpose.

Appeal Procedure A notice of appeal against this permit shall be sent by registered mail or left during business hours at the office of the chairman of the Environmental Appeal Board (Mr. F. A. Hillier, Room 218 - 557 Superior Street, Parliament Buildings, Victoria, British Columbia V8V 1X5) within 15 days of the effective date.

The notice shall contain the name and address of the appellant, the name of agent, if any, for the appellant, the address for service upon the appellant for appeal, particulars relative to the appeal and a statement of the nature of the order requested, and shall be signed by the appellant or on his behalf by an agent.

cc: BCPOC
B. Hlatky



APPENDIX 5
Public Opinion Survey



Bag 5000, Smithers, B.C. VOJ 2NO

YOUR FILE.....

OUR FILE.....

August 13, 1984

☒

Dear Sir or Madame:-

The Fish and Wildlife Branch of the Ministry of Environment, proposes under the auspices of the Habitat Conservation Fund, to produce a quality rainbow trout sport fishery on Dunalter Lake. Presently the lake is heavily infested with longnose suckers and has only a remnant stock of native cutthroat trout. Numerous attempts to introduce rainbow trout into Dunalter Lake have been unsuccessful.

The proposal to rehabilitate Dunalter Lake calls for the elimination of all fish stocks by application of the chemical piscicide rotenone followed by the liberation of hatchery stocked rainbow trout. Although the chemical treatment is not harmful to people, it could produce temporary undersirable tastes and odors in water. Provisions will be made to supply people presently using Dunalter Lake water with alternate drinking water while the chemical remains active (2-6 weeks).

Provided there are no serious objections from concerned citizens, lake residents, or agencies, the project would proceed in 1985.

After reviewing the enclosed fact sheet, please advise this office at your earliest convenience of any comments and/or recommendations that you feel are pertinent to the rehabilitation proposal of Dunalter Lake. For your convenience, we have enclosed a short reply form and a self-addressed stamped envelope.

Sincerely

M.R. Whately
Regional Fisheries Biologist
Northern Region (Skeena)

SH/je
enclosures

FACT SHEET

DUNALTER LAKE CHEMICAL REHABILITATION

A. Project Proposal

A chemical rehabilitation of Dunalter Lake to eliminate undesirable coarse fish; and to prevent re-entry of coarse fish; construction of a fish barrier (water permeable rock dam) on the drainage ditch connecting Vallee Creek to Dunalter Lake; creation of a waterfall barrier on the outlet stream from Dunalter Lake. This will be followed by a shrimp (gammarus) transplant and then an annual stocking program to establish a rainbow trout sport fishery. This project would cost an estimated \$40,000 and would be submitted to the Habitat Conservation Fund for consideration.

B. Background

Local anglers have reported very poor fishing in Dunalter Lake. A total of 6 rainbow plantings (1956-1966) have failed to establish a rainbow trout sport fishery. Longnose suckers, which have been successfully spawning in the lake, are plentiful, and the sport fishery in Dunalter Lake is very poor.

C. Benefits and Implications

1. Removal of undesirable coarse fish species would greatly enhance chances of rainbow trout survival.

2. Construction of barriers on inlet (drainage ditch from Vallee Creek to Dunalter Lake) and outlet would ensure that reinfestation of coarse fish would not occur through natural migration.
3. A stocking program would establish a rainbow trout sport fishery which is anticipated to provide annually;
 - a) 4,000 + rainbow trout (annual stocking rate adjustable)
 - b) up to 2,800 harvestable surplus (i.e. catchables)
 - c) up to 2,500 angler days.

D. Chemical Rehabilitations and Rotenone

The B.C. Fish and Wildlife Branch has been chemically rehabilitating lakes since 1947. In fact, many of British Columbia's most famous lakes including Trap, Courtney-Corbett, Paul, Pinaus and Heffley, were chemically treated to remove all fish and to develop trout monoculture.

