



FISHERIES of Canada

Index to Vol. 21

July 1968 - June 1969

	Month	Year	Page No.
ALASKA			
Alaska Fisheries	Sept.	1968	20
APPOINTMENTS			
G. Lorne Grant as Chairman, Fisheries Prices Support Board	July	1968	18
Dr. L.W. Billingsley as Associate Editor, Fisheries Research Board of Canada	Aug.	1968	27
Richard A. Crouter as Chief Biologist of the Department of Fisheries' Resource Development Service in Ottawa	March	1969	20
Jack B. Estey as a member of the Fisheries Prices Support Board	April	1969	8
Arthur G. Trickey as Director of Financial Management	May	1969	12
D.A. MacLean as Executive Director, Fisheries Prices Support Board	May	1969	12
Dr. John R. Weir as adviser to the Minister of Fisheries and Forestry on renewable resource development and as Chairman of the Fisheries Research Board of Canada	June	1969	16
ASSISTANCE			
Canada Sends Salted Codfish to Nigeria - Biafra	Dec.	1968	10
Fish for Nigeria - Biafra	Jan.	1969	24
Assistance Program for Groundfish Industry	May	1969	5
Deficiency Payment Program For Salt Cod Fishermen	June	1969	9
Salt Fish Technical Aid Program to Expand	June	1969	20
ATLANTIC			
Atlantic Fisheries Technologists' Meeting	July	1968	7
Pink Salmon Transplanted to Newfoundland	Oct.	1968	9
Canada to Establish Exclusive Fishing Zones	May	1969	3
Groundfish Industry Problems Aired by Fisheries Council	June	1969	3
Contracts Signed for FPC Plant at Canso, N.S.	June	1969	10
Boom in Shrimp Fishing Predicted in Maritimes	June	1969	12
AUTOMATION			
Conference on Automation in Fisheries	Aug.	1968	26
Thousand Delegates Expected at Automation Conference	March	1969	11

AWARDS

Dr. J.P. Tully Receives Medal from France	July	1968	18
Fisheries Exhibit Wins Award	Aug.	1968	4

BENCH MARKS

Tide and Water Level Bench Marks	July	1968	16
--	------	------	----

BLUENOSE

Bluenose Skipper -- Some Reminiscences	Sept.	1968	17
--	-------	------	----

CANADA CENTRE FOR INLAND WATERS

Water Research Centre Gets the Go-Ahead	March	1969	9
---	-------	------	---

COD

Government Buys Surplus Stocks	Aug.	1968	27
Canada Sends Salted Codfish to Nigeria -- Biafra	Dec.	1968	10
Deficiency Payment Program For Salt Cod Fishermen	June	1969	9
Initial Purchase of Frozen Cod Blocks	June	1969	17
Salt Fish Technical Aid Program to Expand	June	1969	20

COMPUTER

Computerized System for Scientific Information	March	1969	22
--	-------	------	----

CONFERENCES

Fishing Vessel Construction Materials	Aug.	1968	5
Automation in Fisheries	Aug.	1968	26
Canada to Host Inspection Conference	Oct.	1968	21
Fishing Vessels of the Future	Nov.	1968	3
Harbours Conference	Nov.	1968	27
Symposium on Biology of Coregonid Fishes	June	1969	10

CONSERVATION

Fisheries Conservation in North Pacific Ocean	Dec.	1968	8
Fisheries Officer is Also 'His Worship'	May	1969	11

CONSUMER CONSULTANTS

Consumer Consultants Meet in Ottawa	July	1968	11
---	------	------	----

CRAB

Test Crab Traps for Efficiency on East Coast	Feb.	1969	3
Processing of Queen Crab	Feb.	1969	10
Warn of Overfishing Queen Crab Stocks	April	1969	3

CUBMARINE

Scientists Use 'Cubmarine' For Underwater Research	Sept.	1968	11
--	-------	------	----

DAVIS

Appointment of Hon. Jack Davis as Minister of Fisheries	Aug.	1968	3
Hon. Jack Davis presents Prime Minister with B.C. Salmon	Dec.	1968	16

DE-ICER

Trawler Off to Iceland to Test New De-Icing Device	Dec.	1968	16
--	------	------	----

ECONOMICS

Report on Costs and Earnings of Newfoundland Fishing Vessels	Jan.	1969	13
Canada's Fisheries in 1968	April	1969	7
Price Stability Program Endorsed	April	1969	8

EDUCATION

New Educational Booklets on Fisheries	Sept.	1968	20
School For Fishermen Planned in Manitoba	Jan.	1969	12

EELGRASS

Control of Eelgrass in Oyster-Growing Areas	Sept.	1968	13
---	-------	------	----

EELS

Tagged Eel Worth \$2	Sept.	1968	5
--------------------------------	-------	------	---

EXCLUSIVE FISHING ZONES

Canada to Establish Exclusive Fishing Zones	May	1969	3
---	-----	------	---

EXHIBITS

Fisheries Exhibit Wins Award	Aug.	1968	4
Mobile Exhibits Tour Atlantic Provinces	Nov.	1968	28
Fish-Product Display Held at Halifax	May	1969	7

EXPORTS

Exports at Record Level in 1967	July	1968	3
---	------	------	---

FISH CONSUMPTION

Fish is 'Magic' Food For Weight Watchers	Dec.	1968	4
Fish-Product Display Held at Halifax	May	1969	7
Why Don't Canadians Buy More Fish?	June	1969	8

FISHERIES COUNCIL OF CANADA

Annual Meeting	June	1969	3
--------------------------	------	------	---

FISHERIES PRICES SUPPORT BOARD

Deficiency Payment Program for Salt Cod Fishermen	June	1969	9
Initial Purchase of Frozen Cod Blocks	June	1969	17

FISHERIES RESEARCH BOARD (see "RESEARCH")

FOOD AND AGRICULTURE ORGANIZATION

FAO Urges Global Pact to Curb Marine Pollution	Dec.	1968	7
World Fish Catch Sets New Record in 1967	Jan.	1969	6
Head of FAO Visits Ottawa	Jan.	1969	12
Discuss FAO Projects	April	1969	20
Tuna Treaty Comes Into Force	May	1969	8

FISH FARMING

Sex Hormone Research Linked to Development of Fish Farming	April	1969	9
--	-------	------	---

FISH-FINDERS

Satellites Used as Fish-Finders	Sept.	1968	12
---	-------	------	----

FISHING SHACKS

Fort Erie Fishing Shacks	July	1968	23
------------------------------------	------	------	----

FISH MEAL

Fish Meal Pilot Plant For Research	July	1968	14
Fish Meal Symposium	Oct.	1968	16
Fish Meal and Oil Symposium	Feb.	1969	7

FISH PROTEIN CONCENTRATE

U.S. to Build FPC Plant	Dec.	1968	14
FPC Development Studies Given High Priority	March	1969	12
Contracts Signed For FPC Plant at Canso, N.S.	June	1969	10

FRESHWATER FISHERIES

Scientists Take Fish Census For Future Harvest	Dec.	1968	12
Commercial Fishing in Manitoba	April	1969	15
Portable Fish Plant Tested in Manitoba	April	1969	21

GREAT LAKES

Pollution Research Centre Opened	July	1968	8
Great Lakes Fish Stocks Continue to Recover	Aug.	1968	28
Great Lakes Fishery	Nov.	1968	8
Water Research Centre Gets the Go-Ahead	March	1969	9
Coho Planted in Great Lakes	March	1969	22

GREENLAND TURBOT

Issue New Ruling on 'Greenland Halibut'	Feb.	1969	6
---	------	------	---

HALIBUT

Increased Trawling Concerns Halibut Commission	March	1969	20
--	-------	------	----

HOOKS

How to Remove a Fish Hook	Oct.	1968	13
-------------------------------------	------	------	----

ICNAF

ICNAF Annual Meeting in London	July	1968	17
ICNAF Mesh Size Regulations Established	Nov.	1968	27
ICNAF Action Sought on Atlantic Salmon	May	1969	8

INDIAN FISHERMEN

New Federal Assistance Program in B.C.	Dec.	1968	7
--	------	------	---

INDUSTRIAL DEVELOPMENT

Glass Reinforced Plastic Fishing Vessels	July	1968	10
Conference on Fishing Vessel Construction Materials	Aug.	1968	5
Automation in Fisheries	Aug.	1968	26
Irish Moss – A Growing Resource	Oct.	1968	3
Canada to Host Inspection Conference	Oct.	1968	21
Fishing Vessels of the Future.	Nov.	1968	3
Harbours Conference	Nov.	1968	27
New Speaker Control System	Dec.	1968	15
Mid-water Trawl Has New Success	Jan.	1969	24
Thousand Delegates Expected at Automation Conference	March	1969	11
Boom in Shrimp Fishing	June	1969	12

INSECTS

Deformed Insects in Lake Erie	Aug.	1968	19
---	------	------	----

INSPECTION

Canada's Fish Inspection Sets a High Standard	Aug.	1968	20
R.M. Bond to FAO, Rome	Sept.	1968	6
Canada to Host Inspection Conference	Oct.	1968	21
'Fisheries of Canada' Seal Denotes Quality Fish.	Dec.	1968	5

INSURANCE

Vessel Insurance	July	1968	10
Fixed Fishing Gear Insurance Plan Cut	Dec.	1968	6

INTERNATIONAL COMMISSIONS, etc.

ICNAF Annual Meeting in London	July	1968	17
ICNAF Mesh Size Regulations Extended	Nov.	1968	27
FAO Urges Global Pollution Pact	Dec.	1968	7
Fisheries Conservation in North Pacific Ocean	Dec.	1968	8
Increased Trawling Concerns Halibut Commission	March	1969	20
North Pacific Fur Seal Commission	April	1969	14
Tuna Treaty Comes Into Force	May	1969	8

LAMPICIDE

Great Lakes Fish Stocks Continue to Recover	Aug.	1968	28
---	------	------	----

LICENCES

New Regulations For B.C. Salmon Fishing	Oct.	1968	8
Appeal Committee Named For Salmon Vessel Licensing Program	Nov.	1968	25
Top Limit Placed on Lobster Boat Licences	Feb.	1969	9
Multiple Licences Limited in Lobster Fishery	May	1969	4

LOBSTER

TBTO — A Treatment For Lobster Traps	Dec.	1968	14
Trends in Canada's Lobster Fishery.	Jan.	1969	7
Top Limit Placed on Lobster Boat Licences	Feb.	1969	9
Wood Preservative TBTO	March	1969	11
New Regulations Ban Sunday Lobster Fishing	April	1969	19
Multiple Licences Limited in the Lobster Fishery	May	1969	4

MARINE BORERS

New Type Protection From Marine Borers	Oct.	1968	17
Wood Preservative TBTO	March	1969	11

MARINE PLANTS

Irish Moss — A Growing Resource	Oct.	1968	3
---	------	------	---

MIDWATER TRAWLING

Four Hundred and Twenty Seven Ton Catch.	Nov.	1968	24
Mid-water Trawl Has New Success	Jan.	1969	24

MINISTER OF FISHERIES

Appointment of Hon. Jack Davis	Aug.	1968	3
Minister Urges International Cooperation	Dec.	1968	3
Hon. Jack Davis Presents Prime Minister with B.C. Salmon	Dec.	1968	16

NIGERIA

Fish For Nigeria — Biafra	Jan.	1969	24
-------------------------------------	------	------	----

NORTH WEST TERRITORIES

N.W.T. Fisheries Advisory Committee Formed	Oct.	1968	21
--	------	------	----

OBITUARY

Dr. Arthur O. Blackhurst	March	1969	10
------------------------------------	-------	------	----

OCEANOGRAPHY

Fisheries Scientists on Trans-Pacific Oceanographic Trip	April	1969	12
--	-------	------	----

OYSTERS

Control of Eelgrass in Oyster-Growing Areas	Sept.	1968	13
Mobile Hatchery Aids Oyster Research	Jan.	1969	3

PACIFIC

New Regulations For B.C. Salmon Fishing	Oct.	1968	8
Pink Salmon Transplanted to Newfoundland	Oct.	1968	9
Appeal Committee Named For Salmon Vessel Licensing Program	Nov.	1968	25
Fisheries Conservation in North Pacific Ocean	Dec.	1968	8
Pacific Fish Chart	Dec.	1968	16
Salmon Catch in B.C. Sets Record in 1968	Feb.	1969	7
Experimental Prawn Trap Fishing in B.C.	March	1969	15
Increased Trawling Concerns Halibut Commission	March	1969	20
Canada To Establish Exclusive Fishing Zones	May	1969	3
Boat-Buying 'Freeze' Announced in B.C.	May	1969	10
Contracts Awarded For Next Phase of Babine Lake Salmon Project	June	1969	17
Research Coordinated on Coho, Chinook	June	1969	19

PATROL VESSELS

'Tanu' Launched in B.C.	July	1968	11
Mrs. Jack Davis Names 'Tanu'	Nov.	1968	9

PERCH

Plan to Stabilize Yellow Perch Prices	May	1969	9
---	-----	------	---

POLLUTION

Pollution Research Centre Opened	July	1968	8
Anti-Pollution and Atlantic Salmon	July	1968	12
Deformed Insects in Lake Erie	Aug.	1968	19
FAO Urges Global Pact To Curb Marine Pollution	Dec.	1968	7
Fisheries Battle Against Pollution	March	1969	3
Water Research Centre Gets the Go-Ahead	March	1969	9
Minister Commends Pulp Mill Action	May	1969	4

PRAWN

Experimental Prawn Trap Fishing in B.C.	March	1969	15
---	-------	------	----

PRESENTATION

Professor T.W.M. Cameron Honored by FRB	June	1969	20
---	------	------	----

PROCESSING

New Plant Revitalizes Canso	Sept.	1968	7
Processing of Queen Crab	Feb.	1969	10
Portable Fish Plant Tested in Manitoba	April	1969	21
Loan Fund Set Up	May	1969	10
Contracts Signed For FPC Plant at Canso, N.S.	June	1969	10
Blast Freezer Effects on Fillets	June	1969	18

QUEBEC

Fisheries Training Vessel For Quebec	July	1968	9
--	------	------	---

QUEEN CRAB

Test Crab Traps For Efficiency on East Coast	Feb.	1969	3
Processing of Queen Crab	Feb.	1969	10
Warn of Overfishing of Queen Crab Stocks	April	1969	3

REGULATIONS

New Regulations For B.C. Salmon Fishing	Oct.	1968	8
Appeal Committee Named For Salmon Vessel Licencing Program	Nov.	1968	25
ICNAF Mesh Size Regulations Extended	Nov.	1968	27

RESEARCH

Pollution Research Centre Opened	July	1968	8
Anti-Pollution and Atlantic Salmon	July	1968	12
Fish Meal Pilot Plant	July	1968	14
Tagged Eel Worth \$2	Sept.	1968	5
Scientists Use 'Cubmarine' For Underwater Research	Sept.	1968	11
Control of Eelgrass in Oyster-Growing Areas	Sept.	1968	13
New Type Protection From Marine Borers	Oct.	1968	17
Marine Ecology Lab Studying Sea's Food Chain	Oct.	1968	22
Longline Lures For Swordfish	Nov.	1968	26
Scientists Take Freshwater Fish Census For Future Harvests	Dec.	1968	12
Mobile Hatchery Aids Oyster Research	Jan.	1969	3
Trends in Canada's Lobster Fishery	Jan.	1969	7
Five New Members Join FRB	Feb.	1969	14
Holed Stones From Georges Bank	Feb.	1969	15
Water Research Centre Gets the Go-Ahead	March	1969	9
Wood Preservative TBTO	March	1969	11
FPC Development Studies Given High Priority	March	1969	12
Experimental Prawn Trap Fishing in B.C.	March	1969	15
Synthetic Fibres Used in Fishing	March	1969	23
Sex Hormone Research Linked to Development of Fish Farming	April	1969	9
Fisheries Scientists on Trans-Pacific Oceanographic Trip	April	1969	12
Portable Fish Plant Tested in Manitoba	April	1969	21
Blast Freezer Effects on Fillets	June	1969	18
Research Coordinated on Coho, Chinook	June	1969	19

RESETTLEMENT

Moving Day in Newfoundland	Jan.	1969	11
--------------------------------------	------	------	----

RESIGNATIONS

R.E.S. Homans Resigns as Maritimes Regional Director	May	1969	12
--	-----	------	----

RESOURCE DEVELOPMENT

Cowichan River Study	July	1968	13
Big Qualicum River Spawning Channel	Sept.	1968	3

Babine Project Passes Halfway Mark	Oct.	1968	14
Resource Development in Maritimes and Newfoundland	Nov.	1968	11
Mactaquac Fish Culture Station Opened	Dec.	1968	9
Fisheries Battle Against Pollution	March	1969	3
Meet the "Riffle Sifter"	April	1969	11
Contracts Awarded For Next Phase of Babine Lake Salmon Project	June	1969	17
Seven Million Fish Distributed in Maritimes	June	1969	19
RETIREMENTS			
H.C.L. Ransom, Administrative Officer, Fisheries Prices Support Board.	Oct.	1968	16
SALMON, ATLANTIC			
ICNAF Action Sought on Atlantic Salmon	May	1969	8
Seven Million Fish Distributed in Maritimes	June	1969	19
SALMON, PACIFIC			
Pink Salmon Transplanted to Newfoundland	Oct.	1968	9
Babine Project Passes Halfway Mark	Oct.	1968	14
Salmon Catch in B.C. Sets Record in 1968	Feb.	1969	7
Coho Planted in Great Lakes	March	1969	22
Boat-Buying 'Freeze' Announced in B.C.	May	1969	10
Contracts Awarded For Next Phase of Babine Lake Salmon Project	June	1969	17
Research Coordinated on Coho, Chinook	June	1969	19
SATELLITES			
Satellites As Fish-Finders	Sept.	1968	12
SEAFOOD			
Seafood Eating Habits	Oct.	1968	24
SEAL			
North Pacific Fur Seal Commission	April	1969	14
SHRIMP			
Shocking Shrimp — A New Fishing Method	Aug.	1968	19
Boom in Shrimp Fishing Predicted in Maritimes	June	1969	12
SQUID			
Anyone For Squid?	Feb.	1969	16
STATISTICS			
Fishery Figures For April 1968	July	1968	20
“ “ “ May 1968	Aug.	1968	30
“ “ “ June 1968	Sept.	1968	21
“ “ “ July 1968	Oct.	1968	25
“ “ “ Aug. 1968	Nov.	1968	29

“	“	“	Sept. 1968	Dec.	1968	17
“	“	“	Oct. 1968	Jan.	1969	25
“	“	“	Nov. 1968	Feb.	1969	17
“	“	“	Dec. 1968	March	1969	25
“	“	“	Jan. 1969	April	1969	22
“	“	“	Feb. 1969	May	1969	13
“	“	“	March 1969	June	1969	21

STRANGE CATCHES

A Walrus Tusk	Sept.	1968	19
Holed Stones From Georges Bank	Feb.	1969	15

SUBMARINE

Scientists Use 'Cubmarine' For Underwater Research	Sept.	1968	11
--	-------	------	----

SWORDFISH

Longline Lures For Swordfish	Nov.	1968	26
------------------------------	------	------	----

SYNTHETIC FIBRES

General Characteristics of Synthetic Fibres Used in Fishing	March	1969	23
---	-------	------	----

TAGGING

Tagged Eel Worth \$2	Sept.	1968	5
----------------------	-------	------	---

TRAINING

Training Vessel For Quebec	July	1968	9
School For Fishermen Planned in Manitoba	Jan.	1969	12

TRAPS

Crab Traps Tested For Efficiency on East Coast	Feb.	1969	3
--	------	------	---

TUNA

Tuna Treaty Comes Into Force	May	1969	8
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TURBOT

New Ruling Issued on 'Greenland Halibut'	Feb.	1969	6
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VESSELS

Vessel Insurance	July	1968	10
Glass Reinforced Plastic Fishing Vessels	July	1968	10
'Tanu' Launched in B.C.	July	1968	11
Conference On Fishing Vessel Construction Materials	Aug.	1968	5
Fishing Vessels of the Future	Nov.	1968	3
Mrs. Jack Davis Names 'Tanu'	Nov.	1968	9
Report on Costs and Earnings of Newfoundland Fishing Vessels	Jan.	1969	13
Vessel Seizure	March	1969	8

WEIGHT WATCHERS

Fish Is 'Magic' Food For Weight Watchers Dec. 1968 4

WHITEFISH

Inland Experiment in Alberta July 1968 19

WORLD FISHING

World Fish Catch Sets New Record in 1967 Jan. 1969 6

World Fish Needs: 100 Million Tons by 1985 May 1969 11



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(formerly Trade News) OF CANADA

Vol. 21 No. 1

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In This Issue

- ★ Fishery Exports at Record Level
- ★ Anti-pollution and Atlantic Salmon
- ★ Fish Meal Pilot Plant for Research

Department of Fisheries of Canada, Ottawa

FISHERIES

OF CANADA

(formerly Trade News)

Editor

E. H. HEARNDEN

July, 1968

C O N T E N T S

FEATURES

Canada's Fishery Exports at Record Level in 1967	3
Pollution Research Centre Opened	8
Anti-Pollution and Atlantic Salmon	12
Fish Meal Plant for Research	14
Fort Erie Fishing Shacks are Link With Past	23

NEWS ITEMS

Fisheries Training Vessel for Quebec	9
Changes in Fishing Vessel Insurance	10
Study Session on G.R.P. Fishing Vessels	10
Consumer Consultants Meet in Ottawa	11
'Tanu' Launched in British Columbia	11
ICNAF Annual Meeting in London	17
Dr. John Tully Honoured	18
Fisheries Prices Support Board Appointment	18
Fish Study Going to the Dogs	19
Unique Experiment in Alberta	19

FISHERY STATISTICS	20, 21, 22
--------------------------	------------

COVER PHOTOGRAPH - Crews from the federal Department of Fisheries' Sea Lamprey Control Experiment Station at Sault Ste. Marie, Ont. are operating this summer in the Georgian Bay area where they plan to treat ten rivers with lampricide. This picture shows an operation to detect young lampreys in the Mad River, near Angus, Ont., using electro-shocking gear.

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Canada's Fishery Exports At Record Level in 1967

EXPORT OF Canadian fisheries products during 1967 had an all-time record value of \$235.5 million—an increase of 7.5 per cent over the previous record of \$219.1 million set in 1966. Shipments went to 77 countries with dried salted groundfish and canned fish the most prominent export items. The value of overall shipments of canned fish and shellfish reached \$42.9 million, compared to \$28.5 million in 1966.

Canada now stands in second place (Japan is first) among the world's leading fish exporters in terms of value.

The Canadian fisheries industry faced a precarious position at the outset of 1967. Prices generally for most frozen fisheries products declined in the important United States market during the fall of 1966. However, overall stocks of frozen fish and shellfish in both Canada and the United States tended to lessen during the first part of 1967 and c.i.f. prices to wholesalers in Boston, Massachusetts, notably for frozen cod blocks, eventually increased from a low of 19 to 20 cents per pound to 25 to 26 cents per pound during the late fall months. There was an air of cautious optimism in the industry that the trade had weathered possibly the most serious storm in the history of the fisheries.

EXPORT INNOVATION

An innovation in 1967 was the export of frozen pink salmon to European and other outlets. The restriction on exports of pink salmon in the frozen state, which had been implemented in 1948, was relaxed in August, 1967—and a fairly large volume entered export trade. While the overall 1967 canned salmon pack was lower than in the previous year, the largest sockeye output since 1958 was processed. Some 559,000 cases were packed in relation to 407,000 cases in 1966.

The trade welcomed the progress made in the Kennedy Round of GATT negotiations in eliminating

duties on numerous fisheries products in the United States as well as reducing tariffs on a significant number of fisheries items in both the United States and Europe. This was tempered by the devaluation

CANADIAN EXPORTS OF FISHERIES PRODUCTS BY COUNTRIES

	1966		1967	
	\$'000	Per cent	\$'000	Per cent
All Areas	219,110	100.0	235,445	100.0
United States	150,647	68.7	145,029	61.6
Total Europe	41,536	19.0	60,939	25.9
Britain	21,384	9.8	32,755	13.9
Belgium and Luxembourg	2,452	1.1	4,093	1.7
France	6,250	2.9	6,826	2.9
West Germany	1,712	0.8	2,024	0.9
Italy	1,083	0.5	1,683	0.7
Netherlands	1,841	0.8	2,709	1.2
Portugal	680	0.3	3,383	1.4
Spain	887	0.4	1,265	0.6
Other	5,247	2.4	6,201	2.6
Total British Caribbean	12,682	5.8	13,685	5.8
Jamaica	7,420	3.4	7,951	3.4
Trinidad and Tobago	1,719	0.8	2,039	0.9
Leeward & Windward Islands	1,572	0.7	1,343	0.6
Barbados	657	0.3	792	0.3
Guyana (British Guiana)	975	0.4	1,196	0.5
Other	339	0.2	364	0.1
Total non-British Caribbean	7,321	3.3	6,278	2.7
Puerto Rico	3,340	1.5	3,310	1.4
Dominican Republic	2,556	1.2	1,534	0.7
Haiti	499	0.2	400	0.2
Cuba	—	—	—	—
Panama	202	0.1	66	0
Other	724	0.3	968	0.4
Total Commonwealth countries	38,423	17.5	52,467	22.2
Britain	21,384	9.8	32,755	13.9
British Caribbean	12,682	5.8	13,685	5.8
Australia	2,232	1.0	3,541	1.5
New Zealand	1,032	0.5	813	0.3
Other	1,093	0.5	1,673	0.7
Total all other countries	2,567	1.2	3,487	1.5
Brazil	266	0.1	158	0.1
Other	2,301	1.1	3,329	1.4

of currencies in several traditional markets for fisheries products including Britain and countries in the Caribbean area.

Fresh and Frozen Ocean Perch and Groundfish Fillets and Blocks (cod and related species)—Imports of these types from Canada into the United States during 1967 amounted to 169.2 million pounds (180 million pounds in 1966 and 177.7 million pounds in 1965). According to preliminary statistics, Canada was the leading supplier of fresh or frozen cod fillets, providing 21.5 million pounds of the 32.1 million pounds that the United States imported. Iceland was the other major supplier with 8.1 million pounds as against 10 million pounds in 1966.

Fresh and Frozen Haddock, Hake, Pollock, and Cusk Fillets—Imports into the United States from all sources totalled 25.7 million pounds with Canada supplying 18.4 million pounds, Iceland 3.7, Norway 2.2 million pounds while Denmark's shipments were lower by 819,000 (1.7 million in 1966).

Ocean Perch or Redfish Fillets—Imports were down at 36.3 million pounds as against 41.6 million pounds in 1966. Shipments from Canada totalled 33.2 million pounds (37.7 million pounds in 1966) and from West Germany 1.7 million pounds (2.9 million pounds).

While overall imports of frozen blocks or slabs into the United States for the manufacture of fish sticks and portions during 1967 were lower, amounting to only 189.5 million pounds (206.6 million in 1966) they continue to be the major import variety of frozen fish. The leading suppliers were: Canada, 96.1 million pounds, Iceland 28.7, Greenland 16.2, Norway 15.4 and Denmark 11.9 million pounds.

These frozen blocks or slabs went to some 54 manufacturers of fish sticks and fish portions, the bulk of them in the Atlantic Coast States. United States production of fish sticks and portions in 1967 totalled 232.3 million pounds, a little above the 1966 output. Fish sticks totalled 73.9 million pounds in 1967, about 7,500 pounds lower than in 1966, although fish portions amounted to 158.4 million pounds, up 11,000 in relation to the previous year.

REDUCED TARIFFS

As a result of the Kennedy Round of GATT negotiations, the United States tariffs on cooked and uncooked fish sticks of 30 and 20 per cent respectively are being reduced by 50 per cent. These reductions are to be phased over five years. The



Cannery workers cleaning freshly-caught B.C. salmon. Canadian exports of canned salmon in 1967 reached 43.5 million pounds, worth \$33.3 million.

first stage went into effect on January 1, 1968. The present duties are 27 per cent for cooked fish sticks and 18 per cent for the uncooked product. The final stage will be reached on January 1, 1972. However, these are still formidable barriers and make it fairly difficult for Canadian firms to compete with the very efficient United States manufacturers of these particular products.

Exports of frozen cod blocks and slabs to Britain were higher in 1967 reaching 7.2 million pounds (\$1.85 million) compared with shipments of 6.98 million pounds worth \$1.5 million in 1966.

Atlantic and Pacific Frozen Salmon—Atlantic and Pacific frozen salmon in whole or dressed form were in demand in 1967. Shipments of frozen coho salmon went to 21 countries with France, Britain, Belgium, United States, and the Netherlands the major outlets. Exports totalled 9.7 million pounds, worth \$7.2 million in comparison with 12.4 million pounds valued at nearly \$8 million in 1966. Frozen spring salmon came second, with sales 8.4 million pounds (\$6.8 million) compared with 6.5 million pounds (\$5 million) in the previous year. The United

States, France and Britain purchased significant quantities.

Shipments of Canadian salted groundfish (cod and related species) amounted to 80.2 million pounds worth \$22.6 million, compared to 70.5 million pounds (\$18.4 million) in 1966. With a weakness developing in the market for frozen cod in 1967, there was a shift in some areas from processing in the frozen form to salted fish. The production of salted cod in Newfoundland was 23 per cent higher than in the previous year.

SALT FISH MARKET

The market position for salt fish in the first part of 1967 was firm. There was no excessive carry-over of stocks on the markets or in the fish producing countries. However, this situation changed in the late fall of the year because of the devaluation of currencies in some of the leading markets, including Jamaica and in such producing countries as Iceland, Spain, and Denmark. Jamaica continues to be the most important outlet—and Portugal, United States, Puerto Rico, and Spain were major purchasers.

Returns for hard dried light salted cod (43 per cent moisture content or less) were higher in 1967. Shipments amounted to 13.2 million pounds (\$3.9

million) in comparison with 11.7 million pounds valued at \$3.2 million in 1966. Puerto Rico, Spain, Portugal, Jamaica, and Italy were the leading outlets. Exports of heavy salted cod (43 per cent moisture content or less) were also up, some 38.2 million pounds worth \$10.5 million as against 30 million pounds (\$7.4 million) in the previous year. Jamaica, Portugal, Puerto Rico, Trinidad, Spain, Leeward-Windward Islands, and Barbados were the main markets. Of considerable interest were the purchases of wet salt cod for further processing by West Germany (2.9 million pounds), Portugal (1.9 million pounds), and Norway (1.2 million pounds).