In recent years, the most commonly used toxicant has been rotenone. It is an extract of plants of the family Leguminosae (native to South America, Australia and Oceania) and has primary use as an insecticide and a parasiticide, with a secondary use as a piscicide (poisoning fish). It is a common ingredient of many garden sprays and dusts. The roots of rotenone-bearing plants

have been used for centuries by primitive peoples in different parts of the world to stun and kill fish for food.

The primary action of rotenone is as an inhibitor of the cell respiratory metabolism, and it kills fish when coming into contact with their gills. It is not harmful to humans and most other vertebrates but has some temporary effects on zooplankton, insects, and other benthos. Rotenone-killed fish are safe to eat. Our policy, however, is not to provide the public with fish from this type of project. The possibility always exists that the fish died from some other cause and therefore is not edible. Rotenone has been used by the B.C. Fish and Wildlife Branch to rehabilitate successfully nearly fifty lakes.

E. Time Frame

It is planned that the inlet and outlet barriers would be constructed and additional limnological surveys done in the summer and fall of 1985. The chemical rehabilitation of Dunalter Lake is planned for September, 1985. The lake will be stocked with shrimp and then rainbow trout in spring 1986.

F. Enhancement Techniques

1. A downstream coarse fish barrier will be constructed on the drainage ditch connecting Vallee Creek to Dunalter Lake. The purpose of this barrier is to prevent coarse fish from the

Vallee-Helen Lakes drainage from entering Dunalter Lake. The barrier will simply consist of a placement of softball sized rocks within a 2 metre stretch of the ditch. This will still allow water to filter through but will block fish passage.

2. An upstream coarse fish barrier will be constructed on the outlet stream to prevent the migration of coarse fish from the Bulkley River into Dunalter Lake. This will entail the creation of a 1 metre waterfall in the area just downstream from the lake outlet mouth.
3. Up-to-date limnological and biological surveys would be done throughout the summer to determine present fish population structure and distribution of target species, water chemistry, lake volume and flushing rate, etc.
4. During the fall overturn (probably September) Dunalter Lake and the portions of the inlet and outlet streams within the fish barriers would be chemically treated to eliminate completely all species of fish.
5. Dunalter Lake would be allowed to sit fallow, probably until the following spring, when an annual stocking program of 10,000+ rainbow trout would begin. It would be closed to angling until at least fall, at which time the planted fish should have reached a catchable size.

Monitoring would be done throughout the treatment stage. Bioassays would be set up to test the efficiency of the chemical against the target species under prevailing

conditions. Water temperature, dissolved oxygen and pH would be measured to ensure even dispersal and effectiveness of the chemical. Live caging of fish would be done during treatment and afterwards for a period of about six weeks or until the water de-toxified. Testing of the effectiveness of the lake rehabilitation and stocking program would be done by a combination of gill net sets and creel census.

G. Technical Review and Governmental Authorization

A proposal to rehabilitate a waterbody with a chemical piscicide in British Columbia is formally reviewed by:

1. More than one technical staff of the Fish and Wildlife Branch of the Ministry of Environment, and
2. The Pesticide Control Branch of the Ministry of Environment, through an interagency process.

At least ten Federal and Provincial Acts and associated Regulations have bearing on pesticide uses, including chemicals used to rehabilitate waters for fish production. As proposers we have to submit an application, must have a valid Pest Control Service Licence and have staff who are Certified Pesticide Applicators. Additionally, the Federal Government regulates piscicide use under the Federal Pest Control Act.

DUNALTER LAKE FISHERIES ENHANCEMENT PROJECT

REPLY FORM

The Fish and Wildlife Branch would appreciate hearing your views on the proposed Dunalter Lake rehabilitation. Please mark the appropriate box below, and return to the Smithers Regional Office at 3762 Alfred Avenue, or mail in the provided envelope.

Yes, I am in favour of this project.

No, I am opposed to this project.

I am not yet certain whether I am opposed to or in favour of this project.

Comments/Recommendations _____

Name _____ Date _____

Phone No. _____

APPENDIX 6
Newspaper Advertisement

COUNTRY HOME

4-bedroom home on 6.64 acres, one mile from town. 1,640 sq. ft., wood and electric heat. Attached garage and double carport. Also unattached garage. 847-5423. 2p13

1376 sq. ft. family home. 3-bedrooms up, 1 down, 3-piece bath, large ensuite, finished rec room, 90'x150' yard, lawn, garden, sundeck. \$69,700. 846-5686. 8ps15

Highway 16 West of Smithers 35.8 acres. Excellent view some hay, land, financing possible to right party. Phone 847-3068 or 847-9855. 8ps16

4-bedroom home; 3 up and 1 down, full basement with large finished rec room. RSF ardent wood stove. Furnace natural gas heat, all furniture and appliances included. Example: triple door fridge, 30" range, dishwasher, washer/dryer, freezer, microwave, Palliser sofa/chair, hide-a-bed, Roxton coffee and 2 end tables and much more. Right down to the wheelbarrow, gas bar-b-que, lawn mower, weed eater, etc. All appliances only 2 years old. 2 waterbeds, 2 standard beds, 1 queen new \$1,400 just bought, 1 double. Excellent view, mountain range. All bedrooms, all paintings and pictures, kitchen chrome suite. Ask for Rod at 847-4485 or 846-5004. Will take trailer for trade. 8ps16

9.6 acres at 3 km on Lawson Road. Asking \$17,000 o.b.o. Phone 847-9442. 4p15

In Hazelton, near new 3-bedroom house with den and full basement. Fridge and stove included. Near hospital. Call 842-6015 days or 842-6798 3p14

5 acre lot in Telkwa, must sell. Good price. Phone 562-0616. 5p14



British Columbia Buildings Corporation

Sealed Tenders marked "JANITORIAL SERVICES" for the Ministry of Forest Office Building, Highway 62, Hazelton, B.C., for the period of one (1) year will be received up to 3:00 p.m. April 23, 1986 and those available at that time will be opened in public at 4825 Keith Avenue, Terrace, B.C. V8G 1K7.

An on site tour will be conducted on April 9, 1986, at 10:00 a.m. at the Office Building in Hazelton. Tendering documents will be handed out at the tour and all bidding contractors must attend.

For further information please call Walt Hall in Terrace at 638-3221. 2c14



Province of British Columbia

Ministry of Environment

PUBLIC NOTICE OF PESTICIDE USE PERMIT

A Pesticide, number 125-031-86/88, has been issued by the administrator of the Pollution Control Act, to rehabilitate Dunalter (Irrigation) Lake. This lake, located 10 km northwest of Hazelton, B.C., will be treated with rotenone to remove coarse fish species prior to a general restocking with rainbow trout. Treatment, of this 23 hectare water body, will begin on or about September 15, 1986, with completion scheduled for October 31, 1986. The permit has been issued in the name of:

The Ministry of Environment (M.O.E.)
3726 Alfred Ave.
Smithers, B.C.
Telephone: 847-7290.

Copies of both the permit application and a map of the treatment area are available for viewing at the above M.O.E. office. 2c14

APPENDIX 7
Sport Fishing Closure



FISHERIES PUBLIC NOTICE

NOTICE TO SPORT FISHERMEN

Sport Fishing Closure Changes in Region 6

PURSUANT TO THE AUTHORITY VESTED IN THE UNDERSIGNED BY THE BRITISH COLUMBIA SPORT FISHING REGULATIONS UNDER THE FISHERIES ACT, R.S.C. 1970, AS AMENDED, NOTICE IS HEREBY GIVEN THAT EFFECTIVE IMMEDIATELY:

"the close time for sport fishing is varied to the period

- (a) September 1, 1986, to May 31, 1988, in Dunalter Lake in M.U. 6-9,
- (b) December 1 to September 30 in Morice River and tributaries from signs located on opposite shores of Morice Lake near its outlet to Gosnell Creek in M.U. 6-9,
- (c) December 1 to September 30 in Morice River and tributaries from Gosnell Creek to Lamprey Creek in M.U. 6-9,
- (d) January 1 to December 31 in Sustut River and tributaries above signs located immediately below Bear River in M.U. 6-18, and
- (e) December 1 to June 30 in Sustut River and tributaries below signs located immediately below Bear River in M.U. 6-18."