The overall quantity of salted scale fish (pollock, hake, and cusk) shipped in 1967 declined considerably—some 8.4 million pounds compared with 10.1 million pounds in 1966. Guyana, Puerto Rico, and the Dominican Republic were the chief consumers of salted pollock.

CANNED FISH

Exports of canned fish in 1967 reached 65.8 million pounds (\$40.9 million) as against 47.8 million pounds valued at \$25.8 million in 1966. The major type was canned salmon with the pink, sockeye, and chum varieties showing gains. Shipments of coho were lower than in the previous year. The canned sardine exports at 17.5 million pounds (\$6.2 million) exceeded the 1966 all-time high of 15.9 million pounds worth \$5.5 million.

Canned Salmon—Total Canadian output of canned salmon in 1967 was 1,466,288 cases compared with 1,816,503 cases in 1966.

The United States overall salmon pack in 1967 at 2,077,065 cases was down drastically from the 4,356,515 cases put up in the previous year. Very reduced packs of red or sockeye and pink salmon were noted. The 1967 catch of pink salmon was only 48 million pounds—down from the 163 million pounds taken in 1966. The chum and coho varieties were also lower. No official returns are available on the 1967 salmon packs of Japan and Russia—but it is understood that these outputs were small.

Canadian exports of all species of canned salmon in 1967 reached 43.5 million pounds (\$33.3 million) in relation to 25.5 million pounds valued at \$18.6 million. Canned pink salmon led the other species in quantity and value followed by sockeye, coho, and chum. The principal market for Canadian canned salmon was Britain. Other important outlets

CANADIAN EXPORTS OF FISHERIES PRODUCTS BY FORMS

	1966	1967
	(millions of Can. \$)	
All Fish Products	219.11	235.44
Fresh or frozen	149.37	146.32
Whole or dressed	48.48	46.58
Fillets	69.07	65.95
Shellfish (in shell & meat)	31.82	33.79
Cured	23.94	27.61
Smoked	2.43	2.11
Bloaters and Kippers	1.44	0.93
All other	0.99	1.18
Salted and dried	18.37	22.57
Cod	15.77	20.16
All other	2.60	2.41
Pickled	3.14	2.93
Herring	1.92	1.83
All other	1.22	1.10
Canned Fish and Shellfish	28.51	42.91
Salmon	18.62	33.31
Sardines	5.50	6.19
Lobster	2.59	1.94
All other	1.80	1.47
Miscellaneous	17.29	18.60
Meal	9.42	7.86
Oil	0.80	1.61
All other	7.07	9.13



Exports of hard dried light salted cod from Canada in 1967 amounted to 13.2 million pounds, worth \$3.9 million. Heavy salted cod exports totalled 38.2 million pounds, valued at \$10.5 million.

included Belgium, Australia, Netherlands, France, Italy, Ireland, New Zealand, South Africa, Singapore, Trinidad, Jamaica, Venezuela, Netherlands Antilles, and French Oceania. There were no restrictions on imports of canned fish into Australia, but shipments into New Zealand are under global licence. There has been no change in South Africa where a quota system governs imports of canned fish.

Canned Sardines—The pack in 1967 totalled only 842,870 cases (20 pounds), compared with 1,192,340 cases in the previous year. However, there was a strong demand in traditional markets, and this led to the all-time record high exports by quantity and value. The main outlets were Jamaica, United States, Australia, Dominican Republic, Guyana, Barbados, Britain, Trinidad, South Africa, Austria, New Zealand, Fiji, Surinam, Netherlands Antilles, and Panama.

Exports of molluscs and crustaceans during 1967 were lower in volume but higher in value. Shipments to foreign markets reached 37.7 million pounds (\$35.8 million) in comparison with 41 million pounds valued at \$34.5 million in 1966.

Lobster—Shipments of lobster in the shell, fresh or frozen, during 1967 were valued at \$15.3 million as against \$15.2 million in the previous year. The United States was the major market. However, the increasing demand accounted for important quantities being exported to France, Belgium, the Netherlands, and West Germany. Shipments of lobster meat, fresh or frozen, went chiefly to the United States, although Britain purchased a considerable amount.

Exports of canned lobster in 1967 were worth \$1.9 million, down from the 1966 returns of \$2.6 million—mainly because of reduced landing in 1967, some 35.1 million pounds in relation to 37.3 million pounds in the previous year. The United States, Britain, West Germany, Sweden, and Belgium were the principal outlets.

Scallops—The Canadian catch of scallops in 1967 was the lowest since 1961. Only 13.3 million pounds (\$7.8 million) were taken in relation to 18.3 million pounds valued at \$7.4 million in 1966. This is attributed to the reported continuing decline

in the abundance of sea scallops on the Atlantic Coast.

Exports of fresh or frozen scallops during the calendar year 1967 reached 13.7 million pounds worth \$9.5 million compared with 17.4 million pounds (\$8.8 million) in 1966. The major market was the United States, with France second in importance.

PACIFIC HERRING

The Pacific herring catch continued its severe decline in 1967. A record low of only 58,408 tons were harvested in 1967 worth only \$1.8 million as against 153,826 tons (\$5.1 million) in the previous year. The scarcity of the species resulted in the governmental closure of herring areas during 1967.

The West Coast herring meal output registered 9,678 tons in relation to 27,181 tons in 1966. Production of herring oil in the Pacific region during 1967 amounted to 837,900 gallons in comparison with 3,081,022 gallons.

Landings of Atlantic herring reached 381,860 tons (\$8.2 million) compared with 284,945 tons (\$6.2 million) in 1966. Herring meal put up in the Atlantic provinces amounted to 48,843 tons (25,881 tons) while herring oil output there was 4.3 million gallons (1.7 million gallons in 1966).

Groundfish meal (cod and related species) processed in 1967 totalled 38,156 tons in relation to 41,394 tons. Groundfish body and offal oil production was 411,216 gallons (266,072 gallons) while ground-

fish liver oil was down 350,054 gallons as against 425,730 gallons in 1966.

HERRING MEAL

Exports of herring meal from both coasts amounted to 74.7 million pounds (\$5.9 million) up in quantity from the 73.4 million pounds worth \$6.9 million shipped in 1966. The United States and Britain were the only export markets indicated, with the bulk being sold in the former country.

Canadian exporters of fisheries products were kept informed of world demand and production based on periodic reports received from the Trade Commissioners around the globe. On-the-spot studies in leading outlets were also completed by officers of the Fisheries Division of the Department of Trade and Commerce. A Fisheries Reconnaissance Mission travelled to Eastern Europe in February, 1967, and investigated market prospects for fisheries products in Austria, Czechoslovakia, Rumania, Hungary, and Yugoslavia.

As a special service to the industry, the Department of Trade and Commerce, in co-operation with the federal Department of Fisheries and the Fisheries Council of Canada, has sent fisheries missions to all of the leading fish producing and consuming countries of the world during the past several years.

(The above is a condensed version of an article by T.R. Kinsella, Assistant Director (Fisheries), Agriculture and Fisheries Branch, Department of Trade and Commerce, which appeared in the May 25, 1968, issue of "Foreign Trade").

Atlantic Fisheries Technologists

The 13th annual conference of the Atlantic Fisheries Technologists, attended by industry representatives, Government research, inspection and development agency personnel and businessmen from the Canadian and American Eastern seaboard, the Gulf States and the Great Lakes region, will be held at Hotel Newfoundland, St. John's, Nfld. from September 15-18, 1968. Agenda items will be announced later.

The 1968 Committee (Newfoundland) consists of W.A. MacCallum, Chief, Newfoundland Technological Unit of the Fisheries Research Board of

Canada, chairman; P.P. Russell, general manager, Bonavista Cold Storage Co. Ltd., secretary; and Dr. C.R. Barrett, president, College of Fisheries, Navigation, Marine Engineering and Electronics, member. Other Committee members are: Mrs. Mary H. Thompson (Pascagoula, Miss.), executive secretary, Don McKee (South), Dr. Frank B. Thomas and Norman Durrant (Middle South), John A. Holston and Thomas Fulham (Lower New England), David F. Corney and Peter Jangaard (Nova Scotia), A.W. Lewis (New Brunswick), Eugene Gorman (Prince Edward Island), Armand LaChance (Quebec) and Dr. G.I. Pritchard (Ontario).

Co-ordinated Effort at Burlington

Pollution Research Centre Opened

By **RON GADSBY**
Fisheries Research Board of Canada

Another weapon in the battle against pollution of Canada's inland waters was forged at Burlington, Ont., on May 31. On that date the Hon. Jean-Luc Pepin, Minister of Energy, Mines and Resources, opened the Canada Centre for Inland Waters, a 25,000 square foot complex in which chemists, biologists, engineers, physicists, geologists, economists, sociologists, and other specialists will work together to assess the scope of the pollution problem and devise the proper scientific base from which to solve it.

Drs. F. Ronald Hayes, R.W. Martin and J.P. Tully of the Fisheries Research Board Headquarters, Ottawa, and Dr. Jack Vallentyne of Winnipeg repre-

sented the Board and greeted Mr. Pepin when he visited the FRB section of the huge trailer complex. Dr. Hayes pointed out that the facilities available at Burlington would enhance the already well-established operations of the Freshwater Institute of the FRB on the campus of the University of Manitoba in Winnipeg.

Mr. Pepin said the relatively new Department of Energy, Mines and Resources would be the co-ordinating arm of the federal government's total war against pollution. He recalled that the department came into existence in 1965 and in the short period since that time had given evidence of its vitality and desire to get on with the job.

Mr. Pepin recognized the function of the Fisheries Ministry to preserve natural waters in a



A pollution research laboratory staffed by Fisheries Research Board of Canada personnel forms part of the Canada Centre for Inland Waters recently opened at Burlington, Ont. Shown in the lab are Dr. R.W. Martin, Assistant Chairman, FRB, Ottawa, (left), and Dr. Jack Vallentyne, FRB, Winnipeg.

condition suitable for fish and said that the Fisheries Research Board and the Department of Health and Welfare would be working in conjunction with his department in a joint approach to the problems on the Great Lakes.

The Fisheries Research Board section proved one of the most interesting displays on opening day. In addition to a well-equipped laboratory, an exhibition of photographs illustrating the broad spectrum of Board activities assembled by David Denbigh, of the federal Department of Fisheries, attracted the interest of thousands who visited the Centre on its Open House, June 1.

At the Centre's dock, the public visited the *M.V. Theron*, a 197-foot ship chartered by E.M. & R. and the 147-foot *C.S.S. Limnos*, designed for research in limnology. Each ship is sufficiently large to cope with Great Lakes weather in all seasons.

Mr. Pepin said at a press conference following the opening luncheon that the Canada Centre for

Inland Waters would take the multi-purpose approach to pollution problems. He said that all scientists concerned with pertinent research would have access to its facilities and there would be laboratory space for the university community. It would provide "an interdisciplinary water studies centre" in which scientists studying all phases of water problems could work together," he said.

The Minister stressed that the present accommodation for the Canada Centre for Inland Waters is temporary and it was hoped that a permanent establishment costing between 17 and 20 million dollars, would be completed on the site by 1972. It will place Canada in a position of leadership in the field of water pollution research, he said.

Selection of the site at Burlington was the result of intensive study, the Minister said. He felt it would demonstrate the importance the government placed on the depolluting of the Great Lakes and of almost equal importance was the fact that Burlington is in close proximity to nine universities.

Fisheries Training Vessel for Quebec



The Province of Quebec now has a floating classroom to provide practical experience for students attending the School of Fisheries at Grande-Rivière. The 93-foot training vessel "E.P. Le Québécois" was launched recently at Paspébiac and will be operated by the Quebec Department of Education. Able to accommodate 16 students for sea voyages of up to eight days, the vessel cost about \$800,000 of which the federal Government share is an estimated \$600,000.

Vessel Insurance

Insurance protection provided for commercial fishing boats under the federally-sponsored Fishermen's Indemnity Plan has been extended to cover craft having a maximum appraised value of \$25,000. The new extension, effective June 15, will supersede the previous insurable maximum limit of \$15,000. The minimum appraised value acceptable will remain at \$250.

The extension of the plan to cover boats valued at up to \$25,000 is the result of higher construction costs and the trend by fishermen to obtain larger craft capable of diversified fishing.

The increased insurance coverage is one of several changes in F.I.P. regulations. One amendment extends insurance coverage to fishing boats operating on the 10,000 square-mile Great Slave Lake in the Northwest Territories. Fishing boats operating in the five Atlantic coast provinces and Ontario, British Columbia and the Canadian Arctic

are already covered by the Department of Fisheries insurance scheme.

Other amendments to regulations involve premium rates. The premium of one per cent on fishing craft whose home ports are in Nova Scotia, Newfoundland or British Columbia will be raised to one-and-a-half per cent of the appraised value. Boats eligible for this rate must have an appraised value from \$250 to \$15,000. The one-half per cent premium increase on fishing boats in the two Atlantic provinces and British Columbia was necessitated because of the high loss ratio in those areas.

A two per cent premium will apply to all fishing boats with an appraised value of over \$15,000 and up to the \$25,000 limit. This means that the owner of any fishing boat having an appraised value of \$15,000-plus will pay two per cent of the full appraised value and not just the amount in excess of \$15,000.

The F.I.P. agency has insured nearly 8,000 boats having an appraised value of \$35 million.

Study Session on G.R.P. Fishing Vessels



Among current projects of the federal Department of Fisheries Industrial Development Service is a design and cost feasibility study on a class of G.R.P. (glass reinforced plastic) fishing vessels. Shown during a study session are: right to left (seated) - R. Hart, assistant director, I.D.S.; W.G. Scott, naval architect, I.D.S.; David Pike, Goldharbour (Pty) Ltd., Capetown, South Africa (plastics consultants on the project); Anders Endal of Yeatman, Endal and Company, Halifax (naval architects on the project); and W.W. Johnson, vessel and gear technologist, I.D.S. Standing - A.F. Alexander, marine engineer, I.D.S., and L.W. Proctor, electronics engineer, I.D.S.

Consumer Consultants Meet in Ottawa



Consumer consultants with the federal Department of Fisheries in regional centres across Canada visited Ottawa headquarters for a five-day staff conference recently. Here the visitors and Ottawa staff members watch as J.A.L. Parisien works on the make-up of an issue of "Fisheries of Canada". Left to right: Miss Gwen Leslie, Winnipeg; Miss Jeri Johnson, Toronto; Mrs. Pauline Klosvych, Ottawa; Miss Brenda MacKenzie, Edmonton; Miss Maria Richard, Ottawa; Mr. Parisien; Miss M.J. Myer, Chief, Consumer Branch, Ottawa; Miss Odette Doucette, Halifax; and Mrs. L. Gobeil, Ottawa.

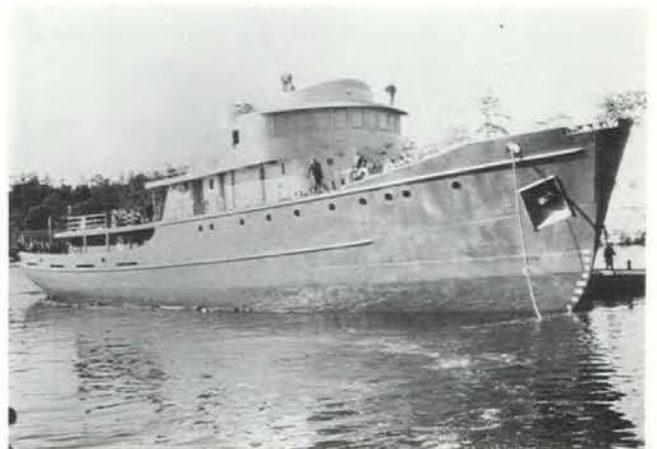
'Tanu' Launched in B.C.

The *Tanu*, a 180 ft. federal Department of Fisheries protection vessel, was launched from Yarrows shipyard in Victoria, B.C. on May 24.

This latest addition to the Pacific Region protection fleet is equipped for off-shore exploratory seining, longlining, and gillnetting. Two Fairbanks-Morse opposed piston engines developing 2,500 horsepower will give a cruising speed of 14.5 knots.

She will be manned by a crew of 22. The new vessel is named after an ancient Indian village located on the east coast of Queen Charlotte Island.

Commissioning ceremonies are scheduled for early September, 1968.



The fisheries protection vessel "Tanu".

Research Breakthrough

Anti-Pollution And Atlantic Salmon

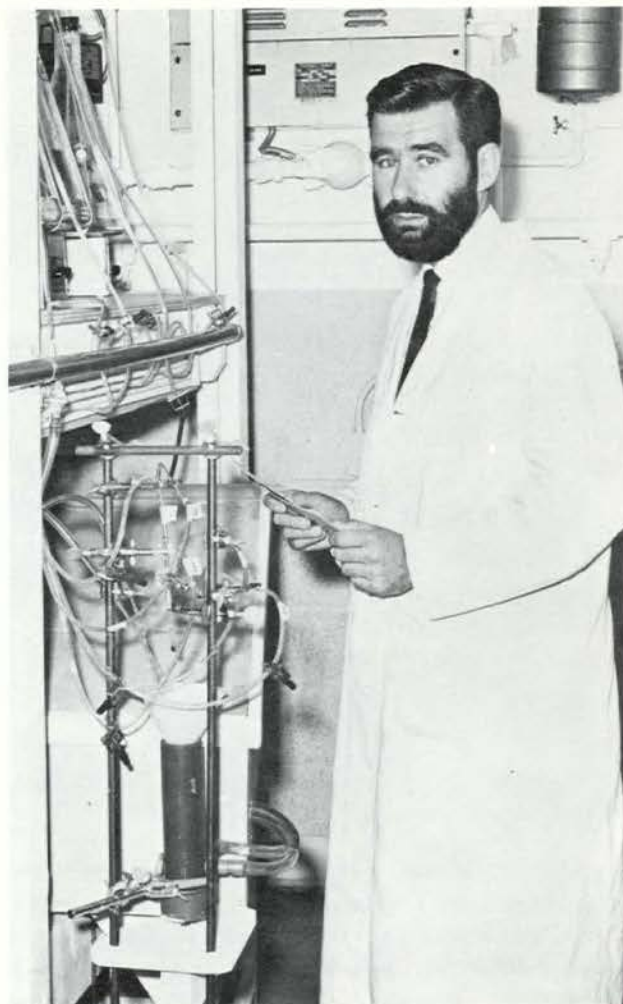
THE WATER Pollution Research Group under Dr. J.B. Sprague at the Fisheries Research Board of Canada's Biological Station, St. Andrews, N.B., has achieved a promising research breakthrough in the form of an "anti-pollutant" substance. It is effective against heavy metal pollution.

Such pollution from base-metal mines has been disastrous for freshwater fish in some parts of northern New Brunswick and in Newfoundland. In particular, runs of Atlantic salmon in major New Brunswick rivers are threatened.

Zinc and copper escape from the mining operations in amounts which may kill small salmon in the stream, or smolts on their way to sea. Even worse, the metals may create "pollution barriers" in rivers. These cause avoidance reactions by adult salmon, even at sublethal concentrations of metal. Adult salmon will not pass through, nor even approach the pollution barrier, when metals reach 80 per cent of the lethal level.

Such pollution is threatening to eliminate the salmon run of the Northwest Miramichi River and could easily do the same for the Restigouche and smaller rivers in the same region.

Control of metal pollution has proved to be exceptionally difficult at certain mines. Conventional treatment methods have reduced pollution considerably, but not enough. This is partly because, in the



Dr. J.B. Sprague at work in his laboratory at the Fisheries Research Board of Canada Biological Station, St. Andrews, N.B.

soft waters of the Maritimes, fish are sensitive to levels of metal which are usually considered "trace" concentrations. For example, young salmon are killed by 0.04 mg/l (p.p.m.) of copper, although this is 25 times lower than the generally accepted safe level for drinking water. As another example, salmon migration is disturbed when copper and zinc reach concentrations which are 125 and 62 times lower than drinking water standards.

The FRB research group has found that a sequestering agent called NTA is effective against this kind of pollution. Several sequestering agents have been tested in the St. Andrews' laboratory; some of them reduced toxicity of metals but the best

was clearly NTA (the sodium salt of nitrilotriacetic acid).

Thorough testing in the toxicity lab during the past year has shown that NTA virtually eliminates short-term lethal action of copper and zinc for salmon and trout. To do this, there must be at least four times as much NTA in the water as there is metal. By itself, the NTA is relatively harmless for fish.

Tests of chronic effects also showed good results. With NTA present, salmon survived a two-month exposure to copper-zinc concentrations which were 40 times higher than the lethal threshold. This much metal should have killed them in a few minutes. Not only did the fish survive for two months, but they quadrupled their weight, growing as well as the control fish held in clean water. These same groups of fish will be examined this summer to see if any pathological conditions developed in the tissues.

AVOIDANCE REACTIONS

The remaining question was whether NTA would help solve the problem of avoidance reactions. Recent laboratory results show that it does. Addition of NTA dampens the avoidance reactions of small salmon to zinc by a ten-times factor. This is great enough to be useful. For example, by holding pollution of the Miramichi to its present level, NTA would get rid of the very real disturbances of salmon migration which have been occurring.

The cost of NTA treatment also seems very favourable – only 30 to 35 cents a pound. NTA will be used commercially to replace part of the polyphosphates which make up a large proportion of household detergents. The polyphosphates are effective water softeners but cause eutrophication of waters.

Some further research is needed. Firstly, a field test to check out lab findings in a natural stream, and to see if NTA also cures metal pollution for mixed populations of aquatic invertebrates. Secondly, it is necessary to rapidly find answers about chemical methods of measuring NTA in natural waters and measuring zinc and copper in the presence of NTA. Ability to make meaningful chemical measurements will be necessary to evaluate performance of NTA in a large-scale pollution situation such as the Miramichi.

Thirdly, the research project which has just started on invertebrates as indicators of severity of mining pollution, becomes even more important. Such biological indicators could be crucial for assessing improvements in mining pollution in future years, when NTA may come into use.

The NTA project is a good example of "scientific cross-fertilization". Scientists around the world know a good deal about "sequestering agents". In effect, sequestering agents link up with various chemicals and remove them from water (water softeners act in this way by sequestering calcium and magnesium in the water).

Research workers at St. Andrews had thought about using such a sequestrant to remove zinc and copper from polluted water, but had never done any experiments. Dr. Gordon Brown, of the New Brunswick Research and Productivity Council, had the same idea and suggested several sequestrants which might be tried. These were partly successful. Then Dr. Stan Ericson, of the U.S. Federal Water Pollution Control Administration research lab in Kingston, Rhode Island, suggested another sequestrant during a visit by Dr. Sprague, and this proved highly successful.

(EDITOR'S NOTE – Although the results of Dr. Sprague's laboratory work are encouraging to fisheries scientists, it will be necessary to await results of field trials before it can be established whether or not NTA can be considered a feasible answer to the problem of dealing with mine wastes in fish bearing waters.)

COWICHAN RIVER STUDY

The federal Department of Fisheries and the British Columbia Department of Recreation and Conservation have agreed to co-operate on a study which will provide an economic evaluation of the commercial and sport fishery resource of the Cowichan River on Vancouver Island.

Field work for the survey will be conducted during the summer and representative fishermen will be asked to provide basic economic information relating to their fishing activities.

One of the major objectives of the study is to provide background information that is needed to assess the economic effect on the fisheries resource of various flood control programs that have been proposed for the Cowichan River.

Fish Meal Pilot Plant for Research

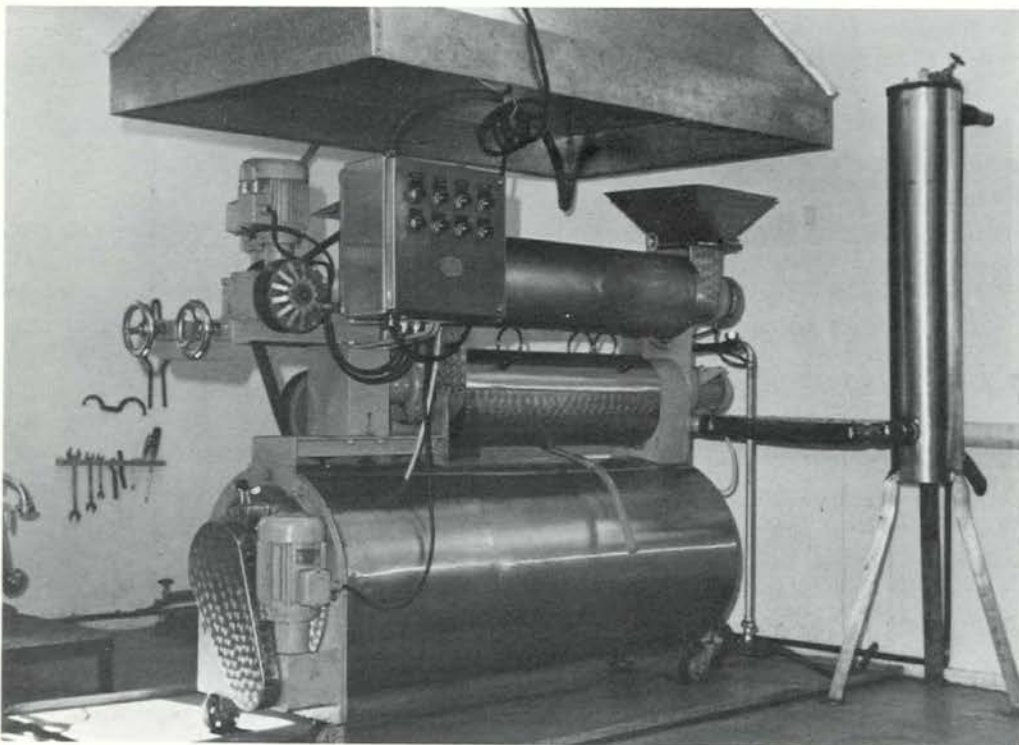
BY F.G. CLAGGETT

OVER THE past 15 years the results of numerous investigations on fish meal and related by-products have been published from the Vancouver laboratory of the Fisheries Research Board of Canada in collaboration with the Poultry Science Department of the University of British Columbia. Much remains to be done, especially regarding utilization of unexploited species, antioxidant application and oxidation mechanisms.

During these years the investigators have encountered many problems in sample preparation due to the dependence on commercial reduction

plants for meal supplies. Among the problems are the seasonal nature of production, strikes, marketing difficulties and scarcity of fish. In addition, the comparatively large size of local reduction plants has made it difficult to obtain samples under special conditions or from small lots of fish.

For some time these investigators have envisaged the need of a small reduction plant for production of meals as they are needed and produced under controlled conditions. In 1967 money was made available for purchase of a small reduction plant by the Industrial Development Service of the Department of Fisheries, and it was erected on



Basic unit of the fish reduction plant at the FRB's Vancouver laboratory.

property recently acquired by the Fisheries Research Board of Canada in West Vancouver.

The layout of a modern fish reduction plant showing the major pieces of equipment is given in Figure 1. Numerous additional pieces of equipment are required in a pilot plant to give flexibility in operation, and to facilitate handling, testing and storage of fish, meal, oil and solubles.

Fifty pounds of meal is the minimum required for most poultry feeding studies, so a plant had to be chosen to produce at least this amount per day. To allow for warm-up of the equipment, and cleaning after production, a rate of 10 pounds of meal per hour (or about 50 pounds of fish) was chosen as the desired size.

Although most reduction plants are of the flame-dryer type, the trend in new plants has been to installation of steam-dryers. These allow better control of operating conditions and hence have less tendency to scorch the meal during drying. Not only is the quality of meal produced more consistent, but the stack gases may be more easily deodorized by water washing.

PLANT FROM DENMARK

A plant of the size desired was offered for sale by the Chemical Research Organization of Esbjerg, Denmark, and was purchased for our use. It is planned to house this plant in the projected new buildings to be erected by the Fisheries Research Board of Canada on the site of the old Great Northern Cannery in West Vancouver. In the meantime a temporary 20 by 24 foot structure was erected on the site to house the equipment.

The basic unit consists of a cooker, press and dryer built one on the other in one piece of equipment. The cooker is a thermal screw turning inside a steam-jacketted cylinder. Ports are installed at various positions along the cylinder so that cooking may be achieved by direct or indirect steam addition. The cooking time is controlled by use of a variable speed gearbox on the screw drive.

The single screw press has a normal press ratio of 6 to 1. Like the cooker, it is powered through a variable speed drive. The sieve plates are stainless steel, and are readily removed for cleaning.

Heat is supplied to the dryer through a steam jacket and a steam heated rotor. The speed of filling

is controlled by the cooker, and the retention time of the meal in the dryer is determined by positioning a variable weir. A powerful fan draws air through the dryer and exhausts it to a scrubber. The jackets are built to withstand an operating steam pressure of 6 atmospheres, and the motors are wired through a control panel to a 220 volt, 3-phase, 60 cycle electrical source.

The other major piece of equipment is a centrifuge for separating solids from the press liquor. The type chosen was a Westfalia model SAOOH-205, a continuous desludger. Its capacity is rated at one gallon per minute, and it may be rapidly converted for oil separation.

Steam for the pilot plant and building heating is supplied by a small electric steam generator with a rating of 50,000 BTU per hour, yielding steam at 100 psig.

A Butcher Boy model 25 grinder is used for reducing the raw fish to a size which can readily be handled by the plant. The dried meal is fed by an Eritz vibratory feeder to a small hammer mill. The

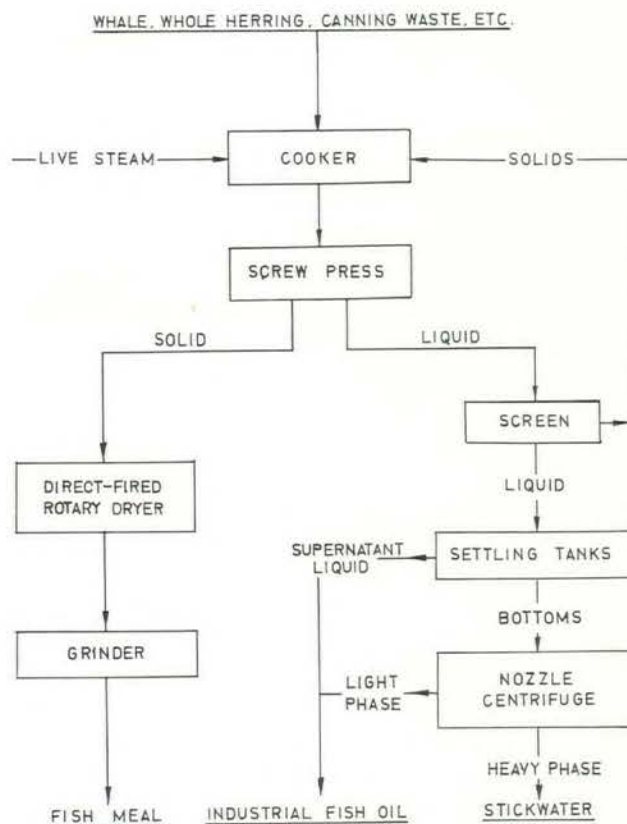


FIGURE 1. SIMPLIFIED FLOW SHEET OF A FISH REDUCTION PLANT

screens on the mill are replaceable so that the fineness of the grind may be varied.

Facilities are available for routine maintenance and repair of equipment, and for monitoring the production by quality control analyses. All fish meal and oil samples are sent to commercial laboratories at present for detailed analyses.

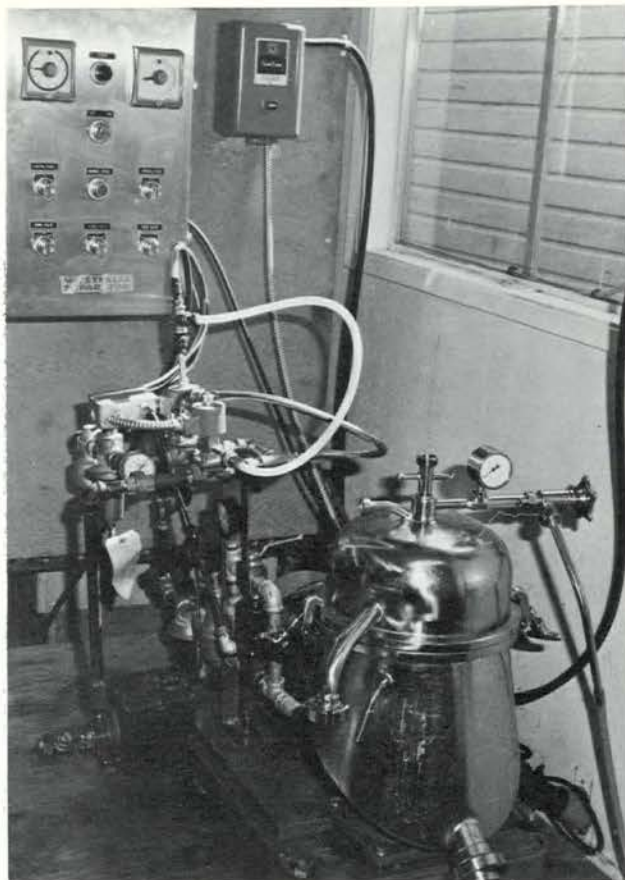
ODOR SUPPRESSION

Although the gases produced by the dryer are small in volume, and not as intense as those from a flame dryer, care had to be used in this elimination as the laboratory is located in a residential area. At the present time the gases are water-washed in a packed column of berl saddles. The outlet gases are cooled to under 100°F, which appears very effective in elimination of steam and noxious odors. The undissolved gases are dispersed from a high chimney, and the scrubber water is passed into the septic tank system.

The reduction equipment is positioned under a fume hood which exhausts through the attic. This system is capable of changing the air supply in the laboratory once every five minutes, and results in an odor-free area during operation of the plant. Since some noxious odors arise from the cooker and press and will be removed by the fume hood, it may become necessary to water wash this air stream for better control of odors.

FUTURE STUDIES

The plant will be used in the near future to examine the meal and oil which may be produced from dogfish, sand lance and other species. This is of primary importance due to the restriction in herring fishing which has idled the reduction plants



Automatic desludging centrifuge.

in British Columbia. Eventually, studies involving antioxidants and oxidation mechanism will be resumed.

Co-operation will be extended wherever possible to anyone wishing to make use of these facilities in an effort to extend the knowledge concerning reduction practices.

Tide and Water Level Bench Marks

Volume 1 of a new series of booklets entitled "Tide and Water Level Bench Marks" has been published by the Department of Energy, Mines and Resources, Ottawa. The booklet provides a comprehensive list of bench marks which are referred to the datum of Canadian Hydrographic Service charts and which are located along the coasts and on the shores covered by these charts.

Six of the volumes have the same geographical boundaries as the six volumes of the Canadian

Tide and Current Tables. The boundaries of the seventh volume include the Canadian shores of the Great Lakes and non-tidal portion of the St. Lawrence River.

Volume 1 covers the Atlantic Coast and Bay of Fundy. Other volumes will be printed later. Copies may be obtained from the Hydrographic Chart Distribution Office, Surveys and Mapping Building, 615 Booth Street, Ottawa. A charge of \$1.00 is made for other than official requests.

ICNAF Annual Meeting in London

Concern over the potential danger to the Atlantic salmon resource presented by the deepsea fishing of this species was voiced by Canada at the 18th annual meeting of the International Commission for the Northwest Atlantic Fisheries.

Meeting in London, England, early in June, the 14-nation body was asked by Canada and delegations from several other nations to consider prohibition of the highseas salmon fishery or stabilizing it at its present level. The commission recommended to member governments to consider preventing increased high-seas fishing of salmon by their nationals in the northwest Atlantic. Further, the governments concerned were urged to consider a high priority study program on the effects of such fishing on the resource.

For some years Canada has been worried about the increased commercial catches of salmon off the Greenland coast. This concern was accentuated by the captures of Canadian-tagged salmon, indicating that at least some of the salmon population being exploited had its origin in Canadian Atlantic rivers. Salmon is an anadromous fish which is born in fresh water and goes to sea to return as an adult to the spawning beds of its native river.

Possible introduction of conservation measures to control the intensity of fishing in the northwest Atlantic was another subject of general importance discussed at the London meeting. No formal recommendations were made, but the Commission noted that scientific assessments indicated that Greenland cod and Georges Bank haddock had reached and may have exceeded levels giving the highest sustainable catches. Scientific opinion was that the same, or a higher, average catch could be achieved with less effort and hence at less cost.

"FRONT AREA" SEALING

Another significant item on the London agenda was the one relating to harp seals hunted in the "Front" area off Labrador and Newfoundland. Based on findings of fisheries research scientists, it was agreed that further hunting restrictions would be necessary. ICNAF countries concerned in the seal hunt will meet later this year to consider the procedure for and the extent of such restrictions.

Statistics presented at the London meeting showed that total catches of traditional fish species in the northwest Atlantic increased by four per cent to more than 3.3 million tons from 1966 to 1967. Increases were particularly noticeable in the Greenland, Labrador and Newfoundland areas whereas there was a decrease in the total catches of cod, haddock and flatfish in the Gulf of St. Lawrence and Nova Scotia banks and the Gulf of Maine areas. The activity expended in fishing showed no clear trend, ICNAF was told.

In conjunction with the Northeast Atlantic Fisheries Commission, ICNAF is continuing its efforts to find a suitable scheme for international inspection to ensure adherence to international fishing regulations. The success of bilateral exchanges of national inspection officers led the Commission to urge all member countries to participate in exchanges pending the establishment of an international inspection scheme.

The Commission noted with satisfaction that a joint USA-USSR survey of the Georges Bank-Gulf of Maine area was providing important information on the research techniques and gear to be used in the studies to determine the year-to-year abundance of haddock stocks.

In certain northwest Atlantic areas ICNAF regulations provide for minimum mesh sizes in the fishing of cod and haddock to allow escapement of fish under commercial size. New regulations to come into effect next September 21 will increase the number of major commercial species to come within the minimum mesh limits.

Dr. A.W.H. Needler, federal Deputy Minister of Fisheries, headed the Canadian group of commissioners which also included H.D. Pyke, Lunenburg, and S.G. Lake, St. John's, Newfoundland. Canada was also represented by a delegation representing the federal Department of Fisheries, the Quebec Department of Industry and Commerce, and the Fisheries Research Board of Canada.

S.M. Kamantsev, a Soviet Union commissioner, was chairman of the London meeting. The commission will meet in Warsaw next year. In 1970 the meeting will be held in St. John's, Newfoundland.

Dr. Tully Honoured

Dr. John P. Tully, of the Fisheries Research Board of Canada, Ottawa, was guest of honour at the French Embassy in Ottawa recently when he was presented with the Medal Commemorative of Prince Albert I of Monaco (Manley-Bendall prize). The presentation was made by the French Ambassador, M. Francois Leduc.

The Committee for Advancement of the Oceanographic Institute of France notified Dr. Tully of the award last September. It is the first time a Canadian scientist has received the medal, which is an acknowledgement of outstanding achievement in physical or biological oceanography.

Dr. Tully, a native of Brandon, Man., began his career in fisheries in 1931 with the FRB Biological Station at Nanaimo, B.C., following graduation from the University of Manitoba. He has been with FRB since that time, apart from the period 1942-45



The French Ambassador in Ottawa, His Excellency Francois Leduc, (right) admires the Prince Albert I of Monaco Commemorative Medal being held by the recipient, Dr. J.P. Tully, of Ottawa.

when he was seconded to the Royal Navy for special duties.

He led the Board's oceanographic program on the Pacific coast for many years and from 1946 to 1967 was Oceanographer-in-Charge of the Pacific Oceanographic group. Since then he has served in Ottawa as Oceanographic consultant to the chairman of the Fisheries Research Board of Canada and secretary of the Canadian Committee on Oceanography.

Dr. Tully was named a Fellow of the Royal Society of Canada in 1964.

Appointment

G. Lorne Grant of Ottawa, has been appointed Chairman of the Fisheries Prices Support Board, succeeding J. Neil Lewis, who resigned in March. Mr. Grant, 48, is Director of Federal-Provincial Fisheries Arrangements with the federal Department of Fisheries.

Born and educated in New Brunswick and a graduate of St. Thomas University in Chatham, Mr. Grant joined the Department of Fisheries in 1947 at Fredericton. He later transferred to Halifax, N.S., where he was attached to the Economics Service, and in 1954 became Maritimes Area Administrator of the Fishermen's Indemnity Plan.

He was appointed Assistant Director of the Department's Newfoundland region in 1958, and moved two years later from St. John's to Winnipeg, Man., as Regional Director of the Department's Central Region. In January, 1967, he was appointed to his present position at Ottawa, assuming responsibility for liaison with provincial fisheries departments and agencies and with federal-provincial fisheries committees.

The Fisheries Prices Support Board is responsible for the implementation of price support measures when severe price declines affect any branch of the commercial fisheries. The Board Chairman is a full-time employee of the Fisheries Department. Board members serving by appointment of the Minister to represent the fishing industry at present are: K.F. Harding of Prince Rupert, B.C., (Vice-Chairman), Bernard Blais, Quebec City, P.Q., H.I. Mifflin, Catalina, Nfld., R.I. Nelson, Jr., Vancouver, B.C., and W.R. Ritcey, Riverport, N.S.

Fish Study Going to the Dogs

Pavlov, the famous Russian physiologist, started more than he knew when he induced "conditioned reflexes" in his dogs. Now other Russian scientists have taken Pavlov's principles to sea and say they work there as well.

All the general laws of higher nervous activity in dogs and other land animals recorded by Pavlov a half century ago are today applicable to fish, according to a group of Soviet scientists.

"Many fish can acquire conditioned reflexes not only under direct influence of stimuli but also as a result of imitating other fish responding to stimuli," the scientists said in a paper presented during a conference in Bergen, Norway, sponsored by the Food and Agriculture Organization of the United Nations.

"Such reflexes were displayed by specimens which had only watched the experiments carried out with their neighbors. This was proved by Bogomolova, Saakyan and Kozorovitsky (1958) in their tests with 'actors' and 'spectators.' Fish 'spectators' learned the things which had been taught to 'actors' beyond a glass partition in the same aquarium."

"Conditioned reflexes, once acquired," the

paper maintains, "do not disappear even after a month's interruption of tests."

The Soviet authors also say there is evidence that anchovies with conditioned defensive reflexes pass on the experience when placed in a school of "untrained" fish. Some species develop a defensive reflex after seeing others of the school caught by hook and line. The reflex fades when fishing ceases, returns immediately when fishing is resumed.

Such conditioned training of fish has great significance to future commercial fishing, say the scientists. Their paper was presented during a "Conference on Fish Behavior in Relation to Fishing Techniques and Tactics," sponsored by the FAO.

Fish and Wildlife Branch, agreed to open selected waters on a trial basis, from the period of April 29 to June 30. During this time, designated lakes and streams could only be fished three days weekly, Monday to Wednesday, under the supervision of field officers of the Fish and Wildlife Branch. To date, whitefish ranging from 1½ pounds to 7½ pounds dressed weight have been caught. The largest yield in any one week was 12,000 pounds and was sold through the various outlets of the southern part of the province.

Inland Experiment

A unique experiment in fishing the lakes and irrigation streams of southern Alberta, has sparked the sales of the Billingsgate Fish Company of Calgary, Alberta. The rigidly controlled fishing of these waters has yielded whitefish for the tables of residents in southern Alberta and brought repeated and larger orders to this plant.

The Billingsgate Company of Calgary was founded in 1907 and today is operated under the third generation of the Fallwell family. It was through representation of Frank A. Fallwell and Frank H. Fallwell to the Alberta government that the once closed lakes and streams were opened for commercial fishing for the first time. Messrs. Fallwell made the request so they could supply the heavy demand for fresh whitefish during the Jewish and Easter holidays.

The Alberta Department of Lands and Forests,



Frank A. Fallwell of the Billingsgate Fish Co., Calgary, displays whitefish caught in Fincastle Lake, near Taber, Alberta.

Fishery Statistics

SEAFISH: LANDED WEIGHT AND LANDED VALUE

	May - April 1966-67		May - April 1967-68	
	Landings ¹	Value ²	Landings ¹	Value ²
	'000 lb.	\$'000	'000 lb.	\$'000
CANADA - TOTAL	2,458,722	158,096	2,449,939	152,087
ATLANTIC COAST - Total	1,925,853	98,073	2,204,302	106,084
Cod	518,598	23,031	558,932	24,606
Haddock	108,859	7,768	97,950	6,581
Redfish	178,021	4,935	169,925	4,400
Catfish	4,553	151	5,478	179
Halibut	4,345	1,634	4,377	1,716
Other Flatfishes	271,099	8,976	266,510	8,746
Pollock, Hake, Cusk	65,211	2,500	54,516	2,085
Other Groundfish	8,403	142	10,222	138
Herring & Sardines	628,482	7,077	900,816	9,530
Mackerel	25,743	901	24,725	944
Swordfish	7,350	3,182	8,134	3,381
Alewives	8,125	143	6,538	106
Salmon	5,209	2,542	6,202	3,343
Smelts	4,234	362	3,500	360
Other Fish	13,614	500	11,231	434
Lobsters	36,262	21,316	35,818	24,049
Clams & Quahaugs	4,606	279	5,801	392
Scallops	16,879	7,309	13,047	8,384
Other Shellfish	16,260	905	20,580	1,303
Misc. Items	-	4,420	-	5,407
PACIFIC COAST - Total	532,869	60,023	245,637	46,003
Pacific Cods	24,888	2,188	18,892	1,524
Halibut ³	32,327	11,477	24,605	6,216
Soles & Other Flatfishes	11,494	721	8,828	560
Herring	267,177	4,426	38,242	668
Salmon	163,063	38,779	129,735	34,856
Other Fish	12,779	543	9,570	413
Shellfish	21,141	1,869	15,765	1,757
Misc. Items	-	20	-	9
BY PROVINCES				
British Columbia	532,869	60,023	245,637	46,003
Nova Scotia	675,744	47,857	731,775	50,066
New Brunswick	339,236	11,024	376,623	11,270
Prince Edward Island	57,843	6,485	44,885	8,250
Quebec	134,091	6,655	197,382	7,504
Newfoundland	718,939	26,052	853,637	28,994

¹ Fish and Shellfish only. ² All Products - Includes livers, seaweeds, tongues, scales, roes, skins, oil, seals, whales and bait worms. ³ Includes halibut landed in U.S. ports by Canadian Fishermen.

MID-MONTH WHOLESALE PRICES - APRIL 1968			PRICES PER CWT. PAID TO FISHERMEN (Week ending April 13th)		
	Montreal	Toronto		1967	1968
	\$	\$		\$	\$
Cod fillets, Atl. fresh unwrapped	.407	.490			
Cod fillets, Atl. frozen, cello 5's	.338	.390			
Cod fillets, smoked	.428	.500			
Haddock fillets, fresh, unwrapped	.513	.630	Halifax		
Herring, kippered, Atl.	.278	.317	Cod Steak	5.25	5.75
Mackerel, frozen, round	.210	.287	Cod Market	5	5.5
Lobsters, canned, Fancy	-	68.267	Haddock	8.5	9
Sardines, canned	9.734	9.777	Plaice	5	4.5-5.25
Halibut, frozen, dressed	.479	.523	Yarmouth		
Silverbright, frozen, dressed	.621	.650	Haddock	5	-
Coho, frozen, dressed	.936	.947	Vancouver		
Sockeye, canned, grade A	27.547	28.300	Ling Cod	5-12	12-16
Pink, canned grade A	17.067	17.680	Grey Cod	4.5-7.5	6-7.5
Whitefish, fresh	.533 ¹	.600	Soles	5-8.5	7.5-8.5
Lake Trout, frozen	.434	.547	Salmon (Redspring)	31-75	34-63

¹ Dressed

Fishery Statistics

FROZEN FISH STOCKS AS AT END OF APRIL

	1967 '000 lb.	1968 '000 lb.
TOTAL - Frozen Fish, Canada	59,733	52,607
Frozen - Fresh, Sea Fish - Total	36,183	32,674
Cod, Atlantic, Fillets & Blocks	4,657	5,852
Haddock, Fillets & Blocks	7,148	5,034
Rosefish, Fillets & Blocks	2,882	1,523
Flatfish, (excl. halibut) Fillets & Blocks	4,814	3,890
Halibut, Pacific, dressed & steaks	4,422	4,147
Other Groundfish, dressed & steaks	1,236	855
Other Groundfish, fillets & blocks	3,701	3,267
Salmon, Pacific, dressed & steaks	1,932	2,123
Herring, Atlantic & Pacific	464	324
All Other Sea Fish, all forms	3,144	3,734
Shellfish	1,783	1,925
Frozen - Fresh, Inland Fish - Total	5,776	5,707
Perch, round or dressed	112	1,628
Pickerel (Yellow & Blue) fillets	1,111	487
Sauger, round or dressed	807	150
Tullibee, round or dressed	264	114
Whitefish, round or dressed	686	551
Whitefish, fillets	207	90
Other, all forms	2,589	2,687
Frozen - Smoked Fish - Total	1,501	1,503
Cod, Atlantic	786	587
Sea Herring, kippers	194	453
Other, all forms	521	463
Frozen For Bait and Animal Feed	16,273	12,723

SALT FISH STOCKS AS AT END OF APRIL

	1967 '000 lb.	1968 '000 lb.
Salted and Pickled Fish, Atlantic Coast		
Wet-Salted - Total	6,736	10,421
Cod	4,118	8,493
Other	2,618	1,928
Dried-Salted - Total	9,053	13,151
Cod	8,150	11,993
Other	903	1,158
Boneless - Total	357	1,165
Cod	327	1,085
Other	30	80
Pickled - Total (barrels)	7,271	4,289
Herring	6,192	3,687
Mackerel	1,079	1
Alewives	1	602
Turbot	1	-
Bloaters (18 lb. boxes)	6,018	96,119
Boneless Herring (10 lb. boxes)	1	1

¹ Confidential.

CANADIAN EXPORT VALUE OF FISHERY PRODUCTS

MAY - FEBRUARY

	1966-67 \$'000	1967-68 \$'000
TOTAL EXPORTS	202,620	200,389
By Markets:		
United States	132,217	126,687
Caribbean Area	17,294	15,499
Europe	45,742	49,919
Other Countries	7,367	8,284
By Forms:		
Fresh and Frozen	133,440	125,842
Whole or Dressed	43,159	39,374
Cod, Haddock, Hake	453	485
Halibut, Pacific	6,098	3,872
Salmon, Pacific	14,429	14,507
Swordfish	3,900	4,239
Other Seafish	7,102	7,440
Whitefish	4,514	3,880
Pickerel	2,422	1,568
Other Freshwater Fish, n.e.s.	4,241	3,383
Fillets, Blocks and Slabs	62,711	56,463
Cod, Atlantic	19,355	16,144
Haddock	5,595	5,959
Ocean Perch, Hake, Cusk, Pollock	8,685 ¹	10,151
Flatfish	13,064 ¹	14,379
Pickerel	2,864	1,881
Other Fillets & Blocks	13,148	7,949
Shellfish	26,966	29,587
Lobsters (in shell & meat)	19,092	20,619
Scallops	7,296	8,007
Other	578	961
Frozen Fish & Shellfish, pre-cooked	604	418
Cured	21,404	23,002
Smoked	2,111	1,581
Herring	1,317	809
Other	794	772
Salted, Wet & Dried	16,597	18,851
Cod	14,354	16,840
Other	2,243	2,011
Pickled	2,696	2,570
Herring	1,647	1,574
Mackerel	595	617
Other	454	379
Canned	32,214	34,886
Salmon	23,245	26,763
Sardines	4,793	4,963
Lobsters	2,569	1,773
Other	1,607	1,387
Miscellaneous	15,562	16,659
Meal	7,577	6,461
Oil	787	1,378
Other	7,198	8,820

¹ Fillets only. No breakdown of blocks for these species in 1966.

Fishery Statistics from Abroad

ICELANDIC EXPORTS BY TYPES OF PRODUCTS, 1966 AND 1967

	Quantity in Thousand Pounds				Quantity in Thousand Pounds			
	Value in Thousand Kroner				Value in Thousand Kroner			
	Jan. - Dec. 1967		Jan. - Dec. 1966		Jan. - Dec. 1967		Jan. - Dec. 1966	
	Q.	V.	Q.	V.	Q.	V.	Q.	V.
GRAND TOTAL	3,884,974		5,595,176		3,884,974		5,595,176	
Salt Fish, Cured	2,612	34,728	3,108	36,366	4,583	32,469	6,305	44,822
Brazil	2,240	29,995	2,641	31,846	3,510	26,908	4,727	35,432
Salt Fish, Uncured	43,347	373,392	53,775	467,032	17,882	105,975	26,310	156,682
United Kingdom	2,676	18,384	5,553	36,331	2,961	18,731	7,718	49,352
Italy	3,825	35,209	8,331	75,965	4,409	22,607	4,409	22,482
Portugal	22,028	186,323	20,587	180,161	4,407	24,844	423	2,132
Spain	9,899	92,051	14,438	133,165	4,184	27,633	8,715	55,742
Other Countries	38,428	41,425	4,866	41,410	1,921	12,160	5,045	26,922
Salt Fish Fillets	836	8,202	4,074	37,822	44,634	293,223	66,171	420,932
West Germany	836	8,202	3,115	28,236	4,987	32,132	6,539	41,782
Stockfish	7,756	137,094	19,279	309,882	8,208	52,544	15,844	104,822
Italy	2,824	58,423	4,533	93,042	1,517	12,029	4,586	30,432
Nigeria	4,826	76,429	14,557	213,631	27,639	182,152	35,501	219,912
Other Countries	106	2,242	189	3,209	2,283	14,366	3,701	23,912
Fish on Ice	46,808	138,710	47,469	150,137	167,611	428,684	278,690	882,082
United Kingdom	27,941	83,010	25,086	84,911	1,082	2,113	6,863	23,612
West Germany	18,867	55,700	22,383	65,226	47,646	137,897	18,911	57,502
Herring, Frozen	32,172	88,167	56,341	162,739	31,647	77,520	32,793	114,542
East Germany	4,118	11,523	9,140	26,529	4,418	14,150	13,929	47,752
Poland	-	-	10,454	30,716	41,094	97,477	96,370	306,192
U.S.S.R.	8,525	23,772	10,886	30,612	-	-	7,965	20,962
Czechoslovakia	7,207	20,902	6,168	18,068	6,614	20,037	6,173	16,442
West Germany	6,250	14,717	7,725	22,439	5,990	11,001	22,917	74,922
Other Countries	6,072	17,253	11,968	34,375	8,922	22,226	18,576	53,822
Frozen Fish, Whole	19,923	117,787	21,876	147,974	13,662	29,782	47,229	144,352
United Kingdom	6,947	38,597	9,835	65,777	6,536	16,481	6,964	21,912
U.S.S.R.	12,218	72,280	11,164	73,420	5,617	13,501	4,993	22,482
Other Countries	758	6,910	877	8,777	3,889	9,129	4,993	22,482
Frozen Fish Fillets	89,774	902,957	92,104	1,055,530	3,889	9,129	4,993	22,482
United States	47,165	529,225	59,992	765,276	32,328	88,217	39,925	129,682
United Kingdom	2,423	24,866	1,098	13,786	5,743	15,752	8,230	25,402
Rumania	2,185	21,172	-	-	4,171	10,955	8,258	26,242
U.S.S.R.	34,965	301,565	27,610	241,705	7,910	22,180	14,815	50,802
Czechoslovakia	2,474	20,116	2,579	26,316	14,504	39,330	8,622	27,232
Other Countries	562	6,013	825	8,447	-	-	-	-
Frozen Shrimps	688	21,091	939	35,658	253,985	759,552	334,398	1,116,552
Frozen Lobster	1,616	110,201	1,872	143,979	8,818	27,735	7,657	28,712
United States	716	62,981	1,272	109,825	11,012	31,376	12,516	40,152
Italy	551	25,580	278	12,061	143,250	411,137	176,771	588,752
Other Countries	349	21,640	322	22,093	14,136	40,426	27,209	92,082
Frozen Roe	5,692	37,335	5,267	30,650	21,078	59,812	10,172	36,102
Canned Fish and Fish Products	1,530	39,125	2,231	45,079	5,739	17,124	11,493	38,892
U.S.S.R.	1,069	29,471	1,034	23,888	780	27,215	2,926	9,302
Cod Liver Oil, Undesterinated	4,048	17,480	6,929	31,880	11,892	35,391	16,576	58,622
Lumpfish Roe, Salted	1,517	10,837	1,182	24,634	6,202	19,559	18,964	27,512
					19,222	54,844	39,207	119,482
					-	-	7,425	27,452
					11,856	34,933	3,482	49,232
					14,120	18,979	19,711	29,232
					3,413	4,899	14,760	22,382
					7,119	32,223	4,079	18,352
					5,410	24,987	666	2,982
					49,780	75,045	25,624	94,962



Fort Erie Fishing Shacks Are Link With Past

One of the more scenic locations of freshwater fishing is along the Niagara River at Fort Erie, Ontario. Built on the shore of this fast flowing river and nestled in the busy town of Fort Erie is a group of fishing shacks whose history dates back to 1898 and before. They are still occupied today although not for the purpose for which the early settlers constructed them. The coal oil lamps have been replaced by electricity and a rocky path by a freeway but they remain in mute testimony to the early days of fishing.

The shore on which they are located is owned by the New York Central Railway under original charter, and is presently maintained by the Niagara Falls Parkways who took over the land and preserved these shacks that appear to be out of place in the park-like shoreline drive between Niagara Falls, Ontario and the Peace Bridge to Buffalo, New York.

It was as recent as 1943 when attention was again focused on this group of buildings. It was here on May 26, 1943 the late Pat Noon of Fort Erie caught the world's record yellow pickerel at that time, from the rocks just below these shacks. The pickerel weighed a certified $22\frac{1}{4}$ pounds having a girth of 21 inches and was $36\frac{1}{2}$ inches long.

Although the site and buildings are preserved, they are unmarked for the thousands of cars and people who pass by their back door, giving no indication of the part they played in the fishing of another era.

Today the modern offices and facilities of the Department of Fisheries of Canada are located within a few blocks of this site and carry out inspection of more fish in one day than would have been landed in a week by these early fishermen.

If undelivered return to:
Department of Fisheries of Canada
OTTAWA

CANADA
POSTAGE PAID
PORT PAYÉ

**POISON—HANDLE WITH CARE
INSECTICIDES KILL FISH, TOO.**

Farm ponds, lakes and streams need to be protected from insecticides to prevent fish mortality. Spraying should be done with this in mind. Washing spray equipment should be undertaken well away from running water since even small streams can carry lethal doses of poisons to rivers or lakes. Canada's game and food fish are a valuable asset. They should be nurtured in every possible way. If you do your part they will be.



DEPARTMENT OF FISHERIES



Ottawa, Canada



FISHERIES

(formerly Trade News) OF CANADA

Vol. 21, No. 2

Aug., 1968



In This Issue

- ★ Hon. Jack Davis Appointed Fisheries Minister
- ★ Special section devoted to Canadian Conference on Fishing Vessel Construction Materials
- ★ Canada's Inspection Service Sets High Standards

Department of Fisheries of Canada, Ottawa

FISHERIES OF CANADA

(formerly Trade News)

Editor

E. H. HEARN DEN

August, 1968

C O N T E N T S

FEATURES

Canadian Conference on Fishing Vessel Construction Materials Attracting World-wide Interest.....	5
Vessels and Materials.....	6
Summaries of Conference Papers.....	9
Canada's Fish Inspection Sets a High Standard.....	20

NEWS ITEMS

Hon. Jack Davis Named Fisheries Minister.....	3
Minister's Statement to Fishing Industry.....	3
Fisheries Exhibit Wins Award.....	4
Strange Insects Found in Lake Erie.....	19
Government Buys Surplus Cod Stocks.....	27
Dr. C. J. Berkeley Honoured.....	27
Great Lakes Fish Stocks Continue to Recover.....	28

FISHERY STATISTICS.....	30,31
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COVER PHOTOGRAPH - A stern trawler under construction at Halifax shipyards. Advance articles and summaries of papers being presented at the Conference on Fishing Vessel Construction Materials at Montreal, October 1-3, form a special section of this month's issue.

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Hon. Jack Davis New Fisheries Minister

Hon. Jack Davis, Member of Parliament for Capilano, British Columbia, became Canada's Minister of Fisheries, July 5, succeeding Senator Hedard J. Robichaud who did not contest the June 25 federal election.