By Order

D. W. NARVER
Director, Fisheries Branch
Victoria, British Columbia



MEMORANDUM FOR THE RECORD

TO: [Illegible]

DATE: [Illegible]

SUBJECT: [Illegible]

[Illegible text block containing the main body of the memorandum, including a circled section.]

APPROVED: [Illegible Signature]

DATE: [Illegible]

[Illegible text at the bottom of the page]

APPENDIX 8

Approval/Licencing from Water Management Branch



Province of
British Columbia

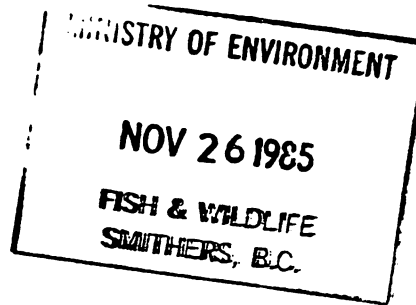
Ministry of
Environment

Water Management
Bag 5000
Smithers
British Columbia
VOJ 2N0

NOV 25 1985

File No: A6-92

Ministry of Environment
Fisheries Branch
Bag 5000
SMITHERS, B.C.
VOJ 2N0



Attention: W. Chudyk

Dear Sir:

Re:- Approval Application - Dunalter and Vallee Creeks

Approval for the above has been granted, and the approval document verifying this is attached.

If you have any questions or concerns regarding the document issued contact the Water Management Branch office.

Yours truly,

L. Williamson
Senior Processing Clerk
Northern Region

847-7280

Encl.

c.c. Deputy Comptroller of Water Rights - Victoria

MINISTRY OF ENVIRONMENT
WATER MANAGEMENT BRANCH
SMITHERS, B.C.

APPROVAL

WATER ACT - Section 7 (1), Clauses (b), (c) and (d)
(Changes in and about a stream)