Announcing the appointment, Prime Minister Pierre Elliott Trudeau stated that Dr. Davis would become responsible for fisheries and forestry, which departments were to be merged under a government re-organization.

Dr. Davis, 51, was born in Kamloops, B.C., and received his early education in British Columbia. He graduated from the University of British Columbia in 1939 with a B.A.Sc. degree in chemical engineering and received a Ph.D. degree from McGill University in 1942 for research work on explosives. During the latter part of the Second World War he served as a flight engineer with the RCAF.

After working for Shawinigan Chemicals Ltd., and A.V. Roe (Canada) Ltd., he went to Oxford on a Rhodes Scholarship where he majored in Economics and Politics, gaining B.A. and M.A. degrees.

In the early 1950's, Dr. Davis was Director of the Economics Branch of the Department of Trade and Commerce in Ottawa and later served as senior economist with the Royal Commission on Canada's Economic Prospects (Gordon Commission).

Moving back to British Columbia in 1957,

Dr. Davis became Director of Research and Planning with the B.C. Electric Company Limited.

First elected to Parliament in 1962, Dr. Davis has continued to represent the constituency of Capilano in the House of Commons. His majorities in 1963, 1965 and 1968 were the highest of any federal candidate in Western Canada. Beginning in 1963 Dr. Davis served as Parliamentary Secretary to Prime Minister Pearson for three years, and to the Minister of Energy, Mines and Resources for two years.



Hon. Jack Davis

On April 26, 1968, he was appointed by Prime Minister Trudeau to the Cabinet as Minister without Portfolio and also Acting Minister of Trade and Commerce.

Dr. Davis is married to the former Anna Georgina M. Worthing of Vancouver. His wife and three children live in West Vancouver.

MINISTER'S STATEMENT TO FISHING INDUSTRY

"It is both a privilege and an honour to be named Minister of Fisheries for Canada. Not only are the nation's fisheries one of its great resources but the federal Government's responsibility for their development goes back to Confederation. Great improvements have been made in the intervening years but much remains to be done. It will therefore be my task to do whatever I can in co-operation with the industry itself to see that we make the most of the numerous opportunities which will present themselves for the continued improvement in the livelihood of those Canadians who make their

living in our fisheries in the years immediately ahead.

"As a new Minister I must become familiar with your problems. It is my intention, therefore, to visit our fisheries on the West Coast, on the Inland Lakes and on Canada's East Coast in the very near future. As a result of these tours and as a result of discussions with members of the industry, I will be in a better position to carry out my departmental duties. Your suggestions both from a policy and from an administrative point of view will always be welcome."

Fisheries Exhibit Wins Award

A federal fisheries' exhibit shown at the Red River Exhibition (Manisphere 98), Winnipeg, was chosen as runner-up and received an honorable mention award. The panel of judges composed of members in the arts and design profession made their choice from over 125 exhibits at the annual event held in Winnipeg during the last week of June.

This is the second year a Fisheries Ministry exhibit has been entered in the Winnipeg exhibition. Last year it featured the Department of Fisheries' activities in Canada with emphasis on the Inspection Service; this year the Fisheries Research Board of Canada has the major message.

The exhibit emphasizes the work of the Fisheries Research Board, Freshwater Institute, Winnipeg, by means of large pictures of scientific projects being carried on in the freshwater region. This theme is extended to a showing of the film "North Pacific"—the Fisheries Research Board's movie on salmon research being done off the Pacific coast. The Atlantic coast is represented by large pictures and wall panels in English and French telling the story of east coast fishing.

An aquarium containing trout and kokanee salmon attracted much interest from the visitors while Fishery Officer Henery Fineberg and Informa-



R.N. Gordon, Director, Central Region of the federal Department of Fisheries, accepts award for the fisheries exhibit from R.W. Manning, Vice-president of the Red River Exhibition, Winnipeg.

tion Officer Ken Barrie were in attendance to answer questions. An estimated 125,000 people visited the display while it was in Winnipeg.

Further exhibits that will publicize the work of the Department and the Fisheries Research Board will be shown at exhibitions in Regina, Edmonton and Prince Albert. The displays are designed and built in Ottawa under the supervision of the Information and Consumer Branch of the Department of Fisheries of Canada.



Fishery Officer Henery Fineberg describes species of fish in an aquarium at the Department's exhibit in Winnipeg.

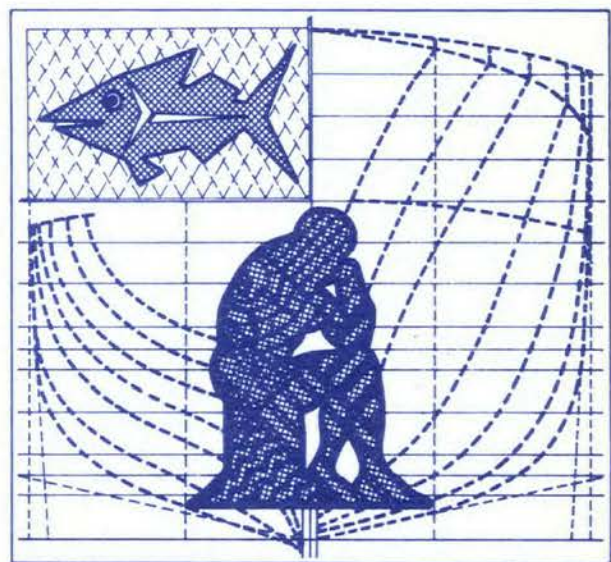
Canadian Conference on Fishing Vessel Construction Materials Attracting World-Wide Interest

INTERNATIONAL interest is being shown in a Canadian conference of much importance to the fishing industry to be held in Montreal, October 1-3. Wood, steel, plastic, aluminum and concrete as materials to be used in the building of fishing vessels will be assessed from all possible angles at the three-day meeting, which is being sponsored by the Federal-Provincial Atlantic Fisheries Committee.

Manufacturers and suppliers of both traditional and newer materials used or contemplated for use in hulls, decks and superstructures of fishing vessels will participate in the conference, as well as boat-builders, vessel owners and operators, naval architects and government specialists. They will discuss raw materials and their application to design, construction, quality control, vessel operation and maintenance, and their comparative economics.

Jan-Olof Traung, noted naval architect who is now with the Fishery Resources and Exploitation Division, Department of Fisheries, Food and Agriculture Organization of the United Nations, Rome, will be the first of more than 30 specialists who will present papers for discussion by the 400-odd delegates who will attend. Mr. Traung will speak on "New Thinking on the Use of Materials in the Construction of Fishing Vessels". The other papers will cover all aspects of hull construction and related vessel components. The authors will include experts from Canada and other leading fishing countries, and descriptions of many of their papers, together with notes on the authors themselves, are contained in the following pages.

The Federal-Provincial Atlantic Fisheries Committee has already sponsored successful con-



Conference symbol

ferences on Canadian Atlantic offshore fishing vessels, the Canadian Atlantic herring fishery, and fish protein concentrate, and a major conference, on automation and mechanization in the fishing industry is planned for February 3-6, 1970, also in Montreal. The committee is made up of the Deputy Ministers responsible for fisheries in the Federal Government and the Governments of Quebec, Nova Scotia, New Brunswick, Prince Edward Island and Newfoundland.

Further information about the fishing vessel construction materials conference and details of registration may be obtained from the Secretariat, Industrial Development Service, Department of Fisheries of Canada, Ottawa.

Vessels and Materials

BY W.G. SCOTT

Naval Architect, Industrial Development Service,
Department of Fisheries of Canada,
Ottawa

THESE DAYS in our society one needs only to glance around house, office, automobile, stores, etc., and it is noticed immediately that many items are made from far different materials than were used a decade or two ago. There have been so many changes in this field lately that we might say we live in a Materials Age.

International engineering disciplines are now exploiting just about every new concoction known to man; however shipbuilding, as far as large hulls are concerned, is still using much the same materials as were used 50 years ago. Admittedly, some new mediums are accepted in components or fittings manufacture, but the hulls are essentially as they were.

W.G. Scott



Progress has been made in production methods; fastenings now can be made in a variety of ways, and very up-to-date processes exist for material preservation.

Newer materials are beginning to make a very cautious entrance into this field, particularly in the more advanced types of marine vehicles (hydrofoils, ACVs, etc.).

Our fishing industry, and indeed the fishing industries of the world, are only now beginning to recognize that while traditional materials are still valued, the materials engineers are coming up with

many newer offerings. All of these could possibly be used in the construction of fishing vessels.

EXCHANGE OF IDEAS

The Federal-Provincial Atlantic Fisheries Committee was particularly keen to exploit this quest for knowledge and provide a vehicle for exchange of ideas, which is the reason for the Conference being dealt with in these pages.

It might be of value to provide some condensed comment on the materials to be discussed at the Conference.

Steel. Up to the mid 19th Century, wood was the internationally accepted material for ocean-going ships. About 1850 iron emerged as a material with properties which made it attractive to several intrepid vessel owners, and Lloyds Register even had a standard quality for iron plate of 20 tons per square inch. About this time steel became a well-known word in the structural world. Henry Bessemer invented a process for making it. Bessemer's efforts were received with much skepticism, as it was alleged that the quality of the material made by his process was inconsistent. Happily this was overcome and steel became an accepted thing in shipbuilding.

Another process of manufacture (open hearth or Siemens-Martin) became known, assuring even more consistent and reliable quality. Lloyds accepted a U.T.S. of 27-31 for this manufacturing technique and permitted a 20 per cent reduction in scantling for an iron ship.

Economics entered the scene and owners were quick to realize that a steel boat carried more than her iron predecessor. Moreover it was quickly noted that steel, although distorting upon impact, did not crack. From this time (about 1900), steel was the accepted thing for ocean going ships. Since then refinements have been made to provide various special qualities; weldability, high tensile strength, high notch resistance etc., all of which are required for differing applications.

Wood. Wood has retained a significant place in fishing vessels. International socio-economic factors dictate that in a lot of situations, nothing else will

suffice. In Canada, our tradition in this style has world-wide renown; also we enjoy an immense natural resource, as our pulp and paper industry can attest.

On both coasts, there are outstanding examples of differing construction styles—the Pacific Coast

JAN-OLOF TRAUNG

Jan-Olof Traung, who will be the first of more than 30 specialists to present papers at the Canadian Conference on Fishing Vessel Construction Materials, was born in 1919 in Goteborg, Sweden, and started his career as a naval architect in 1940 in a boatyard at Sverre. During his time at Sverre, until he joined FAO, he designed and supervised the construction of some 60 fishing vessels for Sweden, Iceland, France and Colombia, as well as hundreds of yachts and small working boats.



Jan-Olof Traung

He joined the Food and Agriculture Organization of the United Nations in Rome in 1950.

During his time with FAO, he has supervised technical assistance projects in the boat, harbour and fisheries engineering fields in Chile, Dahomey, India, Iraq, Pakistan, Senegal, Thailand, Togo, Tunisia, Turkey, UAR and the West Indies. He is the author of many papers on fishing vessels and fishing methods.

He organized and was Secretary of the 1953 FAO International Fishing Boat Congress in Paris and Miami, the FAO Second World Fishing Boat Congress in 1959 in Rome and the Third FAO Technical Meeting on Fishing Boats in Goteborg in 1965, and edited the proceedings "Fishing Boats of the World (1955)", "Fishing Boats of the World 2" (1960) and "Fishing Boats of the World:3" (1967).

In 1947 he organized and acted as Secretary for the Nordic Countries Fishing Boat Congress in Goteborg, Sweden, and in 1948 received a fellowship to study fishing vessels and fishing methods in the U.S.A. From 1948 to 1950 Mr. Traung acted as Consultant Naval Architect to the Royal Swedish Board of Fisheries in connection with

combination trawler-seiners with multi-laminate bent frames; our two Atlantic Coast inshore units, the edgenail "North Straight" and Nova Scotia's "Cape Islander". New Brunswick and Nova Scotia were (and still are) known along the entire Atlantic seaboard for their heritage of tern schooners until steel largely replaced wood for that transport duty. They still build many fine wooden fishing vessels there.

Plywood, itself a laminate, and the process of laminating major structural members—keel, skegs, frames, stems, etc., have been receiving wider acclaim in fishing vessel construction. In military applications, e.g. minesweepers, laminating has formed a major part of the Canadian-United States construction program.

Aluminum. Of the newer materials, aluminum is the most familiar to the fishing industry. Hold linings, penboards and hold pillars have been accepted for a long time. In our expanding herring fishery seine skiffs (offering a lighter unit than steel) are popular. The Pacific Coast industry has used aluminum gillnetters and trollers for a long time.

Our tradition of aluminum in shipbuilding has been quite long standing. In 1934 an all-aluminum patrol boat was built for the R.C.M.P. Another internationally known accomplishment was the extensive aluminum work carried out on the 13,000 D.W.T. bulk carrier "Sunrip" by Davie Shipbuilding.

GRP. Glass Reinforced Plastic is one of the most versatile materials to have become available to us. If exact care and attention are exercised during its handling and fabrication it can provide very high strengths. In shipbuilding its acceptance has been a little bit slow, but the commercial boatbuilders have been quick to detect its versatility, as can be seen every weekend by the pleasure boats on lakes and rivers. The final material is basically a mixture of resins reinforced with glass strands which are arranged in a variety of orientations:

(a) loose chopped random arranged single pieces, resinously bonded, about two inches long, to form Chopped Strand Mat (CSM);

(b) twisted into continuous lengths to form a yarn which is then woven into cloth, tape or cords as desired;

(c) special rovings where the strands are not twisted or spun but laid in flattened bundles to give high unidirectional strength (roving, because of its

heavy weave, provides strength properties between CSM and cloth).

Resins used in GRP marine structures vary both in cost and behaviour, dependent upon which of the many production techniques is selected for the job at hand.

Various other ingredients should be mixed with the resins during the construction processes to give desired performance. Catalysts are added (to initiate the chemical reaction) and accelerators (to speed it up). Further magic "potions" can be included in the resin systems before moulding to provide thixotropy, desired pigmentation and fire resistance.

The construction styles in GRP are like the material itself, quite varied, as are the moulding or production techniques. Among the alternatives available are single skin, cored construction using foam cores or wood, and cellular construction.

Cement. Cement or "Ferro-concrete", to use

the more colloquial term, is a development evoking very high interest in the fishing industry. The materials used have been around for a long time; however, newer techniques are being applied in this construction, and from all indications are now accepted throughout the fishing industry. I can see this material, if worked under proper conditions and procedures, providing a substitute in the inshore areas. The Pacific Coast is certainly Canada's leader in cement boats, and several are now in service, with their performance being closely watched.

In the foregoing notes I have endeavoured to touch upon the possibilities available to the fishing and boatbuilding industries in both our accepted materials and some of the newer ones. The subject contains unlimited scope for ideas, and in my view has tremendous possibilities.

At the Montreal Conference experts in the various materials will be present to offer their views and outline their accomplishments. More details are provided in the following pages.



Wooden dragger under construction at Meteghan, Digby County, N.S.

Summaries of Conference Papers

ALUMINUM AS A FISHING VESSEL CONSTRUCTION MATERIAL

BY HELGE SVENKERUD
Aluminum Company of Canada, Ltd.

The physical and mechanical properties of aluminum alloys developed for use in ships, commonly called marine aluminums, are described and some comparisons and differences to other shipbuilding materials are made in an effort to highlight what advantages can be obtained by using aluminum.

A description of the different marine aluminums are indicated to give fishing vessel owners, operators, naval architects, designers and builders an idea of



Helge Svenkerud

the most suitable alloys for the various components of a fishing vessel. Furthermore, a brief attempt is made to indicate that the fabrication of aluminum can be readily adopted to fabricating equipment normally used for steel. Consequently, a short description is given of each of the methods used in the fabricating of aluminum like, shearing, forming, joining and painting.

The last part of the paper deals with a few of the implications of the use of marine aluminums to those working in and for the fishing vessel industry.

(Mr. Svenkerud was born in Norway in 1932 and obtained a B.Sc. engineering degree in Naval Architecture from the University of Glasgow in 1958. Prior to joining the aluminum industry, he worked with the Norwegian Classification Society, Det Norske Veritas, and the Fishing Boat Section of the Food and Agriculture Organization of the United Nations

in Rome. He joined an affiliated company of Alcan Aluminium Ltd., Nordisk Aluminiumindustri Ltd., in Norway as a sales development engineer in 1960, engaged principally in developing the use of aluminum in the marine field. He left that company as export sales manager in 1965 and joined the Alcan group of companies in Montreal as a market research analyst. Since September, 1966, he has been a sales representative in the Sheet and Plate Division, responsible also for sales of aluminum to the shipbuilding industry in Eastern Canada.

SINGLE SKIN PLASTIC AS A FISHING VESSEL CONSTRUCTION MATERIAL

BY BOUGHTON COBB, JR.
Owens-Corning Fiberglas Corporation,
New York, N.Y., for Fiberglas Canada Ltd.

In the last 20 years or so fiberglass construction has gone through a size evolution, from small dinghies to yachts of sixty-five feet and over. The material and its technology have now advanced to the point where it is only logical that sizeable, commercial fishing hulls can now be advantageously constructed with the material.

A working commercial vessel will daily encounter considerable abuse and high stresses—of a different and more demanding nature than with the



Boughton Cobb Jr.

average pleasure boat. It is suggested that materials selection and fabrication technique be especially appraised and selected to meet these requirements.

Fiberglass construction has great versatility—and future potential for development. But as there is no substitute for in-use experience, we favor at this

time a choice of materials and construction methods which have met the tests of reliability, simplicity and economy.

(Mr. Cobb is Program Manager, Military and Commercial Marine, of Owens-Corning Fiberglas Corporation, New York. He obtained his B.A. degree from the University of Wisconsin in 1950, and has been with Owens-Corning Fiberglas since 1951, mostly in marine sales and marine technical development, although for three years he was program manager aircraft, Aerospace Division. At present he is concerned with large fiberglass hull development, commercial and military.)

Mr. Cobb is a member of the technical committees of the Society of Naval Architects and Marine Engineers and the American Boat and Yacht Council. He is the author of articles on fiberglass hull construction for "Yachting Magazine" and other publications.)

END GRAIN Balsa CORED REINFORCED PLASTIC AS A FISHING VESSEL MATERIAL

BY ROBERT S. LEVINE AND ALEX LIPPAY
Balsa Ecuador Lumber Corporation, New York, N.Y.

Sandwich construction utilizing balsa wood combination with fiberglass reinforced plastic offers a number of advantages for fishing boats, including reduced weight, increased profitability, minimum maintenance and increased hull life. The character-



Robert S. Levine

istics of balsa wood are presented, including mechanical properties, flotation, insulation, moisture content and the effects of grain orientation.

Past applications of balsa to boat building are evaluated, including a 60 ft. river launch, 46 ft. crew boat, various commercial and pleasure boats and

Naval applications. The 72 ft. FRP-Balsa shrimp trawler recently launched in Florida is discussed in detail, including hull construction and tooling, and evaluation of hull scantlings.

A hypothetical 80 ft. balsa cored purse seiner and its steel counterpart are developed and compared. This study indicates that the balsa hull will weigh only 44 percent of the steel hull, and that the slightly higher first cost of the balsa cored seiner can be repaid within a year due to greater profitability and reduced hull maintenance. The advantages and disadvantages of sandwich versus single skin construction and balsa as a core material are discussed.



Alex Lippay

Production techniques using balsa are presented, with emphasis on achieving a quality product at minimum cost. Tooling techniques for both large scale and limited production of balsa cored hulls are discussed, and the advantages of balsa in mold construction are noted.

(Mr. Levine is in charge of the manufacture and development of Contourkore (End Grain Balsa). He is a graduate of the New York State College of Forestry and has been employed by Balsa Ecuador Lumber Corporation since 1960. He is a member of the Society of Plastics Industry and the holder of a number of patents related to the manufacture of Contourkore.)

(Mr. Lippay is responsible for structures development at Balsa Ecuador Lumber Corporation where he has been employed since his graduation from the New York State College of Forestry in 1958. He is a member of the Society of Plastics Industry and Society of Aerospace Materials Process Engineers and active in many areas of development of Marine Reinforced Plastic-Sandwich Structures. Also the holder of patents related to various core configurations.)

LAMINATED WOOD AS A FISHING VESSEL CONSTRUCTION MATERIAL

BY P.A. BOYD, P. ENG.

Laminated Timber Institute of Canada

Glued-laminated timber in fishing vessel construction not only produces a sturdy ship but also utilizes the continuing advantages of wood. Because it is so adaptable, it facilitates construction. Due to uniform strength characteristics, it can now be used safely where previously other materials had to be specified.

Glued-laminated timber is used most extensively for stems, keels, keelsons, ribs and deck beams. It can be produced in any desired shape, in any type of wood and in lengths up to 140 feet.

An additional feature in the use of laminated wood is the ease of construction. The use of traditional ship building labour and not the specialized trades in metallic construction not only facilitates building but also can be a very considerable factor in reducing the cost of small fishing vessels.



P.A. Boyd, P. Eng.

Economy of maintenance is also very important in the choice of a material. Laminated timber can be repaired like any other wooden member. Because wood is so readily available, there is very little time lost in finding a suitable replacement and repairs can be effected with relatively unskilled local labour.

(Mr. Boyd, Executive Director, Laminated Timber Institute of Canada, is 37 years old and a native of Montreal. He is a Civil Engineer, having graduated from McGill University in 1956. Previously, he was an associate of Pelletier & Associates, Consulting Engineers. He was also very active in the engineering profession, serving as a Councillor of both the Engineering Institute of Canada and the Corporation of Engineers of Quebec.)

CONSTRUCTION TECHNIQUES IN ALUMINUM FISHING VESSELS

BY I.M. MATSUMOTO

Vice President, Matsumoto Shipyards Ltd.

The purpose of the paper is to summarize the main techniques in engineering and fabricating aluminum fishing vessels. Because a complete description cannot be presented, only those aspects of construction which are unique to aluminum vessels or which are of special importance in application to aluminum vessels are given, with hopes that they sufficiently cover this subject.



I.M. Matsumoto

The three main topics are the structural engineering aspects, the fabrication techniques, and the methods in dealing with corrosion. Because these features dealing with the construction of aluminum vessels are based on the properties of the marine aluminum alloys, it is of importance that these properties be understood. Also, different marine alloys produced by the aluminum companies differ in their properties, therefore careful selection is required in applying the suitable types to their respective purposes.

The welding techniques have made the greatest improvements of all the processes concerned in aluminum vessel construction. It is mainly due to the advancements in welding techniques that aluminum fishing vessels are appearing in increasing numbers on the present commercial fishing scene where, ten years ago, there were very few or none.

(Mr. Matsumoto was born in Japan in 1918 and came with his mother to Prince Rupert, Canada, when he was six years old. From his father, he learned how to use tools at an early age, with the result that he designed and constructed a 14 ft. clinker-built rowboat at the age of 13.

By working in his father's boat yard he learned

all facets concerning the construction of wooden and steel boats, thus he was able to design and build numerous fishing vessels before he was 21.

The boat building business was stopped by the Second World War, but immediately after, Mr. Matsumoto and his father re-entered the business in Nelson, B.C.; it was later moved to Vancouver where it has now been in progress for the past 18 years.

Mr. Matsumoto has been in the boat building industry now for 35 years, during which time the shipyard has constructed over 500 boats between 25 and 94 feet in length. Since 1960, 225 of these vessels have been built of aluminum.)

WOOD AS A FISHING VESSEL CONSTRUCTION MATERIAL

BY WALTER J. McINNIS AND HOWARD I. CHAPELLE

Past uses of wood, elsewhere in the world, and general experiences are outlined. Principal types of trees from which most ship lumber is cut, deciduous and conifers, is touched upon. Reasons for use of wood as a basic material and need for extreme care at all times in the selection of material, cutting at right time of year, and quality of craftsmanship.



Walter J. McInnis

Availability of wood, and a discourse on wood types, both hard and soft, with locations of these types in various places in the whole structure is described. In addition, a table of possible species of wood arranged in two columns is provided. 1) In the order of their ability to resist rot. 2) In accordance with their strength and ability to hold fastenings.

Stress is laid on the importance of selection, cutting when sap is down, and the need for an honest effort to protect materials at all times, as well as seasoning before being put to use. Reference is made

to the danger in allowing bark edges to go in, as well as dozy pockets, sap edges on planking, etc.

The authors provide a list of construction dos and donts, the need always to build from approved plans, and refer to the lack of an adequate modern revised manual on wood ship construction. Fastening problems, tannic corrosion of same, and painting of members before erection as protection against elements are also dealt with.

Presenting the case for continued use of wood for vessel construction the authors give a general treatment of the situation, and what constitutes a modern wood fishing vessel. The writers point out the rapid use of laminated construction as a result of the development of foolproof adhesives. Successes already obtained in the past and at present in this phase of the work indicating the need for future consideration are described.

(Mr. McInnis is a graduate of Boston Technical High School and Lowell Institute, and has also studied at law and art schools. His career has included 14 years at George Lawley and Son shipyard as draftsman, chief engineer and manager. This completely self-contained shipyard, employing up to 1,000 men, built vessels in wood, steel and bronze, as well as boilers, engines and fittings of all kinds. Mr. McInnis can also claim 42 years as a practising professional naval architect and marine engineer.)

COMPARATIVE ASSESSMENTS – SINGLE SKIN PLASTICS

BY D.A. EISENHAUER
Vice President, ABCO Limited, Lunenburg, N.S.

This paper deals with reinforced plastic fishing ship development in the region of Canada's Atlantic coast. The type of fishing ships now owned and operated out of these parts is discussed. The need is emphasized for efficient, low cost shipyards and the effect of shipyard costs is examined.

The region's present facilities for R.P. boat production is outlined and a history of some of the boats that have been built in the area is given. Particular attention is given to *Cape Islander*, the prototype fishing boat built for the federal and Nova Scotia governments.

Special considerations for the promotion and introduction of small craft are differentiated from

those necessary for the introduction of large fishing ships, bearing in mind the particular needs of the region. In setting up to build large R.P. ships, the need is expressed to keep the capital investment in the shipyard low so as to minimize overhead, thereby assuring continued competitive pricing. Some design considerations are given and some Reinforced Plastic applications for onboard ships of basic steel or wood construction are listed.



D.A. Eisenhauer

Mr. Eisenhauer is a member of the Engineering Institute of Canada and the American Material Handling Society. He is vice-president of ABCO Limited and its subsidiary companies, which include Atlantic Shipbuilding Company Limited, builders of wooden trawlers and deck equipment manufacturers; Industrial Shipping Company Limited, manufacturers of fiberglass sailing yachts; and Atlantic Bridge Company Limited, manufacturers of fiberglass life-boats, motor boats and other marine and industrial equipment. His experience includes seagoing time as engineer on diesel freighter, sales and service of marine machinery and equipment, production and manufacturing of fish plant equipment, development of pleasure and work-boats of reinforced plastic and member of a Canadian trade mission observing ship-yards and fish plants in Central and South America.

PLYWOOD AS A FISHING VESSEL CONSTRUCTION MATERIAL

BY JOHN BRANDLMAYR

John Brandlmayr Ltd., Vancouver B.C.

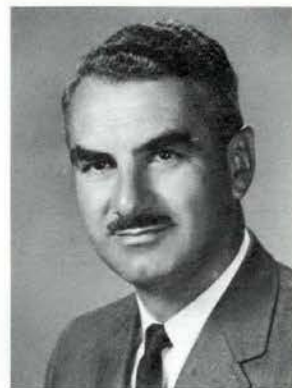
Plywood is described in this paper as a high utilization product of the forest industry which is likely to continue to be a low cost structural material.

The physical properties of plywood are different in character from those of any other boatbuilding material and therefore are difficult for many designers

to visualize. A summary of properties as stated by the Plywood Manufacturers of B.C. is included. A comparative tabulation of lumber, plywood, fiberglass, aluminum alloy and steel has been prepared from the viewpoint of a designer considering these materials. The strength to weight ratio is high for plywood but a hard surface coating of fiberglass is generally required for practical service conditions.

Sheet plywood is well adapted for the construction of small fast fishing vessels built singly or in limited numbers. A typical west coast gillnetter hull is described and pictured.

Plywood is often chosen for decking, bulkheads and superstructure on hulls of other materials. It is also used for molds in the construction of fiberglass vessels and for all forms of patterns.



John Brandlmayr

COMPARATIVE ASSESSMENT - PLYWOOD BOATS

BY JOHN BRANDLMAYR

A comparative assessment of commonly used materials is given in tabular and descriptive form. It is suggested that no one material has dominant advantages. Plywood is considered lowest in cost for one-off construction and molded fiberglass for multiple building. Aluminum alloys are best for strength to weight ratio although plywood and fiberglass are close behind.

Future cost reductions will result more from quantity production than from new materials or combinations of materials. Various forms of composite and sandwich structures are discussed and a low cost composite plywood and fiberglass hull is proposed for single unit construction.

The future use of plywood is considered,

emphasizing its suitability for secondary structural components in all types of construction, applications for molds and for the construction of small quantities of one hull design.

(Mr. Brandlmayr is active in the design of steel, aluminum, fiberglass and wood boats. He is a graduate in Mechanical Engineering, a Member of the Society of Naval Architects and Marine Engineers and the Associations of Professional Engineers in British Columbia and Ontario. He is president of John Brandlmayr Ltd., Consulting Engineers and Naval Architects, Vancouver, B.C., a firm which he started in 1946, and has also been a director of Spencer Boats Ltd. since 1952. Mr. Brandlmayr will present two papers at the Conference.)

COMMERCIAL FISHING VESSELS IN GLASS REINFORCED PLASTICS - CONSTRUCTION TECHNIQUES AND FUTURE TRENDS

Presented by
D.S. PIKE

for Goldharbour (Pty) Ltd., Cape Town, S.A., and
Yeatman, Endal & Co., Halifax, N.S.

Initially, the paper will describe in general terms the underlying principles of reinforced plastics shipbuilding and will then deal briefly with the design concept for single skin vessels before moving on to the basic approach to this type of construction, the problems encountered and advantages to be derived.

The paper continues with large mould construction, methods of lay-up and reinforcement used, the various types of primary and secondary structure utilized and means of attachment. The preparation of



D.S. Pike

precast units, assembly and connection of important hull components will also be discussed.

Methods of tank testing, quality control, laboratory test programs and environmental control procedures will be described and the technique of metal and wooden fittings attachment discussed.

The paper will conclude with a general description of the recently completed Design Study for a combined seiner-trawler of 97' O.A. undertaken on behalf of the Department of Fisheries of Canada, the materials to be used and proposed construction methods.

(Mr. Pike completed an apprenticeship at a British South Coast shipyard with technical studies at Southampton University and subsequently at the Birmingham College of Advanced Technology. He joined Lloyds Register of Shipping in 1953, becoming a Senior Surveyor, principally engaged in Glass Reinforced Plastic Ships construction. He is at present a Director of Goldharbour (Pty) Ltd. Cape Town, South Africa, Industrial Plastic and Marine consultants.)

STEEL AS A FISHING VESSEL CONSTRUCTION MATERIAL

BY W.A. HOPKINS
The Steel Company of Canada, Limited

This paper explores the present and possible use of steel in fishing vessels under three headings—Lloyd's Specifications, Choosing Steel Grades, and Design. Under the first, Lloyd's Register of Shipbuilding specifications are reviewed from a steel producer's point of view. Steel grades are discussed, and interpretation of the specifications is amplified. Under the second, the author points out that recently the steel industry has been telling many end users: "You specify the function; we'll meet your requirements".

The paper explains that the steel and shipbuilding industries could be similarly allied when it comes to specifying grades of steel. The newer high strength grades and their uses are also presented. Under the third heading, the conventional design approach of the civil engineer is applied to design problems, particularly those which fall outside Lloyd's requirements, such as deck houses and masts. Cost saving and weight saving aspects are emphasized.

(Mr. Hopkins was born in Calgary, Alberta. He was educated there and at the University of North Dakota, from which he graduated with a B.Sc. degree in Civil Engineering. He joined the Steel Company of Canada, Limited, in 1962, and at present is Supervisor, Field Sales Engineers, Sales Engineering Department.)

HOW TO EVALUATE DESIGN ALTERNATIVES FOR FISHING CRAFT

BY PROF. HARRY BENFORD

Chairman, Department of Naval Architecture and Marine Engineering, University of Michigan

The paper will explain how to apply the principles of engineering economics to such problems as that of selecting materials for the construction of fishing craft. Several economic measures of merit will be outlined, with a discussion of which should be used under each of several possible sets of



Prof. H. Benford

circumstances. For example, life-cycle costs are suitable for analyzing alternative materials that will result in identical fish-catching capabilities. Where those capabilities differ, however, life cycle costs may be misleading and some other criterion must be applied.

(Professor Benford is at present Chairman of the Department of Naval Architecture and Marine Engineering at the University of Michigan, Ann Arbor, Mich. He graduated from that university in 1940 and worked at the Newport News Shipbuilding and Dry Dock Company until 1948, when he returned to Ann Arbor as an Assistant Professor. In 1959-60 he took a leave of absence to serve as Executive

Director of the U.S. National Research Council's Maritime Research Advisory Committee. He is best known for his work in ship design economics, including an article on fishing boat costs in "Fishing Boats of the World, II".

COMPARATIVE ASSESSMENT - WOODEN BOATS

BY W.S. HINES, B.Sc., P. ENG.

Nova Scotia Department of Fisheries

Without reciting in detail the mechanical and physical properties of wood, all of which can be found in tabular form in architectural and engineering handbooks and other publications and papers, this paper endeavours to explain in laymen's terms why wood continues to be used so extensively for building boats in Nova Scotia.



W.S. Hines

In support of these explanations are a brief history, a list of types of wood and uses, reference to building experiences in Nova Scotia and a review of the characteristics which support its use.

(Mr. Hines was born in East Noel, Hants County, Nova Scotia. He attended the University of Manitoba and McGill University from which he received a Bachelor of Science degree in electrical engineering in 1931. From 1940-44 he served with the Aeronautical Inspection Directorate of the R.C.A.F., and from 1944 to 1945 worked for Canadair Limited in Montreal on design of aircraft electrical systems. He joined the Fishermen's Loan Board as Engineer and Technical adviser in 1945, and was appointed Director, Marine and Engineering Services, Nova Scotia Department of Fisheries, in 1965.)

COMPARATIVE ASSESSMENT – FERROCEMENT BOATS

BY T.M. HAGENBACH

Managing Director, Seacrete Ltd., Wroxham, England

After tracing the history and development of ferrocement as a boatbuilding material and drawing comparisons with the physical properties of competitive materials, the author contends that ferrocement—of which “Seacrete” is a specialised form—is the logical material from which to build fishing and commercial craft for the following main reasons:

1. The ability to build hull, decks, bulkheads, floors and engine bearers, fish tanks and bulwarks in one piece, resulting in a monolithic structure of immense strength which actually increases in strength with age.

2. Due to low cost of raw materials and the type of labour that can be employed, a ferrocement hull will generally cost less than an equivalent hull in other material.

3. Because it has great resistance to abrasion, will not corrode, has proven aging properties and is immune to marine borers, maintenance costs with a ferrocement hull are less than any other.

4. The ease with which a ferrocement hull can, in the event of damage, be repaired by unskilled labour in any climatic conditions except freezing.

Brief details will be given in the paper of approximately 150 ferrocement craft built by the Seacrete company and acceptance of the material by Lloyds Register of Shipping, Bureau Veritas, the United Kingdom White Fish Authority and the Food and Agriculture Organization of the United Nations in Rome.



T.M. Hagenbach

(Mr. Hagenbach, the 58-year-old Managing Director of Seacrete Ltd. and Windboats Ltd., took an honours degree in law at Cambridge University

and subsequently qualified and practised as a lawyer in Yorkshire, Eng. He acquired a Norfolk Broads boatyard in 1946, which soon gained a national and later an international reputation. Starting the manufacture of ferrocement (Seacrete) boats some nine years ago, his company is now regarded as the world leader in this sphere.)

CONSTRUCTION TECHNIQUES & DEVELOPMENTS IN STEEL FISHING VESSELS

BY MICHAEL J. WATERS

Marine Industries Ltd., Sorel, P.Q.

In order to more fairly evaluate differences between the construction methods and materials covered by this Conference, it is the author's intention to deal mainly with steel vessels up to 100 ft.

The paper consists of a step by step account of the construction progress of a steel fishing vessel, with particular attention being paid to modern techniques and equipment that have influenced and will continue to influence steel shipbuilding in Canada.



Michael J. Waters

(Born in 1934 in Bournemouth, England, Mr. Waters studied shipbuilding, marine engineering and naval architecture at Southampton Technical University while taking practical experience at the old established firm of J.I. Thornycroft.

Graduating in Naval Architecture, he lectured in Mathematics for 12 months before emigrating to Canada in 1957. Since that time, he has worked with Marine Industries Limited in Sorel, and for the past 6 years has specialized in the design and construction of fishing vessels in the position of Naval Architect. He spends most of his leisure time designing, building and racing sail boats.)

UNSATURATED POLYESTER RESINS USED IN FISHING VESSEL CONSTRUCTION

BY E.J. FRONTINI
Uniroyal Limited, Elmira, Ont.

This paper is a general discussion of the chemistry, types, methods of fabrication and methods of cure of polyester resins with specific reference to the fabrication of fiberglass reinforced plastic (FRP) fishing vessels. By choice of the proper raw materials used in the production of the polyester, a variety of types, including general purpose, isophthalic and fire-retardant can be manufactured with specific properties depending on the required end use. For FRP fabrication, polyesters are then formulated into resin systems by the addition of various materials to produce laminating and gelcoating polyester resin formulations—the two systems used in FRP vessel construction.

Two of the most common types of cure systems, one based on methyl ethyl ketone peroxide and the other on benzol peroxide, are discussed with a view to showing the various advantages and disadvantages of each, and also their use as related to the method of application and type of laminated construction, that is, number of plies and types of reinforcement. Some of the methods of application are discussed including the hand layup and the sprayup techniques. The sprayup method has two variations—the single and the dual nozzle spray gun with each gun using a different type of cure system. In summary, then, it is intended to show the suitability of polyester resins in FRP vessel construction to meet specific end uses and their ease of curing by a variety of methods.



E.J. Frontini

(Mr. Frontini graduated in 1961 from the University of Toronto with a B.S.C. degree in Chemical Engineering and joined the Chemical Division, Uni-Royal Limited, later that year. He was initially

involved with product development and applications of polyester and polyurethane resins. Subsequently, he became responsible for the technical service for these materials, the area in which he is now engaged.)

CORED FIBERGLASS REINFORCED PLASTIC BOATS

BY K.B. SPAULDING, JR.
Naval Ship Engineering Center, Washington, D.C.

This paper contains guidance and background information for the consideration of various core materials and configurations for use in hull construction. Construction experience in several countries is first cited, followed by a general discussion of the applicability of cored construction and a listing of critical characteristics of core systems to be considered in making a selection. Specific materials,



K.B. Spaulding Jr.

configurations, and fabrication methods currently available are then discussed, followed by comments on design methods for cored construction.

(Mr. Spaulding is currently Boat Liaison Coordinator, Naval Ship Engineering Center, Washington, D.C. He received a B.S. in Naval Architecture and Marine Engineering in 1954 from Webb Institute, and was resident navy fiberglass hull inspector in Bay City, Mich. during construction of the fiberglass 57 ft. XMSB-23 until 1956, when he transferred to the Boats and Small Craft Branch of NAVSEC. There Mr. Spaulding was principally engaged in fiberglass structural design until 1963. From 1963 to 1966 he was head of the Boat Contract Design Section and, in 1967, head of the Boat Concept Formulation Section.)

ESTIMATED HULL WORK AND MATERIAL CONTENT FOR 100-FOOT COMBINATION FISHING VESSEL IN DIFFERENT MATERIALS

BY DAVID J. FRASER

Commercial Marine Services Ltd., Montreal

The construction materials considered are steel, aluminum, wood, plastic and concrete and the vessel is a 100 ft. LOA x 24 ft. breadth moulded x 13 ft. moulded depth. The general arrangement is for a typical one and half partial shelter deck combination vessel with bridge and engine room forward and fish hold aft.

Lloyd's Rules are used to derive the scantlings where applicable but the particular properties of each material are not ignored. It is considered that steel and aluminum are best suited to conic sections, whilst the other materials as used require a conventional round bilge construction. The normal methods of construction employed in Eastern Canada are followed even though more advanced techniques are now available.

Any large differences in some of the other ship constructional items caused by the variation of the basic hull material are taken into account before carrying out an analysis of the hull structural weight, material costs and man hours required for the

completion of the hull in each material. These estimates are adjusted as far as possible for geographical price variations.

FERRO-CEMENT BOAT CONSTRUCTION

BY JOHN SAMSON

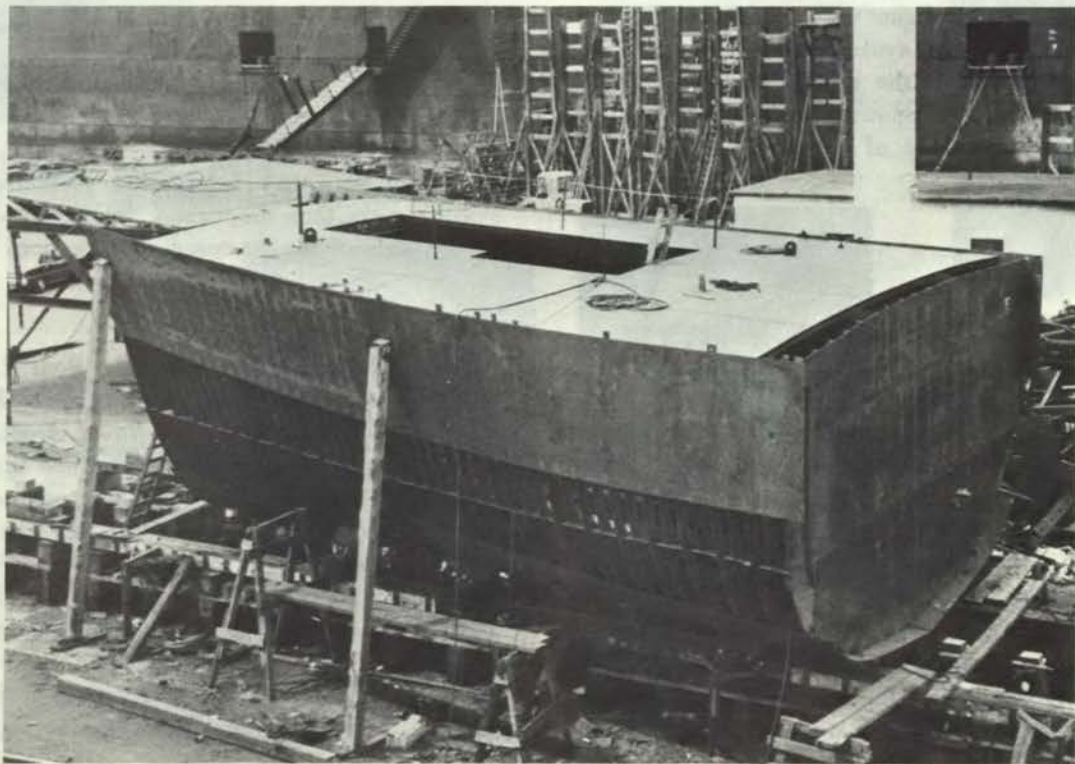
President, Samson Marine Design Enterprises Ltd.,
Vancouver, B.C.

In this paper Mr. Samson, a pioneer of ferro-cement boat construction, will discuss in detail the construction of a ferro-cement hull through from lofting to completion of plastering. He will not touch on the merits or disadvantages of this relatively new medium, but will rather confine himself to construction techniques.

He will take as an example the construction of a 44-foot salmon troller designed in the S.M.D.E. office specifically for ferro-cement.

Mr. Samson will cover the recently developed building technique which involves webb frame construction and this is probably the technique which will be used in the construction of fishing vessels up to the 100-foot mark.

The paper will contain the latest information on building materials and mixtures etc.



Strange Insects Found in Lake Erie

A new deformed type of insect life was discovered during a routine monitor cruise in Lake Erie. These cruises are carried on by the Great Lakes Institute of the University of Toronto, and the Canada Centre for Inland Waters at Burlington, Ontario, to keep close watch on pollution in the Great Lakes.

One of the duties of the Fisheries Research Board of Canada in its continuing scientific study of the cause and effect of pollution on fish life and food found in Canada's freshwater lakes, is the study and analysis of insect larvae. This research is one of the sources of information on pollution and it was during the inspection of 400 samples of larvae that the abnormalities were discovered.

Dr. A.L. Hamilton of the Eutrophication (Pollution) Section of the FRB Freshwater Institute, Winnipeg, found three deformed larvae of a type previously unrecorded. These specimens were the only insect larvae found in samples taken at the western end of Lake Erie where pollution is most severe.

Normal larvae are about one inch long and are called bloodworms because of their bright red color and worm-like appearance. They live on the bottom of lakes where they feed on the algae and sediments from their surroundings. In turn they often provide a major source of food for fish populations. Under normal conditions the larva usually remains aquatic for one year then it develops into an adult fly or "midge".

The abnormal larvae from Lake Erie were alive when collected but their deformities caused by pollution were such that it is extremely unlikely that they could have completed their life cycle. Microscopic examination showed that all the mouthparts of the larvae were badly deformed but the most conspicuous feature was their extremely thick exoskeleton or body wall which averaged almost ten times that of normal specimens. The exoskeleton is a secreted layer and the likely explanation for its excessive thickness is that the larvae have produced it as a protection from pollutants in the environment.

Dr. Hamilton is continuing his research on these larvae and will shortly return to the point where the specimens were first discovered. He will

endeavor to determine the life cycle and general distribution of the abnormal larvae and relate their occurrence to sources of pollution. Assistance will be provided by Fisheries Research Board personnel at the Canada Centre for Inland Waters at Burlington, Ontario, where representatives of Federal and Ontario government agencies participate in co-ordinated programs of research.

Shocking Shrimp

A new fishing method developed by the U.S. Bureau of Commercial Fisheries has shrimp literally leaping out of the mud and into the net.

Tests by the Bureau's gear research station at Pascagoula, Miss., indicate that an electrified trawl system could open up daylight fishing hours for the brown shrimp fleet.

Since pink and brown shrimp normally spend the day burrowed into the bottom and come out to forage at night, trawling for these species is ordinarily restricted to the night hours. This, in effect, reduces the fleet's activity at sea almost 50 percent.

The new system involves the use of electrodes to deliver a very low voltage current to the area where the shrimp are hiding; the shock causes the shrimp to jump involuntarily out of the mud or sand, and they are then scooped into the trawling net.

Daylight experiments with a single-rigged electrified trawl on a mud bottom (the type favored by brown shrimp) resulted in catches ranging from 96 to 109 percent of the catch taken with single-rigged standard systems at night.

A sand-and-shell bottom is preferred by the pink shrimp, and here the electrified system proved somewhat less effective, yielding only a 50 percent catch rate.

Catches at night with the electric gear were consistently smaller than night catches taken with standard equipment, leading to the speculation that the shrimp, which had come out of their burrows to forage, simply swam out of the electric field.

Canada's Fish Inspection Sets a High Standard

BY NIX WADDEN

AS OLD as the Pharaohs yet as modern as today's miracles of technology, the art of fish inspection seeks to guarantee to the consumer that fishery products served at his dining table are wholesome and free of elements injurious to his health.

In Canada a highly developed system of inspection administered by the federal Department of Fisheries provides necessary safeguards of quality control for fishery products destined for export or interprovincial trade, and of all fishery products imported into Canada. Administrative machinery is now in preparation to extend this program to protect the product through its currently most vulnerable stage, that is, from the packing plant or warehouse through the retailer to the domestic consumer.

To achieve this desirable objective, the federal Department of Fisheries has had to succeed in three endeavours:

- (1) to revise and consolidate the federal legislation dealing with fish inspection;
- (2) to secure the co-operation and support of the provinces in the passage of complementary provincial legislation; and
- (3) to gain the support and co-operation of the fishing industry in the development and acceptance of quality control standards and practices.

Attainment of the first of these goals has now been accomplished through the proclamation of a new Fish Inspection Act and the adoption of revised regulations governing all the major forms of fish processing in Canada.

PROVINCIAL CO-OPERATION

Encouraging results have been achieved in recent months in enlisting the provinces' co-operation



A Department of Fisheries inspector examines fillet in a Nova Scotia processing plant.

in the development of a uniform national fish inspection system. Two provinces, Quebec and New Brunswick, now have complementary inspection legislation; Newfoundland recently introduced its Inspection Act; and discussions between the Department of Fisheries and most other provinces on the drafting of provincial legislation are well advanced. Complementary provincial legislation is considered the key to extending fish inspection to the retail level, since regulation of trade within a province is a matter of provincial jurisdiction.

For the provinces, an important consideration is the fact that in cases where complementary inspection legislation is enacted, inspections can be undertaken on the province's behalf by federal inspectors. In the Province of Quebec, where this arrangement has been in effect since 1959, federal inspectors enforce provincial as well as federal

inspection regulations. Since 1966, an intensive inspection of Montreal's retail fish stores has been provided by federal Fisheries Inspectors as an educational service to improve quality standards. Extension of inspection at this level of distribution is desirable to complete the chain of consumer protection from ship to shop.

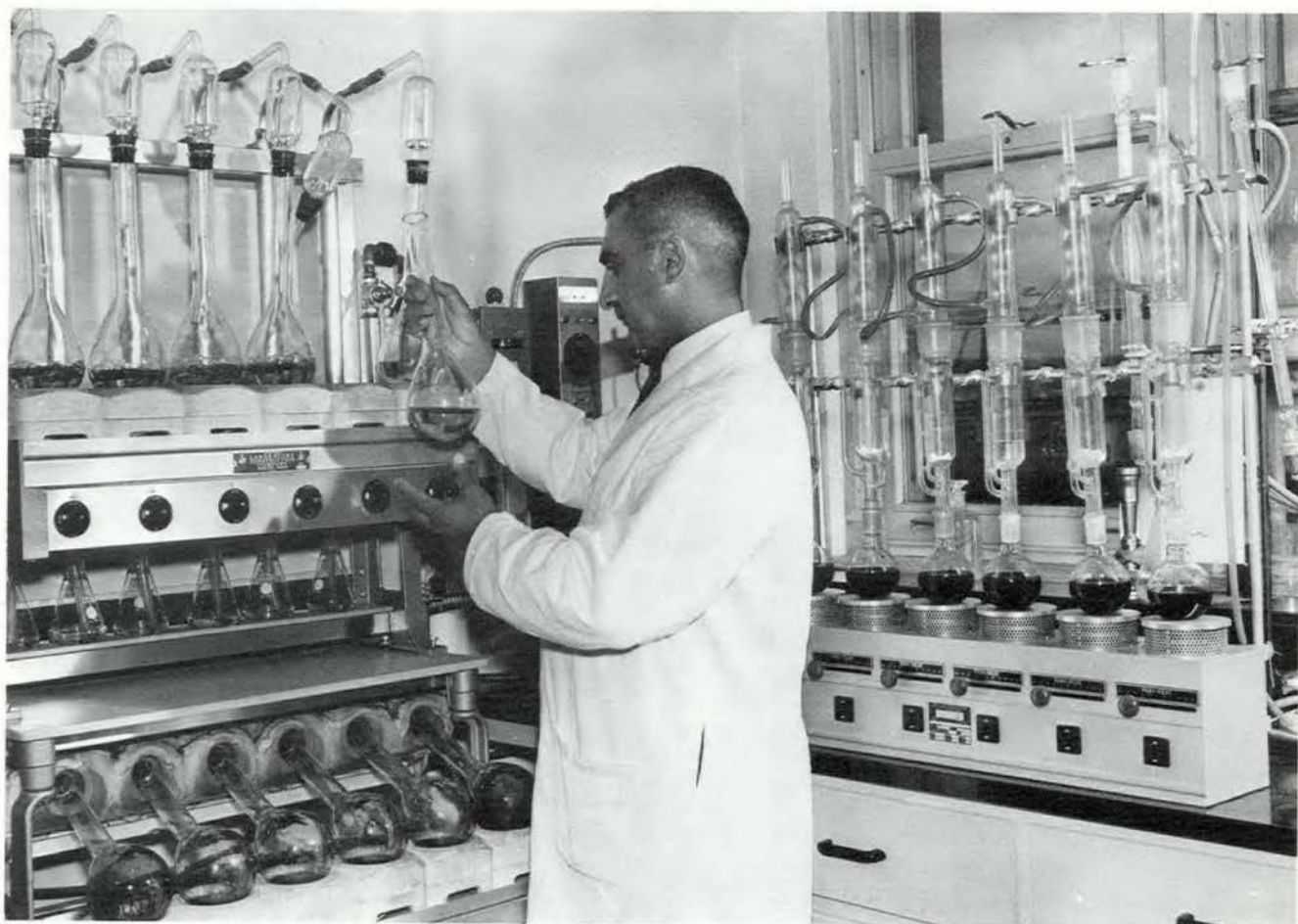
Canada's fish inspection system is generally regarded as among the most progressive in the world. As evidence of this fact, Canada is to be host for the First International Symposium on Fish Inspection and Quality Control, to be held under the auspices of FAO in Halifax in July 1969. The Director of the Inspection Service of the federal Fisheries Department, H.V. Dempsey, has served as Vice-Chairman of the FAO subsidiary, Codex Alimentarius Commission, a body which endeavours to establish worldwide quality standards for food products in international trade. In addition to the United Kingdom, South Africa, Denmark and other countries where he has participated in quality control discussions, Mr.

Dempsey, in 1967, visited Russia as a consultant to an FAO Study tour to deliver a series of lectures on Fish Inspection.

CANADIAN STANDARDS HIGH

Present Canadian standards of fish inspection are high: compulsory inspection leading to a certificate of registration applies to all plants which process or pack fresh, frozen, salted or canned fish for export or interprovincial trade; plants which store frozen fish intended for export must also be registered. All fish and shellfish products intended for sale outside the province of origin, and all imported fishery products are subject to inspection. In the case of salted and pickled fish, canned Pacific salmon, and fresh and frozen (freshwater) whitefish bound for export markets, all products are required to be inspected.

Evolution of the Canadian inspection system and the Acts and Regulations on which it is based has been a gradual and painstaking process. Until



Chemist sets up the digestion-distillation apparatus for the determination of protein content at the Department's Fish Inspection Laboratory at Halifax, N.S.

its repeal late in 1967, the foundation of this system was the Fish Inspection Act of 1914, which had the immediate purpose of improving the quality of barreled pickled herring. Amended from time to time to expand and improve the scope of its application, the Act was used as the authority for regulations in respect of various species of fish and shellfish, including several varieties of pickled and salted fish, oysters and scallops produced on the east coast, and whitefish produced in inland lakes.

Some ambiguity was inherent in the 1914 Act because it was not clear from its terms whether the Act applied to all products, regardless of whether they were intended for consumption within or outside the province of origin. Some doubt arose as to the scope of its application, and in order to overcome this difficulty an expedient was adopted in 1932 whereby provincial legislatures could enact enabling legislation validating those parts of the federal Act that might be within provincial legislative jurisdiction. This type of enabling legislation had also been adopted to deal with agricultural products but was challenged in some provincial courts, and had to be replaced by new legislation restricting quality control authority to out-of-province exports.

REVISED ACT

Drafted in the years immediately following the Second World War, a revised Fish Inspection Act was presented to Parliament October 13, 1949. Speaking on second reading of the bill, Fisheries Minister R.W. Meyhew cited among reasons for the measure the lack of clarity of the existing legislation in respect of federal-provincial jurisdiction and the fact that provisions of the bill were similar to those already applied to other food products.

The new Act was intended (1) to provide for inspection of fish which moves in inter-provincial and export trade (2) to revise the regulatory powers to meet current quality control problems, and (3) to amplify and simplify some of the enforcement procedures.

The bill was not to become law immediately on receiving royal assent, but would be brought into effect only on proclamation. This procedure was considered appropriate so that its application might be timed to co-ordinate with any similar provincial legislation that might be enacted to cover sale and inspection of fish within a province's boundaries. In cases where complementary provincial legislation was passed, federal officers would, at the request of



One of the Department's three mobile inspection laboratories.

a province, administer both federal and provincial fish inspection regulations.

Passage of the new Inspection Act was only the first step in a determined drive by the Fisheries Department to improve the quality of fishery products. Minimum standards of fish handling and processing had to be developed and sets of regulations giving effect to the broad objectives set out in the Act had to be drafted, discussed and implemented. Accordingly, during the interval between the passage of the new Act and its proclamation in 1967, the Department of Fisheries concentrated on improvement and expansion of its fish inspection program, upgrading standards and procedures to keep pace with rapid advances in food technology.

MAJOR REORGANIZATION

Inspection services of the federal Department of Fisheries up to 1949 were provided largely on a voluntary basis, but with increasing consumer and market demand for quality products, a broadened and more stringent inspection system was required. Among the first steps in this direction following the passage of the new Fish Inspection Act, was the establishment within the Department of Fisheries in 1950 of an Inspection and Consumer Service, responsible for all fish inspection operations across Canada. Formed during a major reorganization of the department, the new Service was also given responsibility for consumer activities by staff home economists. The Consumer section was later trans-



A technical officer conducts a sensory assessment of canned salmon at the Department's Vancouver Inspection laboratory.

ferred to form a branch of the Information and Consumer Service.

As a preliminary step toward the upgrading of quality control standards in the fishing industry, the Inspection Service in collaboration with the Fisheries Research Board of Canada undertook in 1953 a comprehensive survey of more than 500 establishments in which fish was processed, packed or stored for export or inter-provincial trade. These data were later used in setting uniform minimum standards of sanitation, construction and equipment for plants producing fish and shellfish products. By 1956 a voluntary program of plant inspection was instituted in the Maritime Provinces, and in the following year a similar program was underway in British Columbia.

In 1959, an important milestone was reached when the Department of Fisheries undertook an inspection program to apply quality standards for fresh and frozen fish products established by the Canadian Government Specifications Board. Plants applying for C.G.S.B. approval under this voluntary program had to meet specific requirements in regard

to construction, sanitation, equipment and operation. Fishery products of plants so approved became eligible for inspection. Frozen fish products complying with the stated quality standards were entitled to be stamped with the official designation "CANADA INSPECTED". Fresh fish, including whole fish, fillets or steaks, could, if approved, be designated as "PROCESSED UNDER GOVERNMENT SUPERVISION". In each case the designation was enclosed within a line drawing of a maple leaf.

Introduction of this program April 1, 1959, followed the 1958 transfer of responsibility for the fish inspection system in the province of Quebec from provincial to federal hands. The timing of the transfer allowed Quebec plants to enter the inspection program immediately. Inspection was the only aspect of that province's fisheries administration returned in 1958 to the federal department, which had relinquished it to Quebec by agreement in 1923.

A definite improvement in the quality of Canadian fishery products was observed as a con-

sequence of the introduction of C.G.S.B. standards and their acceptance by many major fish processors. Participation remains today, as at the beginning, on a voluntary basis as far as the product standards are concerned, but the degree of support displayed by industry for this quality control endeavour helped to create a climate of co-operation essential for the successful introduction of the next forward step in the long-range inspection program. Plant standards set by the C.G.S.B. have now been incorporated in revised Fish Inspection regulations.

On April 1, 1965 the requirement for compulsory registration of fresh and frozen fish plants went into effect. To qualify for registration, such establishments were required to meet minimum standards for construction, equipment, sanitation and operation. A reasonable period of time was allowed to enable plants to carry out modifications necessary to comply with these standards.

New regulations intended to effect further improvement in quality standards of the Canadian fishing industry were approved in 1967. Incorporating previous inspection regulations which had been completely revised and rewritten, together with several important additions, the new Fish Inspection Regulations became effective in May, and revised Canned Fish and Cannery Inspection Regulations received government approval a month later. These are now being consolidated into one set of Regulations.

Together, these regulations extended compulsory registration to canneries, salted fish plants and cold storages in addition to fresh and frozen fish plants and stipulated that all fish processed or packed in such establishments be subject to inspection. In effect this means that compulsory registration now applies to practically all Canadian fish processing plants whose products are bound for sale outside the province of origin.

Minimum standards have been established by these regulations for refrigerated transport and fishing boats; and closer control has been imposed on the use of quality designations on fishery products.

STORAGE TEMPERATURES

Cold storage plants used to store frozen fish are required by the revised regulations to maintain storage room temperatures of -15° Fahrenheit or colder.