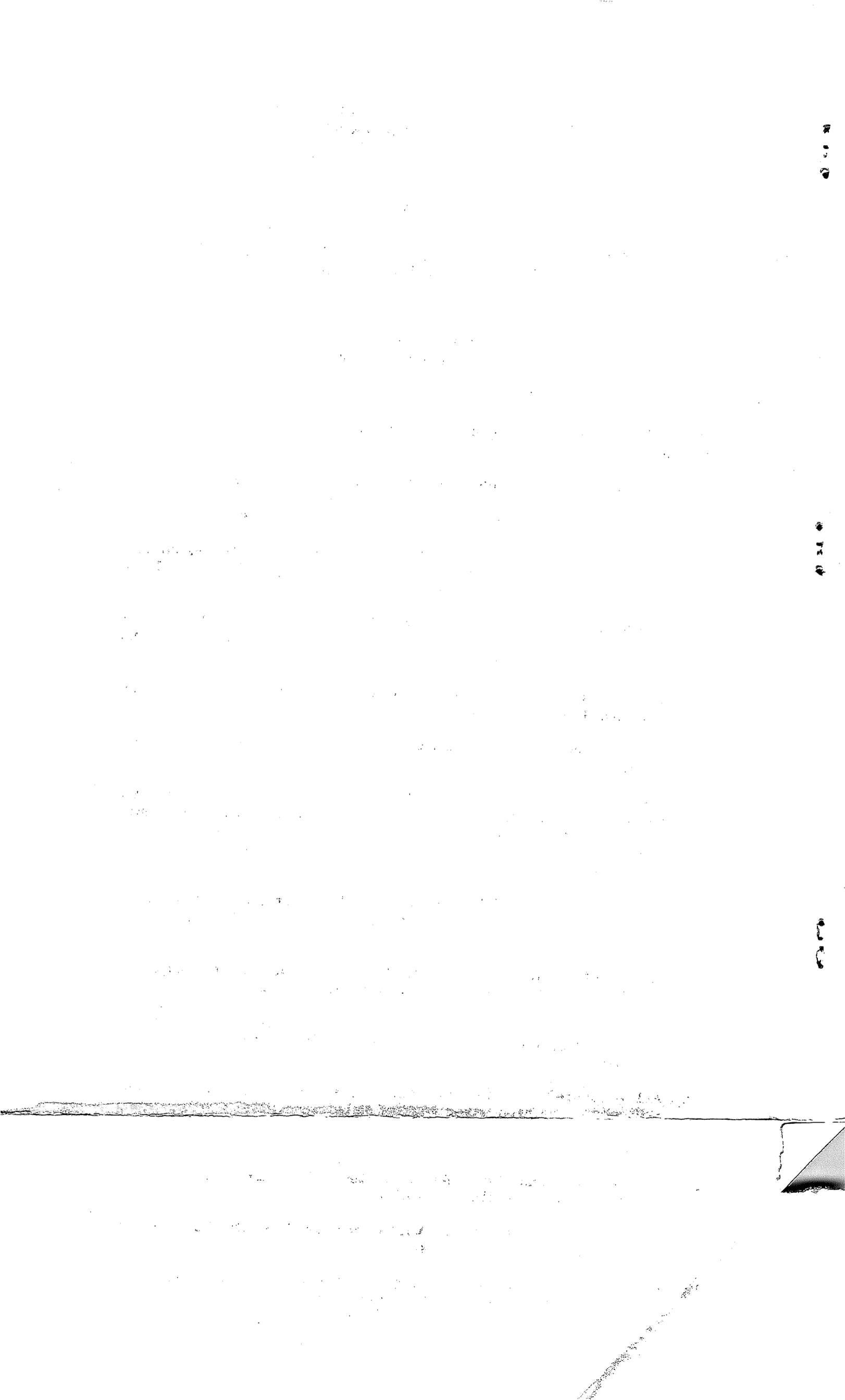
MINISTRY OF ENVIRONMENT
FISH AND WILDLIFE BRANCH

is hereby authorized to make changes in and about a stream as follows:

1. The names of the streams are Vallee and Dunalter Creeks.
2. The changes to be made in and about the stream are :-

Vallee Creek: construction of a fish barrier (metal culvert with fish screen - fore bay and cobble placement downstream)

Dunalter Creek: construction of a fish barrier (low level wooden cribbed drop structure with rock and earth fill).
3. This approval is appurtenant to District Lot 281 and District Lot 284, Range 5, Coast District.
4. This approval does not authorize entry onto privately held or Crown land.
5. The holder of this approval shall take reasonable care to avoid damaging any land, works, trees, or other property, and shall make full compensation to the owners for any damage or loss resulting from the exercise of the rights granted with this approval.
6. Adequate armour shall be placed at the upstream and downstream ends of the culvert to protect the channel of the stream from erosion.
7. The backfill around the culverts shall be placed and compacted in accordance with standard engineering procedures.
8. All disturbed areas of the banks of Vallee and Dunalter Creeks shall be restored to their original condition and protected from erosion.
9. All excavated material and debris shall be placed in a stable area above the high water mark of Vallee and Dunalter Creeks and protected from erosion by planting grass and/or other vegetation.
10. Vegetation along the banks of Vallee and Dunalter Creeks shall be disturbed as little as possible.
11. Any machinery operated in Vallee and Dunalter Creeks shall be free of excess oil and grease.
12. Care shall be exercised during all phases of the work to minimize siltation of Vallee and Dunalter Creeks.



13. Instream work shall be undertaken during the period of November 15, 1985 to March 31, 1987.
14. The completion date for this approval shall be March 31, 1987.

D.W. Roberts

D.W. Roberts, P. Eng.
Regional Water Manager
Northern Region

... ..
... ..
... ..

... ..
... ..
... ..