Refrigerated equipment used for the transportation of frozen fish is required to maintain the temper-

ature of the fish so that it rises no more than 10° from the time of loading until it has reached its destination.

Minimum standards for boats used for fishing or to transport fish for processing are another innovation. All such boats are required to have facilities for protecting fish from the sun and weather and from bilge and other contamination. Boat owners must wash gutted fish before stowing, use ice or other suitable means to preserve fish aboard the boat, and wash down boat decks and holds after fish has been discharged.

The consolidated regulations prohibit the use of quality designations (that is, comparative grades of quality such as "fancy", "choice", "prime", "superior", etc.) on labels or containers of fish or shellfish unless specific standards of quality have been defined by the regulations, and are complied with. To date, specific quality standards have been defined only for salted and pickled fish.

Immediately affected by this labelling restriction was Canada's salmon canning industry which has since produced new labels omitting the quality terms formerly in common usage. The federal Department of Fisheries set an objective to have labels for fishery products produced after March 31, 1968, in compliance with this new requirement. It is expected that cans of salmon bearing the new labels will begin appearing on supermarket shelves in the near future.

Having enjoyed, by the introduction of these comprehensive and progressive measures, a gratifying degree of co-operation from the fishing industry, the Department of Fisheries was, by 1967, in a position to complete the consolidation of inspection legislation toward which its efforts had been directed for nearly two decades.

FOUR AMENDMENTS

It was somewhat of a tribute to those who drafted the 1949 Fish Inspection Act that, in presenting it for formal proclamation in the fall of 1967, only four brief amendments were deemed desirable in order to bring it fully up to date.

Following passage through the Senate, the Act to Amend the Fish Inspection Act was debated and passed by the House of Commons February 7, 1968, and received royal assent one month later. One of the amendments included 'canning' with forms of

fish processing to which the Act and regulations made under its authority may be applied. This simple amendment has made it possible to incorporate fish canning regulations under the Fish Inspection Act, rather than under the Meat and Canned Foods Act which may now be repealed. Action is now underway to bring about this consolidation, which members of the Department feel will streamline and simplify the regulations.

To administer its widespread program of inspection, the Inspection Service of the Fisheries Department deploys a staff of more than 380 professional, technical, administrative and support staff at 140 inspection centres and 22 inspection laboratories across Canada.

Inspection officers make daily visits to all fish processing plants within their area of jurisdiction to ensure that plant processing and fish handling conditions comply with the appropriate regulations.

Samples of the raw material and of the finished product are routinely withdrawn for examination. When specialized examination of samples appears necessary, they are submitted to the nearest inspection laboratory.

Laboratories are located at St. John's and Grand Bank, Nfld.; North Sydney, Halifax and Yarmouth, N.S.; Shediac, Shippegan and St. Andrews, N.B.; Charlottetown, P.E.I.; Montreal and Grindstone, Magdalen Islands, Que.; Toronto, and Fort Erie, Ont.; Winnipeg, Man.; Prince Albert, Sask.; and Victoria and Prince Rupert, B.C. In addition, three mobile laboratories operate out of Halifax, Montreal and Winnipeg, while a unique floating inspection laboratory, the M.V. *Belle Bay* covers Newfoundland coastal fish plants from St. John's.

TECHNICAL ADVICE

Laboratory staff also carry out frequent visits to processing establishments to provide technical



The floating inspection vessel "Belle Bay" covers coastal fish plants in Newfoundland.

advice with respect to product assessment, and the sanitary operation of each establishment.

Department policy on enforcement of inspection regulations is to obtain voluntary compliance whenever possible and only in instances where deliberate offenses are believed to have been committed does prosecution follow. Such instances rarely occur.

Industry support is essential for a successful fish inspection program; the co-operation of the Canadian industry has always been of a high order.

Fish inspection is a highly technical art requiring formal training and several years of experience in field work. Qualifications of inspectors must frequently be upgraded to keep pace with technological advances in fish processing. In recognition of this fact, the Inspection Service conducts periodic refresher courses, sponsors the university training of qualified inspectors towards science degrees, and selects certain officers for specialized post-graduate training in food technology and related sciences.

In response to increasing demand for applied research in developing new products and improving techniques for fish handling, processing, storage and distribution, the Inspection Service has within the past year expanded its facilities and staff to undertake work in these areas. In these endeavours, as in the more routine activities for which the Inspection



Volatile acid apparatus at the Fish Inspection Laboratory, Halifax.

Service is responsible, the maintenance of highest quality standards of Canadian fishery products is the constant objective.

Automation in Fisheries

The impact of automation and mechanization on the fishing industry both at the present time and in the future will be analysed and assessed at a major conference to be held February 3-6, 1970, in Montreal.

Tradition plays a greater part in the fisheries than it does in most industries, but the modernization of Canada's fishing fleets and shore establishments has been greatly accelerated during the past few years, and is to be continued at an even faster pace.

The Conference on Automation and Mechanization in the Fishing Industry is being sponsored by the Federal-Provincial Atlantic Fisheries Committee, which is made up of the Deputy Ministers responsible for fisheries in the Federal Government and the governments of Quebec, Nova Scotia, New Brunswick,

Prince Edward Island and Newfoundland. Its purpose is to introduce and describe the various methods and techniques which reduce tedious, arduous work while increasing the workers' pay and conditions and improving the efficiency of the industry both afloat and ashore.

The Conference papers will be submitted by experts in a score of fields from Canada and other leading fishing countries of the world. They will deal with a multitude of subjects, including navigation, vessel operations, fishing gear of all kinds, processing methods at sea and on land, handling and stowage of fish at sea, the transfer and unloading of fish, manpower, and vessel design and construction. Related topics such as marketing, relevant legislation and port development will also be covered.

Government Buys Surplus Cod Stocks

Final arrangements have been made with a view to assisting the Atlantic coast salted cod industry to dispose of its carry-over of stocks from the 1967 season. Under the new program, last year's surplus will be bought by the Government of Canada through the Fisheries Prices Support Board.

During a two-day meeting with representatives of the industry the supply situation was reviewed and conclusion reached that the surplus stocks of salted cod produced in 1967 are not as great as originally estimated. As a result of the discussions, the FPSB offered, and the trade delegation accepted, a revised schedule of prices for the surplus stocks which come close to current market prices. It was proposed that the program be put into action within two weeks.

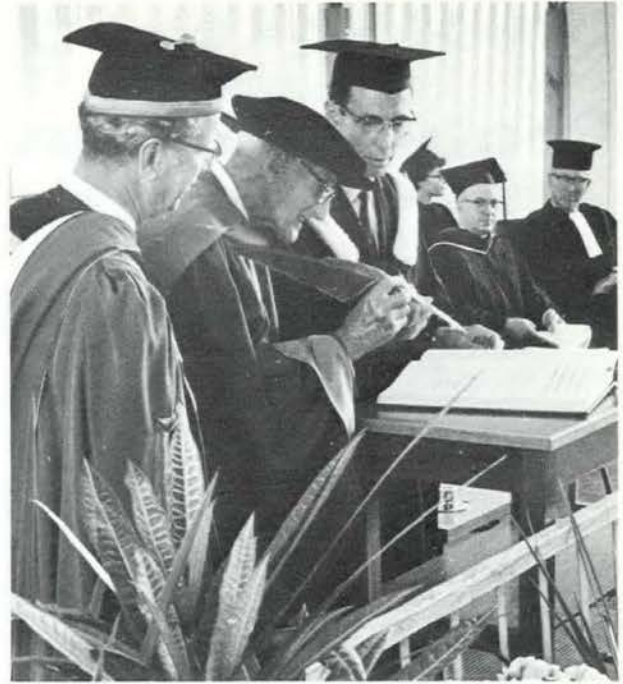
Federal Fisheries Minister Jack Davis said the removal of the 1967 over-production of salted cod from normal trading channels should clarify the market situation in regard to the 1968 catch and thereby give real impetus to the current season's operations by Atlantic coast cod fishermen.

Attending the meeting with the Minister were Deputy Minister Dr. A.W.H. Needler and G.L. Grant, Chairman of the Fisheries Prices Support Board. Industry representatives were: from Newfoundland—F.A.J. Laws, E.A. Snow and Hedley Snelgrove; from Nova Scotia, R.F. Johnson.

FRB Appointment

The appointment of Dr. L.W. Billingsley, 59, of Ottawa, to the position of Associate Editor, Fisheries Research Board of Canada, has been announced by Dr. F. Ronald Hayes, Chairman of the Board. He succeeds Dr. G. Ian Pritchard, 37, of Ottawa, who becomes Technological Consultant to the Chairman.

Dr. Billingsley, formerly Scientific Editor and Head of the Publishing section, Defence Research Board, holds a Ph.D in biochemistry from McGill University. He has served as Editor, The Canadian Journal of Research, Editor, Canadian Chemistry and Process Industries, and as Chief of Technical



Dr. C.J. Berkeley signs the register after receiving an honorary degree of Doctor of Laws at the University of Victoria's Spring Convocation. Dr. Berkeley was honoured by the University for his many years of volunteer study, with his late wife Edith, of marine worms (polychaetes) at the Nanaimo, B.C., station of the Fisheries Research Board of Canada. Now in his 90th year, Dr. Berkeley still works in his laboratory for several hours each day. Flanking Dr. Berkeley are President Malcolm G. Taylor, left, and Registrar R.J. Ferry.

Information Services for a Canadian pharmaceutical firm. During the war he directed the RCAF Nutrition Laboratory at Winnipeg and organized research document exchange among allied nations.

In his new position, Dr. Billingsley will be concerned with the Journal of the Fisheries Research Board of Canada, a leading international vehicle for publishing aquatic research, and other FRB publications.

Dr. Pritchard graduated with the degree of B.Sc. (Agri), with specialization in animal science, from McGill in 1952. He received his Master of Science degree in nutrition and economics from the University of Vermont in 1954, and his Ph.D. degree in nutrition with supporting work in biochemistry, statistics and physiology, from the North Carolina State University in 1959.

Great Lakes Fish Stocks Continue to Recover

REPORTS PRESENTED at the 1968 annual meeting of the Great Lakes Fishery Commission show that fish stocks are continuing to recover in those Great Lakes where sea lamprey have been reduced.

An increase in lamprey taken at assessment barriers on Lake Superior this spring does not appear to have noticeably slowed the rate of recovery. The catch of lamprey, although double that of 1967, is close to the average for the six years since 1962 when the lamprey population in Lake Superior dropped sharply following completion of the first round of chemical treatment of spawning streams.

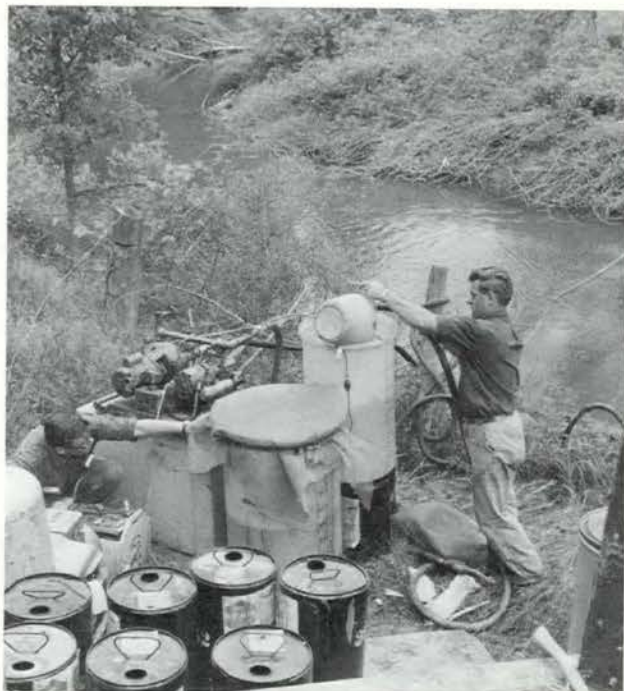
Natural reproduction has resumed and naturally-produced fish are being taken more frequently by fishermen. On the south shore of Lake Superior anglers are taking rainbow and brown trout in increasing numbers along with coho salmon.

CANADIAN PROGRAM

Treatments with lampricide of ten streams tributary to Lake Superior and eleven streams tributary to Lake Huron are scheduled in 1968 by the Sea Lamprey Control Experiment Unit of the Department of Fisheries of Canada, with headquarters at Sault Ste. Marie, Ont. The program was half-completed by the end of July.

The Lake Superior streams being treated include Sawmill Creek and the Little Carp, Goulais, Chippewa, Batchawana, Sable, Little Gravel, Jackfish, Kaministikwia and Pigeon Rivers. Of the Lake Huron tributaries, Echo River, near Sault Ste. Marie, and the Sturgeon, Lafontaine, Nottawasaga, Silver and Chikanishing Rivers in Georgian Bay have already been treated. The Still, Magnetwan, Naiscoot-Harris, Boyne and Sydenham Rivers will have been treated by fall.

The only other rivers requiring treatment in the Lake Huron basin are the Saugeen and the Bayfield, in the southern basin; and the Mindemoya, Blue Jay, Manitou and Kaboni on Manitoulin Island. These will be treated in 1969.



One of the feeder sites for lampricide used in the treatment of the Nottawasaga River watershed this summer. Cost of a single treatment of the 130-mile Nottawasaga was estimated at approximately \$32,000.

Dr. J.J. Tibbles, Director of the Sea Lamprey Control Experiment Unit, stated that all rivers in the Lake Huron and Lake Superior basins that contain populations of sea lamprey ammocoetes will be treated at four-year intervals until sea lamprey are no longer found in them.

Citing an example of lamprey control, Dr. Tibbles said lamprey scarring of rainbow trout in the Nottawasaga River, sampled at Nicolston Dam, was about 17 per cent before lampricide treatment. This figure dropped to three per cent after the original treatment in 1961. However, lamprey larvae which had remained buried in the stream bottom for five to six years, became active during the spring run in the Nottawasaga this year and of the trout checked, more

than 25 per cent were found to be scarred by lampreys.

"This indicates what can and will happen if the control program on sea lamprey is not maintained" Dr. Tibbles declared.

POLLUTION PROBLEMS

During the course of its three-day meeting, the Great Lakes Fishery Commission called for higher water quality standards for the five lakes, especially Lake Erie. It voiced concern particularly over conditions in the lake that cause depletion of oxygen that fish require to survive. It urged that pollution control agencies give fishing considerations more attention, especially in regard to sub-lethal effects of pollutants that may not kill fish but affect the organisms on which they live and depend.

Expressing a growing concern over persistent pesticides such as dieldrin and DDT in Lake Michigan, two to five times greater than in the other lakes, the Commission urged all governments and agencies to further restrict their use in the watersheds of the Great Lakes.

The Commission emphasized the need for accelerating the sea lamprey control program in Lake Huron while maintaining it in Lakes Superior

and Michigan. A shortage of funds restricted control work this year. Although Canadian and United States funds still are tight, the Commission decided to go ahead in 1969 with retreatment with lampricide of 14 Lake Superior streams and 13 in Lake Michigan, and pre-treatment of 25 on Lake Huron.

A contribution of \$50,000 made available by the Upper Great Lakes Regional Commission will augment the regular budget in order to speed up the Lake Huron program—considered essential for the restoration of desirable fish species.

1969 BUDGET

The control budget for 1969 was set at \$1,600,000. For 1970 it was put at \$1,848,000 which would provide for retreatment of 13 Lake Superior streams, 23 on Lake Michigan and 11 on Lake Huron, plus new treatment on eight on Lake Huron.

A subcommittee was set up on Lake Superior to work out uniform reporting and sampling procedures on the growth of lake trout populations and the number of lamprey wounds on the fish by age and size class.

The Commission also asked for a detailed analysis by its fall meeting of the apparent increase in both adult lampreys and wounds on trout that has puzzled fishery experts this spring.



An electrical barrier used to assess the effectiveness of lampricide treatment.

Fishery Statistics

SEAFISH: LANDED WEIGHT AND LANDED VALUE

	May - 1967		May - 1968	
	Landings ¹	Value ²	Landings ¹	Value ²
	'000 lb.	\$'000	'000 lb.	\$'000
CANADA - TOTAL	142,843	9,715	213,587	19,751
ATLANTIC COAST - Total	135,013	7,984	197,705	16,632
Cod	27,046	1,177	43,869	1,883
Haddock	9,330	601	10,596	796
Redfish	1,825	49	7,803	198
Catfish	473	16	1,088	41
Halibut	516	182	515	181
Other Flatfishes	29,493	961	38,808	1,339
Pollock, Hake, Cusk	3,442	136	5,217	182
Other Groundfish	748	15	829	7
Herring & Sardines	54,044	534	66,880	733
Mackerel	0	0	806	40
Swordfish	186	133	216	138
Alewives	598	18	2,475	48
Salmon	154	95	234	152
Smelts	51	8	43	3
Other Fish	368	16	220	21
Lobsters	4,550	3,125	15,217	9,420
Clams & Quahaugs	589	38	698	48
Scallops	1,379	759	1,662	1,180
Other Shellfish	221	23	529	67
Misc. Items	-	98	-	155
PACIFIC COAST - Total	7,830	1,731	15,882	3,119
Pacific Cods	969	82	2,341	176
Halibut ³	2,340	563	7,645	1,817
Soles & Other Flatfishes	301	23	1,500	92
Herring	284	17	277	21
Salmon	1,581	816	1,520	777
Other Fish	80	4	795	26
Shellfish	2,275	225	1,804	210
Misc. Items	-	1	-	-
BY PROVINCES				
British Columbia	7,830	1,731	15,882	3,119
Nova Scotia	36,444	4,116	60,598	7,355
New Brunswick	20,305	848	43,740	1,600
Prince Edward Island	1,971	328	8,523	3,017
Quebec	39,864	731	28,041	1,579
Newfoundland	36,429	1,961	56,803	3,081

¹ Fish and Shellfish only. ² All Products - Includes livers, seaweeds, tongues, scales, roes, skins, oil, seals, whales and bait worms. ³ Includes halibut landed in U.S. ports by Canadian Fishermen. ⁰ Less than half the unit used.

MID-MONTH WHOLESALE PRICES - MAY 1968

	Montreal	Toronto
	\$	\$
Cod fillets, Atl. fresh, unwrapped lb.	.407	.490
Cod fillets, Atl. frozen, cello 5's lb.	.340	.390
Cod fillets, smoked lb.	.430	.507
Haddock fillets, fresh, unwrapped lb.	.507	.630
Herring, kippered, Atl. lb.	.278	.317
Mackerel, frozen, round lb.	.210	.287
Lobsters, canned, Fancy Case 48-1/2s	-	68.267
Sardines, canned Case 100-1/4s	9.922	9.777
Halibut, frozen, dressed lb.	.473	.523
Silverbright, frozen, dressed lb.	.619	.650
Coho, frozen, dressed lb.	.929	.947
Sockeye, canned, grade A Case 48-1/2s	27.547	28.300
Pink, canned grade A Case 48-1/2s	17.067	17.680
Whitefish, fresh lb.	.617 ¹	-
Lake Trout, frozen lb.	.428	.547

¹ Dressed.

PRICES PER CWT. PAID TO FISHERMEN (Week ending May 18th)

	1967	1968
	\$	\$
Halifax		
Cod Steak	5.25	5.75
Cod Market	5	5.5
Haddock	8.5	9
Plaice	5	4.5-5.25
Yarmouth		
Haddock	6	-
Black's Harbour		
Sardines	-	2
St. John's, Nfld.		
Cod	-	-
Haddock	2.75-3.5	-
Rosefish	2.5	-
Vancouver		
Ling	8-16	10-13
Grey Cod	6.5-7.5	7-7.5
Soles	8.5-9.5	8-12
Salmon (Redspring)	35-77	40-80

Fishery Statistics

FROZEN FISH STOCKS AS AT END OF MAY

	1967 '000 lb.	1968 '000 lb.
TOTAL - Frozen Fish, Canada	62,429	67,735
Frozen - Fresh, Sea Fish - Total	38,204	47,728
Cod, Atlantic, Fillets & Blocks	5,799	9,213
Haddock, Fillets & Blocks	7,447	5,175
Rosefish, Fillets & Blocks	1,817	2,146
Flatfish, (excl. Halibut) Fillets & Blocks	6,857	6,612
Halibut, Pacific, dressed & steaks	4,254	7,795
Other Groundfish, dressed & steaks	1,460	2,409
Other Groundfish, Fillets & Blocks	3,932	4,705
Salmon, Pacific, dressed & steaks	1,594	2,275
Herring, Atlantic & Pacific	350	330
All Other Sea Fish, all forms	2,940	3,959
Shellfish	1,754	3,109
Frozen - Fresh, Inland Fish - Total	8,576	5,543
Perch, round or dressed	1	1,624
Pickerel (Yellow & Blue) fillets	1,005	315
Sauger, round or dressed	712	65
Tullibee, round or dressed	247	107
Whitefish, round or dressed	626	471
Whitefish, fillets	170	95
Other, all forms	5,816	2,866
Frozen - Smoked Fish - Total	1,479	1,580
Cod, Atlantic	826	723
Sea Herring, kippers	145	400
Other, all forms	508	457

Frozen For Bait and Animal Feed 14,170 12,884

¹ Confidential, included with "Other".

SALT FISH STOCKS AS AT END OF MAY

	1967 '000 lb.	1968 '000 lb.
Salted and Pickled Fish, Atlantic Coast		
Wet-Salted - Total	5,871	8,988
Cod	3,821	6,522
Other	2,050	2,466
Dried-Salted - Total	7,516	12,919
Cod	6,686	11,897
Other	830	1,022
Boneless - Total	376	1,217
Cod	334	1,077
Other	42	140
Pickled - Total (barrels)	5,108	9,269
Herring	3,689	5,174
Mackerel	405	1,875
Alewives	1,014	2,220
Turbot	—	—
Bloaters (18 lb. boxes)	—	81,354
Boneless Herring (10 lb. boxes)	¹	4,698

¹ Confidential

CANADIAN EXPORT VALUE OF FISHERY PRODUCTS MAY - APRIL

	1966-67 \$'000	1967-68 \$'000
TOTAL EXPORTS	231,673	233,716
By Markets:		
United States	150,560	148,897
Caribbean Area	20,371	19,199
Europe	52,441	56,530
Other Countries	8,301	9,090
By Forms:		
Fresh and Frozen	151,062	146,484
Whole or Dressed	48,864	44,904
Cod, Haddock, Hake	532	650
Halibut, Pacific	6,852	4,438
Salmon, Pacific	16,157	15,913
Swordfish	3,963	4,317
Other Seafish	8,014	8,430
Whitefish	5,490	4,940
Pickerel	2,876	2,053
Other Freshwater Fish, n.e.s.	4,980	4,163
Fillets, Blocks and Slabs	70,499	66,685
Cod, Atlantic	21,289	19,112
Haddock	7,013	7,690
Ocean Perch, Hake, Cusk, Pollock	9,578 ¹	11,308
Flatfish	14,702 ¹	16,896
Pickerel	3,121	2,342
Other Fillets and Blocks	14,796	9,337
Shellfish	30,943	34,284
Lobsters (in shell & meat)	21,406	23,236
Scallops	8,817	9,783
Other	720	1,265
Frozen Fish & Shellfish, pre-cooked	756	611
Cured	24,345	27,154
Smoked	2,452	1,995
Herring	1,484	1,070
Other	968	925
Salted, Wet & Dried	18,948	22,117
Cod	16,277	19,666
Other	2,671	2,451
Pickled	2,945	3,042
Herring	1,830	1,835
Mackerel	631	730
Other	484	477
Canned	38,557	41,517
Salmon	28,187	31,686
Sardines	5,889	6,224
Lobsters	2,684	1,884
Other	1,797	1,723
Miscellaneous	17,709	18,561
Meal	9,091	7,451
Oil	842	1,448
Other	7,776	9,662

¹ Fillets only. No breakdown of blocks for these species in 1966.

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OUR DESIGNERS ARE BUSY ON TIME, LABOUR AND COST-SAVING DEVELOPMENTS FOR THE FISHING INDUSTRY.

Throughout the year, the Industrial Development Service of the Department of Fisheries undertakes many projects in an effort to improve and modernize the catching and processing of fish. During the past year, for example, the Department has played an important role in developing the Atlantic herring fishery, the Pacific offshore ground-fish fishery, designs of fishing vessels, more efficient catching gear, and a Canadian tuna industry. Currently the Department is investigating such things as the underwater exploration of marine resources by divers, electrical devices for catching fish, automation and mechanization on board fishing vessels and in fish processing plants. In almost every instance the Federal Department co-operates closely with the Provincial fishery departments and the fishing industry in a continuing effort to improve the working conditions and financial returns to the fisherman.



DEPARTMENT OF FISHERIES



Ottawa, Canada



FISHERIES

(formerly Trade News) OF CANADA

Vol. 21 No. 3

Sept. 1968



In This Issue

- ★ Big Qualicum Spawning Channel for Chum Salmon
- ★ New Processing Plant Revitalizes N.S. Port
- ★ Control of Eelgrass in Oyster-growing Areas

Department of Fisheries of Canada, Ottawa

FISHERIES OF CANADA

(formerly Trade News)

Editor

E. H. HEARN DEN

Sept. 1968

C O N T E N T S

FEATURES

New Spawning Channel Has 81.3% Survival Rate	3
Tagged Eel Worth \$2	5
New Processing Plant Revitalizes Port	7
Scientists Use 'Cubmarine' for Underwater Research	11
Control of Eelgrass Using 2,4-D in Oyster-growing Areas ...	13
Bluenose Skipper -- Some Reminiscences	17

NEWS ITEMS

Inspection Chief to Work with FAO	6
Plan Use of Satellites as Fish-finders	12
Strange Catch -- A Walrus Tusk	19
New Educational Booklets on Fisheries	20

FISHERY STATISTICS	21, 22
--------------------------	--------

CURRENT READING	23
-----------------------	----

COVER PHOTOGRAPH - A two-man underwater craft, known as a Cubmarine, was tested by Fisheries Research Board of Canada scientists this summer off the East Coast as an aid to aquatic research. See article on page 11.

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New Spawning Channel Has 81.3% Survival Rate

THE NEW \$200,000 artificial spawning channel on the Big Qualicum River, Vancouver Island, the first to be designed by the federal Department of Fisheries exclusively for chum salmon, has been an outstanding success in its first season of operation.

By December 15, 1967, 8,400 chum salmon had successfully spawned, leaving 13.9 million eggs deposited in the gravel, which in turn produced 11.3 million fry giving an almost unheard of 81.3% egg-to-fry survival.

The new channel, which is built adjacent to the natural stream bed, is 3,400 feet long by 40 feet wide and has a capacity of approximately 13,500 adult chum salmon. Small holding pools, located at 170-foot intervals divide the channel into 19 spawning sections, each with a capacity of 700 fish at a density of 1.1 fish per square yard.

Designed exclusively for chum salmon, the

channel was completed in the latter part of October, 1967, in time for the November chum salmon run. All phases of construction were supervised by the federal Department of Fisheries.

FLOW CONTROL

Completion of this spawning channel is but one part of the much larger development known as the Big Qualicum River Project. By means of extensive works constructed by the Department of Fisheries in the early 1960's the rate of runoff from Horne Lake into the Big Qualicum River can now be regulated for the exclusive benefit of salmon production.

For the past four years the flows have been manipulated as desired to create improved spawning conditions. As a result, it has been possible to supply above-normal flows during the natural low-flow summer months and to control the temperature of the water. In addition, shifting of the gravel in which the

Bend section of the 3,400-ft. artificial spawning channel for chum salmon adjacent to the Big Qualicum River, B.C.





Photograph taken during construction of the spawning channel shows dividers between the sections.

salmon lay their eggs, which occurred formerly as a result of frechets during the incubation period, has now been curtailed.

Water temperature control was made possible by the construction at different levels of three intake pipes from Horne Lake. In the summer and early fall when the surface water is at its warmest, supplies are tapped from the lowest intake thereby obtaining the coolest water in the lake to pass on to the spawning beds below.

By means of flow control it has also been possible to create optimum water conditions in the

new artificial spawning channel. During spawning the channel is operated at a water depth of nine inches and with velocities ranging from 1.5 to 3.5 feet per second.

During the 1967 spawning season the channel was operating at approximately 63% of capacity. When it is operating at full capacity it should be capable of producing a total of 16.8 million fry per season.

The new channel is another step towards total utilization of all spawning areas in the valley of the Big Qualicum River.

Completed spawning channel, showing intake and settling pond.



Tagged Eel Worth \$2

INCREASED commercial exploitation of the American eel (*Anguilla rostrata*) in New Brunswick and Nova Scotia is the aim of a survey now being conducted under the sponsorship of the Industrial Development Service of the federal Department of Fisheries.

While the eel fishery has not been neglected entirely in the Maritimes, the commercial fishery has been far below its considered potential. The main eel fishery is on the St. John River below Fredericton, the northeast shores of New Brunswick, southwest Nova Scotia and Cape Breton, and in Prince Edward Island.

A research team under the direction of Dr. Vadim D. Vladykov, of Ottawa University, is tagging eels for the Department to accumulate data on movements, rate of growth and other important facts. A plastic tag bearing numbers is attached to the eel's lower jaw by means of a stainless steel ring. To encourage the return of these tags, a \$2.00 reward will be paid for a captured eel with tag intact. To obtain the reward, the captured eel should be handed to a local Department of Fisheries officer. The date and place of capture and the name of the fisherman should be given.

Last year a million pounds of American eels were caught in Quebec, but in the Maritimes the total catch was less than 200,000 pounds. These figures are small compared with the Japanese eel fishery which nets more than 40 million pounds a year.

GREAT DEMAND

While eels are not a highly popular food in Canada, there is great demand in the United States, Great Britain, Germany, Denmark, and several other European countries. The commercial export of eels from the Maritimes is relatively small. Many fishermen sell their small catches to consumers on the

\$2.00 REWARD
RÉCOMPENSE DE \$2.00

FOR CAPTURE OF TAGGED EELS **POUR LA CAPTURE D'ANGUILLES ÉTIQUETÉES**

The Federal Department of Fisheries is carrying out an extensive investigation into possible ways and means of developing the commercial eel fishery.

Le ministère fédéral des Pêcheries effectue des recherches approfondies sur la manière et les moyens possibles de développer la pêche commerciale de l'anguille.



A large number of eels, with plastic tags of different colours attached to the lower jaw by metal rings, are being released in order to trace their movements, rate of growth, and other important facts.

On a mis en liberté un grand nombre d'anguilles auxquelles on a attaché des étiquettes en plastique de différentes couleurs afin de connaître les déplacements, le rythme de croissance et d'autres éléments importants concernant les anguilles.

In order to obtain the reward, the captured eel, with the tag intact, should be handed in to the local fishery officer to whom the date, place of capture, and the name of the fisherman should be given.

Pour obtenir la récompense, on devra remettre à l'agent des pêches de la localité, l'anguille capturée avec l'étiquette intacte, en indiquant la date et le lieu de la capture ainsi que le nom du pêcheur.

YOUR CO-OPERATION IS EARNESTLY SOLICITED **VOTRE COLLABORATION EST VIVEMENT SOUHAITÉE**

DEPARTMENT OF FISHERIES  MINISTÈRE DES PÊCHERIES

Poster which is being circulated in the Maritimes in connection with the tagging of eels.

local market. Most Maritime eels are caught in tidal areas.

Eels are captured by baited trap, unbaited trap, weir, spear and hooks. However, traps account for about 90 per cent of the eels caught.

As opposed to anadromous fishes such as salmon and alewives which run in from the sea to spawn in fresh water, the American eel does the reverse. Known as a catadromous fish, the eel lives

much of its life in fresh water and returns to the sea to breed.

Studies of the American eel's life history indicate that it spawns in an area generally accepted to be east of the Bahamas and south of Bermuda, perhaps in the sprawling island of drifting seaweed known to mariners as the Sargasso Sea.

The young that result from the spawning regain the coast where they enter streams or estuaries as elvers. They migrate upstream in May and June, travelling anywhere from a few yards to hundreds of miles. As no spawning takes place in fresh water, American eels found in the Great Lakes and the upper Mississippi River must have travelled that far from the spawning area.

The following information on the life of the eel is from the Fisheries Research Board of Canada publication "Fishes of the Atlantic Coast of Canada", by A.H. Leim and W.B. Scott:

"As eels approach the size of maturity in autumn they leave the lakes and rivers and return to the sea, where full maturity is achieved. The eggs have not been found in the sea but are presumed to be released in deep water. They spawn in midwinter and the adults are not seen again. The eel is very prolific and females produce from 5 to 20 million eggs. It is presumed that the eggs and larvae require water of high temperature and high salinity for development.

"The eggs hatch into elongate larvae with large teeth; these soon develop into the 'leptocephalus' stage which is transparent, broad and ribbon-like. They remain in this stage for about one year, during which time they are carried or swim actively toward shore. They next transform into the elver stage—the body narrows and shortens slightly, finally becoming almost cylindrical. These elvers or 'glass eels', at first unpigmented and transparent, appear in estuaries on the Canadian shores in April. In May and June they are ascending into fresh water in large numbers. On entering fresh water they become heavily pigmented and are almost black. In rivers and streams they swim close to shore, where opposing currents are at a minimum.

"The elvers are two and a half to three inches long when they enter fresh water and are over a year old. Scales do not appear until the third year when the fish are six to eight inches long. Eels, whose scales show six and seven rings, are presumed to be from nine to 11 years old; they are from 24 to 28

inches long. This is based on a study of eels from lakes in southern New Brunswick.

"The eel eats voraciously, chiefly at night, and feeds on any small fishes or invertebrates that are available. Young alewives are eaten extensively; salmon and trout fry are found in eel stomachs, although the eel tends to avoid the cooler waters that these species prefer. They will eat the viscera and occasionally the flesh also of salmon or shad that are caught in gill nets. In estuarine and brackish water they eat many kinds of small fishes, shrimps, crabs, and small Crustacea".

Duty with FAO

R.M. Bond, Chief of Inspection, federal Department of Fisheries, left Ottawa at the end of August for a period of temporary duty of about 16 months with the Food and Agriculture Organization's Department of Fisheries at Rome.

The major part of his duties in Rome will be in connection with the FAO Technical Conference on Fish Inspection and Quality Control which is to



R.M. Bond

be held at Halifax, N.S., from July 15 to 25, 1969. Some 300 delegates and observers representing upwards of 40 countries are expected to attend the conference.

Mr. Bond, a native of Glace Bay, N.S., is a graduate of St. Francis Xavier University, Antigonish. He joined the Department of Fisheries at Halifax in 1948 and was subsequently officer-in-charge of the inspection laboratories at Charlottetown, P.E.I., and St. Andrews, N.B. In 1961 he was appointed assistant chief of the Inspection Branch, Pacific Region, moving to Ottawa in 1964 as Chief of Inspection.

R.S. Bolton, Chief of the Inspection Branch, Pacific Region, returned from Rome earlier this year after a period of duty of about 18 months with the FAO's Department of Fisheries.

Canso Makes a Comeback

New Processing Plant Revitalizes Port

BY W.J. LEVER

WHEN THE great glaciers of the Pleistocene Age retreated over one million years ago, they split what is now Nova Scotia and left a spit of land jutting out into the sea as the nearest point on the mainland to the great Atlantic fishing banks.

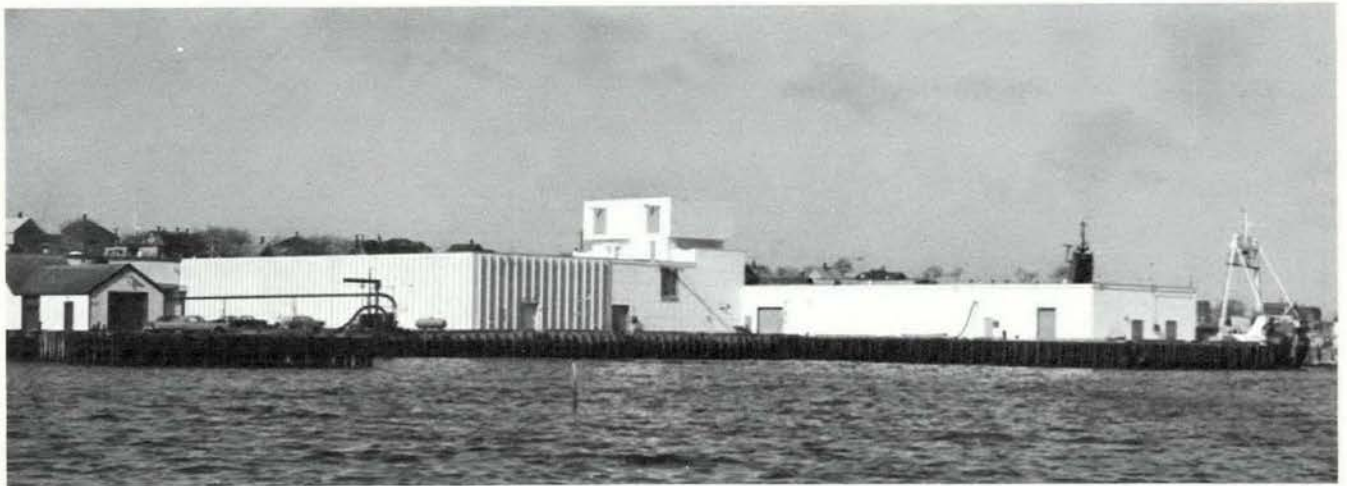
The people who settled this rugged, southeastern land's-end point almost 500 years ago, named it Canso derived from the Indian word "Kamsok", meaning "opposite the lofty cliffs". They naturally turned to the sea for their livelihood since the glaciers of long ago had deprived them of topsoil and left them an inheritance of great rock outcroppings and granite boulders.

Throughout its history Canso has had its ups and downs as a fishing community and is again emerging as one of the major fishing centers of the Maritime Provinces.

This is the result of the construction of a multi-million dollar fish processing plant by Acadia Fisheries. Now in partial operation, it is expected to officially open early this fall.

Built at a cost of over \$5,000,000, the structure covers about four acres and is considered one of the most advanced fish processing plants in North America. It houses the most sophisticated equipment for the preparation and preservation of fresh and cooked seafoods and it will take a fleet of modern trawlers to supply the raw fish to keep this plant in operation.

Following plans two years ago to construct this new plant, the company ordered four new stern trawlers - *Acadia Thunderbird*, *Acadia Gannet*, *Acadia Tern* and *Acadia Condor*. The *Thunderbird*



The multi-million dollar fish processing plant of Acadia Fisheries recently completed at Canso, N.S., viewed from the harbour side.

and *Gannet* were completed last year and have been making some excellent catches. The *Tern* and *Condor* were completed earlier this year.

These four stern-ramp fishing vessels each have an overall length of 151', a 33' beam, a moulded depth to the main deck of 15' 9", a 12,000 cu. ft. fishroom capacity capable of carrying 400,000 pounds of fish. According to company officials, the working deck on the vessels, where the fish are dressed and cleaned prior to being iced, will be equal in appearance and efficiency to any modern shore-based processing plant. Each of these new trawlers is equipped with refrigeration gear for super-chilling the product when required and for maintaining the most desirable temperatures in the fish storage and working areas.

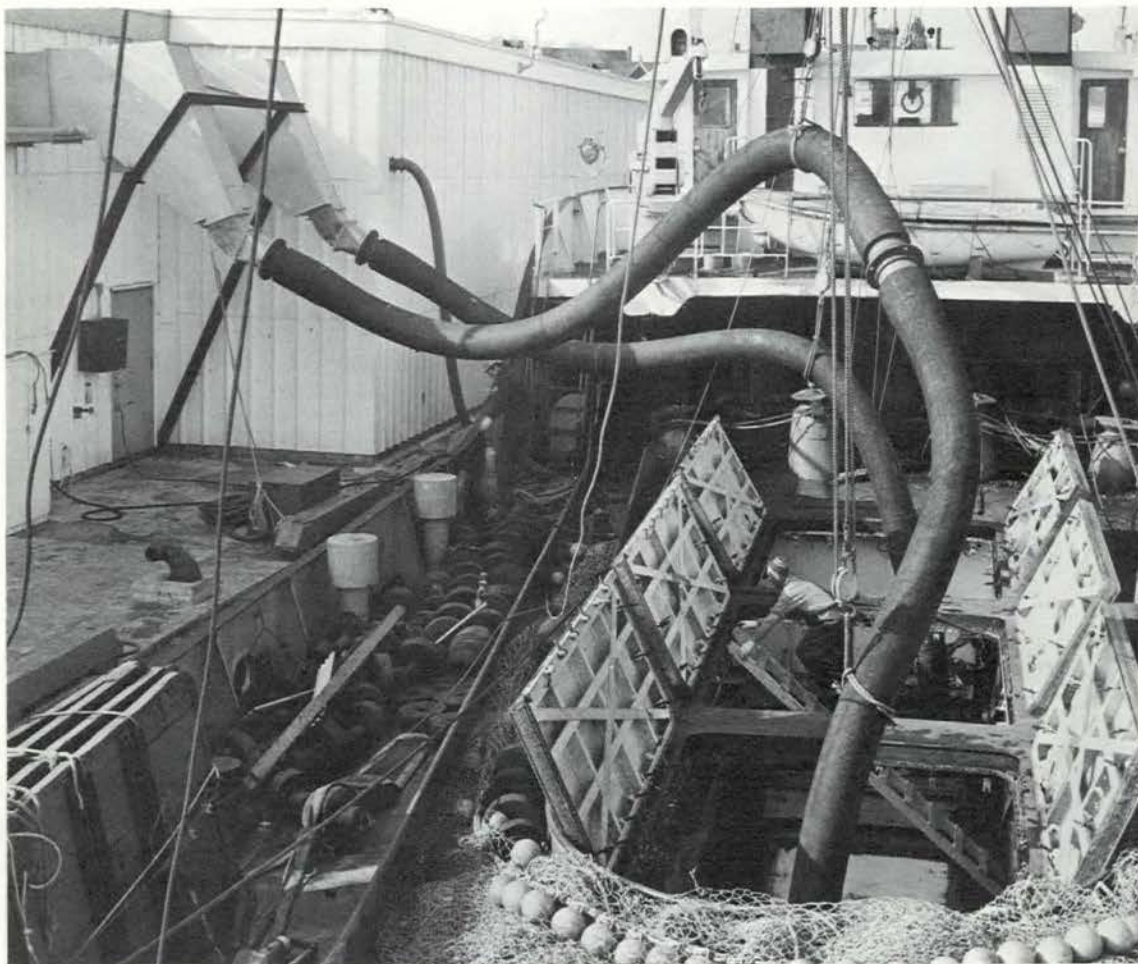
Acadia Fisheries also operate several other large, modern side trawlers out of the area. It maintains a processing plant at Mulgrave, some 20 miles from Canso.

The expected annual capacity of the new Canso plant will be about 60,000,000 pounds of fish. It is also expected that it will require a plant force of up to 250 people; up to 100 fishermen aboard the trawlers in addition to 400 shore fishermen for a total of up to 750 people directly involved with the plant. Then there will be the people needed in the allied industries to supply the services of the fishing fleet and the plant workers.

Acadia Fisheries also operates a fish reduction plant, completed last year, as part of its Canso complex.

The residents of this small Nova Scotia town are now looking to the future with confidence in contrast to several years ago when economic conditions appeared bleak. That was when an old fish plant Acadia had just taken over burned to the ground.

Since it first became a fishing settlement in the early 1500's, Canso has lost established aspects of the fishery as a result of changing methods,



Unloading a trawler at the new Canso plant by means of suction pumps.

tastes and techniques. It has always relied exclusively on the harvest from the Atlantic Ocean. It was once a major salt fish community, a great whaling port, fishing schooner and baiting-up harbour, victualling and supply point for the pre-Second World War swordfishing fleet and terminal for trans-Atlantic cables before the advent of communication satellites.

Historical reports say that in 1728 "business in Canso was booming; some 250 vessels and between 1,500 and 2,000 men being engaged in the fishery. There are not enough trading vessels to carry to market all the fish on hand". Again during the whaling era, in the year 1773, reports said that "in one day 70 whaling sloops were in port; that up to 2,000 men were engaged in this new fishery venture and that a larger fleet was expected to arrive daily". And in the 20's and 30's there are those who recall "you could walk across Canso Harbour over the decks of the swordfishing boats when they were all in port".

MANY ECONOMIC BLOWS

Like everything else, fishing methods change, and some lapse entirely into history. And so it has been with Canso. Changing techniques and times in the fisheries have hit many economic blows, but it has recuperated every time.

The story of Canso is really in its people. Over its 500-year history they met the challenge of change



Fishery Officer Joseph McMullin, left, of the Department of Fisheries' Inspection Service, takes water samples in Canso harbour with the help of a crew member of the patrol boat "Sabella" to ensure that clean water is used in the plant's operations.



A panoramic view of a few of the packing lines at the Canso plant.

Fishfilleting is a streamlined operation at the new plant.



frequently. Following the disastrous fish plant fire in January 1966, for example, a group of Canso citizens formed the Canso and District Development Association, a task force that mobilized residents into a fight to improve the area economy. A town plebiscite quickly authorized the expenditure of \$250,000 to provide sewer and water facilities essential to the operation of a new fish plant. Subsequent negotiations with various federal and provincial government agencies and departments established a fund of \$1,000,000 to bring about these improvements.

These moves started Canso on its way to becoming the second largest fishing community in

the Maritimes. With good water and harbour facilities available, Acadia Fisheries realized that expansion was justified with a willing and co-operative people.

AIR OF OPTIMISM

Now, in Canso, streets are being paved to protect the valuable water and sewer system; housing projects are underway; additional school classrooms being built; new service industries are establishing and throughout the town there is an air of optimism.

In co-operation with the federal Department of Fisheries, Acadia Fisheries, their fishermen and plant workers, intend to do everything to ascertain that only good quality fish products are marketed.



The Grand Banks fishing fleet in Canso harbour in the late 20's. There were more than 100 vessels in port when this picture was taken.

Scientists Use 'Cubmarine' For Underwater Research

By RON GADSBY
Fisheries Research Board of Canada

A scientific instrument to aid underwater research was tested by the Fisheries Research Board of Canada during the past summer and its performance was greeted with mixed emotions by those who used it. The instrument was the Perry Submarine Company's Cubmarine, a 22-foot, two-man underwater craft that took researchers down to 600 feet below the surface of the Gulf of St. Lawrence. In principle, it was an operational success.

The Cubmarine, leased by the Industrial Development Service of the Department of Fisheries of Canada for use by the Board, is an easily manoeuvred craft operated by battery power and compressed air and equipped with port holes to provide lateral and downward visibility. Conversation between the captain and passenger is easy and in one dive during which Queen Crab were under study, the craft remained under water for almost five hours. The Cub is equipped with carbon lights and visibility of up to forty feet is possible depending on the clarity of the water.

During the five weeks the Cubmarine was in the Board's scientific stable, it performed at St. Andrews, N.B., Grande-Riviere and St. Margaret's Bay. It travelled from point to point on its own truck and has a crew of two. James Dudley was the captain and Dave Sanford was maintenance man and every scientist involved in the operation took time out to praise the crew for their cooperation and overtime efforts to make the research program operate at top efficiency.

Dr. Jeffrey Watson of St. Andrews, who is engaged in studies of the Queen Crab, plunged deeper than any other Board scientist. His dive to 600 feet in the Gulf of St. Lawrence was the record and brought him to the environment of his chosen animals.

"It was a dark and frigid world down there," Watson said. "We dove at a sharp angle and there wasn't any time to experience any sort of apprehension during the dive. I was very busy attempting to make the cameras function and to see what we were after."

Dr. Watson feels the Cubmarine has limitations



Close up of 'Cubmarine'

in its effectiveness but submarines, properly designed and larger in size, can be extremely effective, he said.

Dr. Ken Mann, in charge of the St. Margaret's Bay station, was enthusiastic about the two-man machine for his work. He said the submarine, in one phase of its operation, could accomplish as much in a single morning as a skin-diver could do in a two-month period. He felt that certain design changes should be incorporated in the Cubmarine but felt that its overall performance was excellent.

As part of the St. Margaret's Bay program studies were made of the feeding habits of certain species of fish. In this field the Cubmarine was invaluable because its presence did not appear to disturb the aquatic animals. It was also possible to study the seaweeds at close range and to shed more light on their importance as forage for fish.

But what about the physical experience of making a descent in a tiny underwater craft?

To board Cubmarine requires a certain amount of agility, especially if the sea is even slightly

choppy. The vessel sits low in the water and a very mild breeze will almost guarantee a slight drenching for the passenger as he boards.

Inside, the space is comparable to a two-place light aircraft. The pilot, as in an aircraft, sits forward and his visibility is restricted to straight ahead and below. His lateral visibility is highly limited and this factor poses problems to the passenger who attempts to direct the pilot to specific positions.

The passenger has little forward visibility but looks down and out through the ports. A certain amount of bending and stooping is involved in acquiring the best view. There are no grappling arms to pick up samples but photography is possible with underwater cameras and high speed film.

The concensus of the scientists was that the submarine is a great aid to aquatic science. Each would like to have design change for his own use. However, they almost all agreed with the principal of the manned submersible as an effective tool and expressed hope that in the future, bigger and better submarines will be part of the Fisheries Research Board's operations.

Plan Use of Satellites as Fish-finders

A novel space-age program of co-operation between a U.S. Bureau of Commercial Fisheries research vessel and weather satellites in orbit is set to begin off the coast of West Africa late this year.

If successful, such projects could supply knowledge of inestimable value to commercial fishermen in terms of more efficient predictions of favorable fishing conditions and larger catches, U.S. Secretary of the Interior Stewart L. Udall said.

The Bureau of Commercial Fisheries ship, *Undaunted*, has been chosen as the first marine research vessel to work with Nimbus satellites in a feasibility study on monitoring oceanic fronts from space.

The vessel operates out of Miami, where it is attached to the Bureau's Tropical Atlantic Biological Laboratory.

Oceanic fronts, present in specific areas of the world, form boundaries between water masses and

appear to act as concentrating mechanisms for surface-schooling fish like the tunas.

The study is part of a program funded by NASA and administered by the U.S. Navy Oceanographic Office to determine what useful oceanographic data can be collected by spacecraft.

Daily routine of oceanographic vessels consists primarily of occupying scientific "stations." Each station entails stopping the ship to collect samples of marine life and sea water for analysis either aboard or at the home laboratory. Hundreds of such stations, some requiring up to four or five hours, would be necessary to cover an area as large as that shown in a single photograph taken from a satellite.

BCF scientists hope that the broader coverage offered by spacecraft picture transmission, combined with routine oceanographic observations, will provide a more effective and more rapid method of surveying the ocean.

Control of Eelgrass Using 2,4-D in Oyster-Growing Areas

BY M.L.H. THOMAS

Fisheries Research Board of Canada Biological Sub-Station, Ellerslie, P.E.I.

EELGRASS and Atlantic oysters naturally occur together in oyster growing areas of eastern Canada. Although oysters grow well among eelgrass its presence makes fishing difficult. Where oysters are regularly fished with tongs or other devices, eelgrass is usually eliminated since it is uprooted in the fishing process. However, if an oyster bed is not fished or cleaned off for several years, it is often invaded by eelgrass which may form almost impenetrable mats. Such an invasion of many maritime oyster beds by eelgrass followed the epidemic disease of oysters known as Malpeque Disease which so reduced stocks that fishing was unprofitable.

Eelgrass is a particular problem on oyster beds in northern New Brunswick, a situation which occurred as a result of the sequence in timing of oyster disease and a disease of eelgrass. The first epidemic of Malpeque Disease was observed in oysters in Malpeque Bay, Prince Edward Island in 1916 and rapidly spread throughout the island beds. In 1954 the disease crossed Northumberland Strait to the mainland and spread as far as Cape George on the Nova Scotia coast of Northumberland Strait and to Miscou Island in New Brunswick, which is the northerly limit for Atlantic oysters. Where it occurred, Malpeque Disease killed over 90% of the oysters.

An equally virulent disease, which has been called "wasting disease" spread very rapidly through eelgrass in the entire North Atlantic area in 1932 and 1933 and practically wiped the plant out. Follow-

ing this disease, conditions for oyster culture in northern New Brunswick were better than they had ever been, the fishery flourished and landings reached an all-time high since the oyster disease was at that time still confined to Prince Edward Island.

Later when oysters in the area died from Malpeque Disease, eelgrass had recovered from its disease and rapidly colonized the idle beds. In Prince Edward Island the oyster beds were not colonized by eelgrass to the extent that they were in New Brunswick, since both diseases struck at about the same period, nevertheless many formerly productive beds in Prince Edward Island were permanently lost.

The improvement in conditions for oysters which followed the death of eelgrass is thought to be mainly the result of a hardening of the bottom. The roots and stems of eelgrass naturally hold much of the fine mud always present in coastal waters, and the dense stand of leaves reduces currents which naturally carry such deposits away. This mud or silt in eelgrass beds covers shells and shell fragments which are essential for the settlement of young oysters, interferes with the feeding of oysters that may settle and also reduces the market value of adult oysters by causing the growth of long, thin shells.

There is every reason to believe that artificial removal of eelgrass on oyster beds would greatly

improve conditions for oyster culture. Indeed in some areas culture is out of the question while eelgrass remains abundant.

EELGRASS

Before discussing control, a brief description of eelgrass and its mode of life will be given.

Eelgrass, or *Zostera marina* as it is known to scientists, is one of only two flowering plants growing in sea water in the Maritimes. The true seaweeds such as kelp, rockweed, Irish moss and dulse are only distantly related to eelgrass. Despite its name, eelgrass is not a true grass but is closely related to the pondweeds that are common in fresh water. The other flowering plant occurring in sea water in the Maritimes is wigeon grass (*Ruppia maritima*) which is closely related to eelgrass. Eelgrass usually grows in saltier water than wigeon grass but occasionally the two are seen together.

Eelgrass is common throughout northern temperate regions. On the east coast of North America it is found from Labrador to North Carolina. For eelgrass to grow, water temperatures must rise above 50°F during the summer and for flowering and seed formation must exceed 60°F. Eelgrass grows most abundantly in relatively sheltered bays and estuaries where wave action is not heavy. It commonly occurs at depths from about mean low water level to about 10 feet. However, in clear waters it may grow at much greater depths. It occurs on a variety of bottoms from mud to gravel but is most common in mud.

Figure 1 shows a typical shoot of eelgrass. Each shoot consists of an underground rhizome (stem) and cluster of leaves. The number of leaves in a cluster varies but is commonly 4 to 8. Length of the leaves is also variable but may reach 3 feet or more. In the Maritimes a foot is average. In the fall several of the outer leaves normally break away and float. These cast leaves are frequently piled up by the wind on the shore, and when dry are sometimes gathered to be used as insulation.

The inconspicuous flowers are produced in early summer on special shoots which later die. The seeds, which are borne underwater, sink to the bottom when shed and generally overwinter before germination.

Formerly productive oyster beds whose use has been limited by eelgrass and having only a moderate

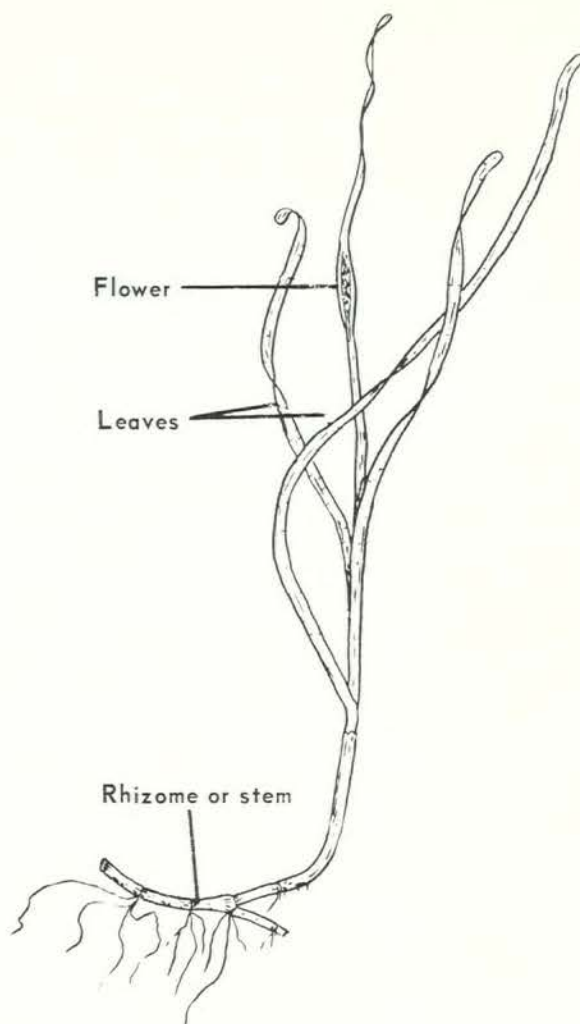


Fig. 1. A typical shoot of eelgrass.

accumulation of silt may be greatly improved by eelgrass removal. In such locations natural tidal movement and water currents should clear away the mud once eelgrass is eradicated.

The rehabilitation of beds covered with over six inches or so of silt must be approached with extreme caution. If such large volumes of mud were released by the removal of eelgrass it could be carried by currents on to good oyster grounds or affect other productive fisheries.

EXPERIMENTAL CONTROL OF EELGRASS

Numerous herbicides for controlling weeds on land and in freshwater have appeared in recent years and it was decided to test the more promising of these at the Biological Sub-Station, Ellerslie,

Prince Edward Island. A program to do this was begun in late 1963.

Eight herbicides were included in initial trials. For comparison, the chemical treatment described by A.R.A. Taylor in Oyster Circular 23 Biological Station, St. Andrews, N.B. issued in 1954 (now out of print) was included. Taylor's treatment was known to kill eelgrass but had proved too expensive for general use. Three of these killed eelgrass, but one, that advocated by Taylor, showed undesirable side effects in that it killed all animals and plants except oysters.

The two herbicides effective against eelgrass but having no apparently adverse side effects were re-tested on larger plots for a further year. These tests showed that only one consistently killed eelgrass at concentrations that would allow economical control. Accordingly this herbicide was thoroughly tested for a further year on large plots in widely varying localities to establish suitable application rates, methods and times. At the same time careful tests were made to see whether the herbicide affected other animals or plants in the area and whether it

could be picked up and accumulated by oysters, perhaps to be passed on to consumers.

The effective herbicide was the butoxyethanol ester of 2,4-D impregnated on small clay particles which carry the chemical to the bottom, where it dissolves among the plants and where it can be most effective in eelgrass control. The actual brand used was Aqua Kleen, made by Amchem Products Inc., Ambler, Pennsylvania, U.S.A. Aqua Kleen contains the equivalent of 20% of 2,4-D. This brand of formulation as it is usually called has also been used with success in the U.S.A. for the control of a different weed (water milfoil) which has become a nuisance in partly salty areas of Chesapeake Bay, U.S.A. Studies by many workers have shown it to be relatively non-toxic to marine animals and plants.

CONTROLLING EELGRASS WITH AQUA KLEEN

a) Amount required

The amount of 2,4-D required to eradicate eelgrass varies with the size of the plot and with the amount of water movement over the plot. The table



Fig. 2. Spreading 2,4-D granular herbicide with a 'Solo' mistblower in Bidford River, Prince Edward Island.

following may serve as a general guide. Actual use of Aqua Kleen may suggest modifications to the application rate suggested. Amounts given in the table are for the 20% granular formulation.

Table I

Suggested application rates for Aqua Kleen for eelgrass control on plots of various sizes and current conditions.

Plot Size Acres	Application rate, Pounds per Acre	
	Slight Current	Moderate Current
¼ to 1	400	800
1 to 5	200	400
5 to 20	100	200

Experience with plots of over 20 acres may show that a reduced application rate would control eelgrass on large areas.

The current conditions referred to in the table refer to currents that would carry the dissolved herbicide away from the plot. Most estuarine areas have a slight current, more open locations where moderate currents exist need twice the amount to kill eelgrass. Control of eelgrass may not be possible where currents are strong.

b) Application methods and equipment.

Aqua Kleen is made in the form of clay granules resembling fine gravel. These granules must be dispersed evenly on the water where they will sink to the bottom. Hand spreading is out of the question except for very small plots. For plots over ¼ acre a mechanical spreader should be used. Hand operated rotary seeders such as the Gerber or Cyclone may be good for plots up to a few acres. However, for larger plots a gasoline engine driven blower spreader such as the 'Solo' mistblower is required. Mechanical spreaders should be mounted on the bow of a shallow draft boat equipped with an outboard motor. Figure 2 shows a 'Solo' blower in use. Application rates should be adjusted so that the plot will be covered twice by swaths running at right angles. It is helpful to drive stakes at intervals along all sides of the plot to enable parallel swaths to be made. Swath width will depend on equipment used.

c) Time of application

The best time for killing eelgrass with 2,4-D is

late June. However, applications from early June to late July have been successful.

Applications should be made as close as possible to the time of low slack tide if there is sufficient depth at this time to use the equipment. High slack water may be better in very shallow areas. Treatment at slack water reduces herbicide loss in tidal currents. For this reason too, application at neap rather than spring tides would be indicated.

CAUTIONS ON THE USE OF AQUA KLEEN

Although 2,4-D is not very poisonous, it should be handled with care, as should all pesticides.

The raw chemical should be stored away from food of any kind and in a building not used for food storage at other seasons. The raw herbicide should not be handled excessively and it is recommended that gloves are worn when using it. During application it is advisable to use a mask to prevent inhalation of dust containing the herbicide. The application equipment and boat must be thoroughly washed after use if they are to be used for other purposes. Follow manufacturers directions on the bag label carefully.

Although 2,4-D in the amounts recommended does not appear to be harmful to marine life, it is collected from the water and temporarily stored by shellfish in the treatment area. Experiments have shown that oysters may retain some 2,4-D in their meats for up to two months after treatment; other shellfish also do this. Because of this, oysters must not be harvested for direct marketing from treated or near treated areas for at least two months after treatment. Treatment of eelgrass in June would ensure 2,4-D free oysters by September.

PERMIT TO USE CHEMICALS

Persons who wish to use a chemical weed control material on oyster ground of any kind should notify the Officer in Charge, Oyster Culture Station, Ellerslie, Prince Edward Island, who will advise if the material may be applied and the conditions under which it may be used.

ACKNOWLEDGEMENT

Financial support for this study was made available by the Industrial Development Service of the federal Department of Fisheries.

Bluenose Skipper

- Some Reminiscences

BY G.J. GILLESPIE*

When I read that Captain Angus Walters had died in his native Lunenburg, my thoughts went back more than 30 years to the time when I first met the skipper of the famous *Bluenose*. It was in 1937, as I recall it, while covering the waterfront beat for a Halifax newspaper, I interviewed him aboard his schooner as she discharged fish at a Halifax dock.

I remember asking Captain Angus how he regarded the new breed of fishermen of that era—the younger ones who sailed aboard the trawlers, preferring to fish from the decks of those craft rather than enduring the rougher and more risky fishing from an open dory. “They’re softies”, he snorted, “not the same kind of young-uns that sailed in the schooners when I started fishing with father more than 40 years ago”.

Captain Angus’ remarks were given quite a play in the daily press, and the “young-uns”—in letters to the editor—let it be known that they weren’t softies. All this didn’t bother the *Bluenose* skipper because it was his policy to answer straightforward questions with straightforward answers.

His tongue could be as sharp as a shark’s tooth, but he had great warmth for the men who sailed on the fishing banks. That was evidenced in 1937 when captains of the Lunenburg fishing fleet, with Captain Walters as their leader, tied up their vessels to support a higher price for fish. It was the first revolt in the long history of Lunenburg fisheries. The fishing captains supported the case for the schooner men, and it wasn’t long before a compromise was worked out between the fish companies and the fishermen.

* Mr. Gillespie, a writer with the federal Department of Fisheries Information and Consumer Service, is the author of “Bluenose Skipper”, a biography of Captain Angus Walters published by Brunswick Press.

Of the many conversations I had with Captain Angus over the past three decades, the one I remember most was his account of the life-and-death fight of *Bluenose* against the sea one fierce night off the fringe of Sable Island.

“I’ll never forget the date”, he recalled. “It was April 7, 1926. We’d been fishing off Sable Island



Capt. Angus Walters
in his sailing days

Bank, and we were riding at anchor not far from North West Bar on the southwest side of the island.

“It was a dirty day. Right from dawn it started to snow. The snow was heavy and with a breeze of wind from sou’sou’west to really whip her up, it was a real blizzard. As the day went on the wind increased and by six o’clock it was blowing a hard gale.

“I could tell we were in for a bad spell of it”, Captain Angus went on. “My chief worry was that the anchor cable would part during the night and we’d go adrift, and going adrift anywhere near Sable meant real trouble. I made the best preparations I could in case the worst did happen. I reefed to storm sail and then the foresail. Then before long I reefed the jumbo. I couldn’t put any smaller canvas onto her.

“What I feared would happen did happen. The cable parted. You could tell in a second—the vessel

just seemed to bolt ahead like a horse taking the bit in his mouth.

“Right then it became a fight for life. The breeze was driving her closer to the bar, and it was just a question of which way to head. It was a sheer toss-up—I figure that’s where fishermen’s religion comes in—but we took the starboard tack. It was the right one.

“Just at the time the anchor cable snapped, the heaviest sea I had ever seen in all my years at sea whanged us head-on. It ripped out fourteen stanchions like they were matches, and carried away a part of the rail and bulwarks.

“We were driving her into windward, and kept throwing out lead. If one stitch of canvas had gone or if we had scraped the bottom that would have been the end of *Bluenose* and all of us. As soon as you hit the sand and the seas start breaking over you there’s nothing in God’s earth to save you. She just fills up with sand and breaks up.

“Anyway, we started our fight that was to last for eight hours to get around the point. I lashed myself to the wheel. I knew the boat and figured I could handle her best. If I may say so, I never expected to see Lunenburg again. I had great faith in the *Bluenose* but I didn’t figure any vessel could weather up to what she had to take that night.

“It was touch and go near midnight. Then we got a break. The wind changed. We made out all right, but without a doubt it was the *Bluenose* that

did it. I guess that was her proudest moment when she pulled us out of that mess.”

Captain Walters recalled that a little more than a year later, *Bluenose* was caught off Sable Island in a gale, but she had plenty of sea room and rode it out. However, in the same general area around Sable six other Lunenburg schooners didn’t have a chance. All were lost with their crews. In the same gale, the American schooner *Columbia*, which the *Bluenose* had beaten in the 1923 international schooner races, was lost. Just what happened no one knows, because dead men tell no tales.

The last time Captain Angus and I chatted was about a year ago in his home on the side of Lunenburg harbour. Fog rolled in from the Atlantic he knew and loved so well—it was “thick ’o fog” as he would say—and he was somewhat sadly reminiscent. He spoke of his old rival Capt. Ben Pine, master of the Gloucester schooner *Gertrude L. Thebaud* which *Bluenose* had beaten so soundly in the last of the international schooner races in 1938. During Captain Ben’s last illness in 1952, Captain Walters visited him in his Gloucester home. For a whole afternoon the old salts exchanged reminiscences of their sailing days.

Captain Ben is gone now. So is the *Thebaud*. She was lost in a hurricane in Caribbean waters. Her bones rest on the bottom not many leagues from the reef off Haiti where *Bluenose* sank in 1946.

“It’s too bad it’s all over,” said Captain Angus on that foggy night last summer. “The ships are gone, and most of the masters are gone too.”



The famous Lunenburg schooner “Bluenose”

Strange Catch - A Walrus Tusk

BY J.C. MEDCOF AND ESTHER I. LORD

Fisheries Research Board of Canada, Biological Station, St. Andrews, N.B.

Canada's east coast scallop fishermen are cool customers and the strange things they come across at times would surprise you. Sometimes they're surprised themselves. They're liable to drag up any *old* thing, and most of their surprises come from their favourite fishing ground—Georges Bank, where they drag up about 11 million pounds of tasty scallops every year

A walrus tusk, 15 inches long and 8 inches in basal circumference, was a big surprise to the crew of M.V. *Lady Monica*, skippered by Fidelis d'Eon. Donnie Comeau rescued it from the catch on May 17, 1966, nearly 200 miles southwest of Yarmouth, Nova Scotia, at 42°03' N. Lat. and 67°03' W. Long., in 30 fathoms. Later he showed it to Israel Pothier of Lower Wedgeport who described it to the local newspaper, *The Yarmouth Light Herald*, which published a picture of it in early June; the *Halifax Chronicle Herald* also reported the find. At that time it was believed to be part of a mastodon tusk.

The tusk was subsequently sent to the Biological Station at St. Andrew's and we, in turn, sent it to

Dr. Clayton E. Ray, a specialist on walrus, at the U.S. National Museum, Washington, D.C., for identification. It's a walrus tusk all right, and without doubt from the same species (*Odobenus rosmarus*) that lives in the Arctic today. By its size, we estimate this tusk fitted a beast weighing 2,000 to 3,000 pounds.

The tusk is not fossilized, but it is a bit on the ancient side, as may be judged from the way the enamel-like covering of this great tooth has flaked away from the dentine. One of the flakes shows annual growth bands on the inner side.

Except for the 1937 freak occurrence of a walrus in the Bay of Fundy, near Digby, Nova Scotia, the last known appearance of a walrus south of Labrador was in 1763 near Pictou, N.S. So it's not so surprising that Emile Cormier of Richibucto, N.B., dragged up a skull with two tusks from the Northumberland Strait in 1965. Dr. D.J. Scarratt brought it to us and it was sent to the Fisheries Research Board's Arctic Biological Station for study. It is



Walrus tusk, 15 inches in length, hauled up by the M.V. "Lady Monica" from Georges Bank, May 1966. Drying has caused flaking of the outer layer.

believed that walrus disappeared from these shores soon after 1767, following the influx of settlers.

The owner of our Georges Bank tusk probably lived many hundreds of years before that—possibly as far back as 10,000 to 20,000 years, when sea levels were lower than they are now and when (according to geologists) Georges Bank was dry land and a part of what is now Massachusetts. At that time, Georges may have been a favourite spot for walrus to haul out and bask in the sun.

Apparently our walrus had friends because United States fishermen have found their skulls and tusks on Georges Bank, too. In 1928 they found a

skull with 2 tusks attached and in 1941, a skull with a single tusk. In 1965 a dragger working about 50 miles south of Long Island, New York, also hauled up part of a skull, with a single tusk.

The tusk from Georges Bank is now in the National Museum of Canada, Ottawa, where it will receive more thorough study than we can give it. Scientifically, it is a most valuable and interesting specimen, and we thank Mr. Comeau who lives at Pinkney's Point, Yarmouth County, Nova Scotia, for bringing it in. We would be grateful to receive other strange catches with information on positions and depths like those supplied for the walrus tusk. They shed light on the fascinating history of our fishing banks.

New Educational Booklets on Fisheries

Two new educational booklets have been issued by the Information and Consumer Service of the federal Department of Fisheries. They are "Canada's Pacific Salmon" and "Lamprey Control in the Great Lakes".

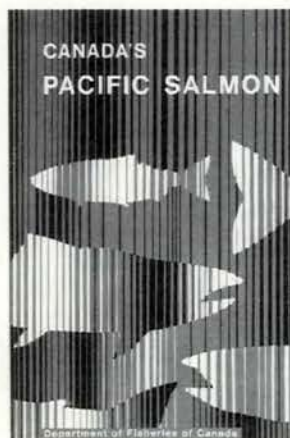
"Canada's Pacific Salmon", a 34-page booklet with text by the well-known Canadian author and naturalist Roderick L. Haig-Brown, is a revised version of the Pacific salmon booklet first issued in

1956. It includes full-colour plates of the five species of British Columbia salmon in addition to a photo-sequence in colour of a young salmon's growth from egg to fry stage.

jects, management and protection and the international aspects of the Pacific salmon fishery.

"Lamprey Control in the Great Lakes" by Nix Wadden, an information officer with the Department of Fisheries at Ottawa, is a 16-page booklet outlining the work of the Department's Sea Lamprey Control Experiment Unit which has its headquarters at Sault Ste. Marie, Ont.

Both booklets are available free of charge from the Department's Information and Consumer Service, Ottawa, or from Regional headquarters.



In his text, Dr. Haig-Brown describes the characteristics of the various species and deals with spawning and migration, commercial fishing methods, the sport fishery, processing, research pro-

cessing, research pro-

Alaska Fisheries

Alaska, indignantly regarded as a \$7.2 million folly at the time of its purchase in 1867, is yielding sevenfold returns—in fisheries alone—a century later.

Statistics gathered by the United States' Bureau of Commercial Fisheries show that "Mr. Seward's Ice Box" produced 370 million pounds of fish in 1967. The catch was valued at more than \$47 million at the dock, and after processing, market value was estimated at \$80 million. And 1967 was definitely an off-year in Alaskan fisheries.

Although Alaska held third place among the American states in both value and volume of catch, this represented a drop from first place in value, and from second place in volume. By contrast, Alaska harvested 582 million pounds in 1966.

Fishery Statistics

SEAFISH: LANDED WEIGHT AND LANDED VALUE

	May - June 1967		May - June 1968	
	Landings ¹	Value ²	Landings ¹	Value ²
	'000 lb.	\$'000	'000 lb.	\$'000
CANADA - TOTAL	390,495	31,376	476,366	41,257
ATLANTIC COAST - Total	355,794	25,153	441,241	33,404
Cod	115,324	5,143	149,606	6,217
Haddock	17,945	1,123	18,073	1,309
Redfish	14,511	378	29,371	749
Catfish	1,104	38	2,277	405
Halibut	978	340	862	303
Other Flatfishes	64,298	2,099	68,798	2,329
Pollock, Hake, Cusk	6,910	268	12,179	423
Other Groundfish	1,843	28	2,262	25
Herring & Sardines	96,832	1,046	106,074	1,186
Mackerel	5,153	199	7,458	334
Swordfish	349	222	754	512
Alewives	3,770	65	6,409	120
Salmon	2,342	1,188	1,952	1,108
Smelts	65	8	66	5
Other Fish	4,308	65	5,077	77
Lobsters	15,421	10,866	23,568	14,651
Clams & Quahaugs	1,180	77	1,499	104
Scallops	3,024	1,665	3,309	2,479
Other Shellfish	437	58	1,647	175
Misc. Items	-	277	-	893
PACIFIC COAST - Total	34,701	6,223	35,125	7,853
Pacific Cods	2,845	232	4,656	348
Halibut (3)	8,504	2,092	12,574	2,930
Soles & Other Flatfishes	791	62	3,381	205
Herring	11,130	196	3,65	28
Salmon	7,724	3,266	9,607	3,929
Other Fish	166	5	1,609	59
Shellfish	3,541	369	2,933	354
Misc. Items	-	1	-	-
BY PROVINCES				
British Columbia	34,701	6,223	35,125	7,853
Nova Scotia	97,670	9,990	132,252	13,320
New Brunswick	52,537	2,411	78,565	3,411
Prince Edward Island	7,434	2,774	15,044	5,101
Quebec	67,549	2,904	48,339	2,949
Newfoundland	130,604	7,074	167,041	8,623

¹ Fish and Shellfish only. ² All Products - Includes livers, seaweeds, tongues, scales, roes, skins, oil, seals, whales and bait worms. ³ Includes halibut landed in U.S. ports by Canadian Fishermen.

MID-MONTH WHOLESALE PRICES - JUNE 1968			PRICES PER CWT. PAID TO FISHERMEN (Week ending June 15th)		
	Montreal	Toronto	1967		1968
	\$	\$	\$ \$	\$	\$
Cod fillets, Atl. fresh, unwrapped lb.	.407	.490			
Cod fillets, Atl. frozen, cello 5's lb.	.335	.390			
Cod fillets, smoked	.428	.507			
Haddock fillets, fresh, unwrapped lb.	.507	.630			
Herring, kippered, Atl. lb.	.278	.317			
Mackerel, frozen, round lb.	.210	.287			
Lobsters, canned, Fancy Case 48-½s	-	68.267			
Sardines, canned Case 100-¼s	10.010	9.847			
Halibut, frozen, dressed lb.	.470	.523			
Silverbright, frozen, dressed lb.	.625	.650			
Coho, frozen, dressed lb.	.923	.947			
Sockeye, canned, grade A Case 48-½s	27.713	28.300			
Pink, canned grade A Case 48-½s	17.117	17.680			
Whitefish, fresh lb.	.483 ¹	.477			
Lake Trout, frozen lb.	.424	.547			
			Halifax		
			Cod Steak	5.25	5.75
			Cod Market	5	5.5
			Haddock	8.5	9
			Plaice	5	4.5-5.25
			Yarmouth		
			Haddock	-	8
			Black's Harbour		
			Sardines	2	2
			St. John's, Nfld.		
			Cod	-	-
			Haddock	2.75-3.5	-
			Rosefish	2.5	-
			Vancouver		
			Ling Cod	10-16	8-10
			Grey Cod	6-7.5	7-7.5
			Soles	7-10	6-9.5
			Salmon (Redspring)	45-75	45-80

¹ Dressed.

Fishery Statistics

FROZEN FISH STOCKS AS AT END OF JUNE

	1967	1968
	'000 lb.	'000 lb.
TOTAL - Frozen Fish, Canada	80,395	85,278
Frozen - Fresh, Sea Fish - Total	54,480	65,176
Cod, Atlantic, Fillets & Blocks	12,242	18,147
Haddock, Fillets & Blocks	7,389	4,650
Rosefish, Fillets & Blocks	3,365	3,766
Flatfish, (excl. halibut) Fillets & Blocks	8,391	7,148
Halibut, Pacific, dressed & steaks	7,569	9,376
Other Groundfish, dressed & steaks	1,366	2,416
Other Groundfish, fillets & blocks	3,835	6,000
Salmon, Pacific, dressed & steaks	3,488	4,716
Herring, Atlantic & Pacific	538	280
All Other Sea Fish, all forms	3,698	5,124
Shellfish	2,599	3,553
Frozen - Fresh, Inland Fish, - Total	8,710	5,906
Perch, round or dressed	1	1,275
Pickerel (Yellow & Blue) fillets	1,021	347
Sauger, round or dressed	735	313
Tulibee, round or dressed	290	86
Whitefish, round or dressed	633	708
Whitefish, fillets	165	92
Other, all forms	5,866	3,085
Frozen - Smoked Fish - Total	1,584	1,647
Cod, Atlantic	801	844
Sea Herring, kippers	269	334
Other, all forms	514	469
Frozen For Bait and Animal Feed	15,621	12,549

¹ Confidential, included with "Other".

SALT FISH STOCKS AS AT END OF JUNE

	1967	1968
	'000 lb.	'000 lb.
Salted and Pickled Fish Atlantic Coast		
Wet-Salted - Total	11,880	11,517
Cod	9,128	8,315
Other	2,752	3,202
Dried-Salted - Total	6,444	12,721
Cod	5,742	11,774
Other	702	947
Boneless - Total	431	1,145
Cod	328	955
Other	103	190
Pickled - Total (barrels)	14,392	18,936
Herring	3,896	4,286
Mackerel	4,335	5,626
Alewives	6,161	9,024
Turbot	-	-
Bloaters (18 lb. boxes)	1	1
Boneless Herring (10 lb. boxes)	1	6,660

¹ Confidential.

CANADIAN EXPORT VALUE OF FISHERY PRODUCTS MAY

	1967	1968
	\$'000	\$'000
TOTAL EXPORTS	15,190	19,472
By Markets:		
United States	10,129	15,092
Caribbean Area	2,249	1,736
Europe	2,549	2,234
Other Countries	263	410
By Forms:		
Fresh and Frozen	9,872	13,993
Whole or Dressed	2,526	2,653
Cod, Haddock, Hake	23	40
Halibut, Pacific	392	422
Salmon, Pacific	993	718
Swordfish	137	312
Other Seafish	373	454
Whitefish	162	211
Pickerel	131	151
Other Freshwater Fish, n.e.s.	315	345
Fillets, Blocks and Slabs	4,648	5,820
Cod, Atlantic	1,288	1,863
Haddock	784	853
Ocean Perch, Hake, Cusk, Pollock	624	355
Flatfish	1,075	1,794
Pickerel	143	140
Other Fillets & Blocks	734	815
Shellfish	2,639	5,467
Lobsters (in shell & meat)	1,753	4,025
Scallops	780	1,219
Other	106	223
Frozen Fish & Shellfish, pre-cooked	59	53
Cured	2,185	2,251
Smoked	101	196
Herring	38	124
Other	63	72
Salted, Wet & Dried	1,797	1,864
Cod	1,473	1,620
Other	324	244
Pickled	287	191
Herring	195	125
Mackerel	84	34
Other	8	32
Canned	1,912	1,874
Salmon	1,399	1,301
Sardines	455	348
Lobsters	6	95
Other	52	130
Miscellaneous	1,221	1,354
Meal	784	965
Oil	246	17
Other	191	372

Current Reading

THE SOCKEYE SALMON, *Oncorhynchus nerka* by R.E. Foerster. (Fisheries Research Board of Canada, Bulletin 162). Published by the Queen's Printer, Ottawa. Price \$8.00.

In writing this handsomely-produced 422-page book, Dr. Foerster has drawn on a vast knowledge of the subject gained from some 40 years' detailed study of the life history, propagation and ecology of the sockeye salmon. It is for good reason that he is widely referred to as "Mr. Sockeye Salmon".

The gradual but marked decline of sockeye stocks in the North Pacific Ocean has become a matter of increasing concern to fisheries authorities. Two major causes have been suspected—overfishing, and a general reduction in the rate of natural survival of young sockeye. In many areas both these factors are at work. Obviously any study aimed at restoring the sockeye populations to their former state requires a thorough understanding of the species life history in addition to a knowledge of the effects of environmental conditions.

Dr. Foerster's bulletin is an attempt to meet this need by bringing together all that is presently known about sockeye. All studies carried out in the North Pacific sockeye area have been reviewed and their results incorporated in order to present sockeye production under a variety of climatic and environmental conditions and to assess overall survival, as well as at each stage of the life cycle from egg to adult.

Starting his studies of fisheries biology in the early 1920s at the universities of British Columbia and Toronto, Dr. Foerster joined the Fisheries Research Board of Canada in 1924 and was in charge of sockeye salmon research on the Fraser River until 1938. During those years he developed the counting-fence techniques which became the basis of salmon research throughout the world. He was subsequently Director of the FRB's Biological Station at Nanaimo,

B.C., retiring from the Board in 1962. He has published more than 85 scientific papers.

TIDES OF CHANGE by A.V. Hill. Published by the Prince Rupert Fishermen's Co-operative Association.

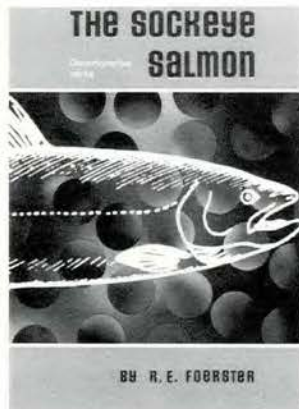
This is the story of Fishermen's Co-operatives in British Columbia, told with eye-witness accuracy and shafts of humour by a sympathetic fellow-fisherman.

Vic Hill, a pilot with the Royal Air Force in World War I and something of a jack-of-all-trades in his earlier years, made his first contact with the fishing industry of Canada's West Coast in 1926 when he joined the B.C. commercial fishing fleet as a troller. Since that time he has maintained an unbroken involvement in many efforts aimed at bettering the lot of the working fishermen and their dependent families.

As an active member of the first fishermen's co-operative in B.C., he can call on personal experience to record the brief rise and fall of this pioneer organization. He was later active in the development of the North Island Trollers' Co-operative Association, which helped lay the foundation of the present highly-successful Prince Rupert Fishermen's Co-operative Association, and from 1937 to 1941 he was secretary of the Pacific Coast Fishermen's Union. He was subsequently Director of Member Relations with the Fishermen's Co-operative Federation and later Supervisor of Fisheries Services with the Extension Department of the University of B.C.

Although he had this wealth of personal experience to draw from, Mr. Hill took pains to research his subject thoroughly by delving into old minute books, contract agreements and other documents and by interviewing many old-timers. Not the least of the remarkable aspects of this book is that its research and writing was accomplished at a time when Mr. Hill was completely paralyzed in all his limbs. The entire manuscript was dictated from a wheelchair.

Referring to the author's achievement, Leslie H.C. Phillips writes in the introduction: "There possibly will be some readers who may not agree with all his interpretations of the phenomena he describes, but none will be able to challenge his honesty of approach and his diligence in ascertaining facts."



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In This Issue

- ★ Irish Moss – A Growing Resource
- ★ Pink Salmon Find New Home in Newfoundland
- ★ Babine Project Passes Halfway Mark

Department of Fisheries of Canada, Ottawa

FISHERIES OF CANADA

(formerly Trade News)

Editor

E. H. HEARNDEN

Oct. 1968

C O N T E N T S

FEATURES

Irish Moss -- a Growing Resource	3
Pink Salmon Find New Home in Newfoundland	9
How to Remove a Fish Hook	13
Test New Treatment to Protect Wood from Marine Borers	17
Marine Ecology Laboratory Studying Sea's Food Chain	22

NEWS ITEMS

New Regulations for B. C. Salmon Fishing Industry	8
\$8,000,000 Babine Project Passes Halfway Mark	14
Canada to Host Fish Inspection Conference	21
N. W. T. Advisory Committee Formed	21

FISHERY STATISTICS	25, 26
--------------------------	--------

CURRENT READING	27
-----------------------	----

COVER PHOTOGRAPH - Freshly raked Irish moss being loaded into truck at the dockside for removal to the drying plant at Miminegash, P.E.I. See article starting on page 3.

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Irish Moss — A Growing Resource

Photostory by JAMES KINLOCH

SEAWEEEDS, in particular the one known as Irish moss, are becoming of growing importance to a number of Canada's Atlantic coast fishing communities. In the past 25 years the Irish moss harvest in the Maritime Provinces has grown from about 1.5 million pounds, which brought \$30,000 to the fishermen, to 79.3 million pounds, worth \$2.3 million to the fishermen. The weights quoted are for wet moss, one ton of which yields approximately 150 pounds of carrageenin, a gelatinous extract that gives the plant its greatest importance.

Carrageenin, widely used in the food processing and other industries, is in great demand, and is worth from \$1.75 to \$3 a pound. The name is derived from that of the Irish village of Carrageen, near Waterford, where the worth of Irish moss was recognized many years ago.

Irish moss (*Chondrus crispus*) looks something like parsley, although it varies in colour from light green to purple. It is a small marine plant found attached to rocks near low water or beyond it, sometimes to depths of 30 feet. It has multiple branches near the tips, which give it a tufted appearance. When it occurs in areas where there are very high tides, the fronds may be six or seven inches long, but ordinarily the fully grown plant runs to four or five inches.

A leading authority on marine plants, Constance I. MacFarlane of the Nova Scotia Research Foundation, describes it as follows:

"Where it occurs in any quantity, *Chondrus* forms a kind of thick carpet over rocks and ledges and is distinguishable from most common seaweeds in that the plants, because they are short, sturdy, and closely packed, do not



Irish moss.

droop when uncovered at low tide. The colour depends on the season, on the chemical constitution of the water, and on the amount of light available. In summer, in shallow water and exposed to sunlight, the colour is a yellowish green, in autumn, brown. In deeper water or in shade the plants are a reddish purple, frequently with iridescence. The shaded stalks of exposed plants also may have this colour. When dried, the plant darkens so that unbleached dried moss is known to the trade as 'black' moss. The cleanest and usually the best Irish moss grows in somewhat exposed situations, though good moss may often be found in sheltered places as well. In sheltered bays, especially if the water temperature



**Raking Irish moss offshore near Miminegash,
Prince Edward Island.**

is a little higher than 'outside', the moss may mature earlier than on exposed rocks, and sometimes it is of good quality with a good gel content."

Irish moss is harvested mostly by hand, picked off the shore where it is tossed by storms. Often the harvesting is a family affair, with women and children flocking to the beaches with the men after

heavy weather has sent the waves rolling in with fronds torn from the bottom.

It is also gathered by long hand rakes from small boats and, along with that picked off the beach or raked out of the surf at the water's edge, is carried, often by horse-drawn wagon, to the drying plants. The moss taken from deeper water is lifted from the seabed by rakes dragged behind the type of boat used for lobster fishing.

The moss is usually sold wet to the dryer, but some fishermen air dry it to about 20 per cent moisture content before selling it. At this stage it is crisp but not crumbly.

Care must be taken with both hand-picked and raked moss to prevent damage to the "holdfast", a thin disc by which the plant is attached to the rock. It is also necessary, in order to allow for regrowth and future cropping of the beds, to remove only the larger branches of the plant; the teeth of the rakes are especially designed to make this selection possible.

A Marine Plants Experimental Station, built and operated by the Industrial Development Service of the Department of Fisheries of Canada, was opened in the fall of 1966 at Miminegash, Prince Edward Island, providing mechanical drying facilities for Irish moss harvested in the area. Within a year, two commercial plants were established nearby, so that the Station can now devote its attention to the general development of the marine plants industry for all Canadian regions where there is a seaweed potential.

At the present time the main activity at the



Storm-tossed moss is gathered from the surf. Horses are still used for this operation, but will probably disappear with increasing mechanization.



Moss gatherers on the beach near Miminegash.

Station is the upgrading of storm-tossed Irish moss. The equipment includes a washer, a stone separator, a screen for removing sand, a specific gravity separator for removal of other seaweeds and a bagging machine. The Station program also includes underwater studies such as surveys of the seabed and investigations of harvesting methods.

The Experimental Station is managed by H.D. Johnston, the Industrial Development Service's Regional Representative in the Maritimes, who has described the uses to which both natural and derived products are put:

“The natural products are those in which the seaweed itself is used as the end product. These may be whole, ground, or dried. Such products are used primarily for human foods, for animal foods, and for fertilizer. The derived products are those manufactured from seaweeds by chemical processes. Historically the products have included a wide variety of materials, such as iodine, acetone and decolorizing carbon. The major derived products, both in the present and in the recent past, are those which have the ability to form gels and colloidal suspensions. In Canada and the United States the principal colloidal products made from seaweeds are carrageenin, agar, and algin. Commercially these derived products

are vastly more important than the natural ones.

“At the present time Irish moss is the most important seaweed due to its extract, carrageenin. The uses to which this extract is put are almost infinite. The hydrocolloids



Hoop net for use in surf.



Picking storm-tossed moss thrown up on the beach.

produced have high viscosities in water solution and possess an ability to alter the physical properties of various fluids. In addition, carrageenin has thickening, emulsifying, stabilizing and suspending properties. It is also colorless, tasteless and odorless."

In the food processing industry, carrageenin is used by the makers of chocolate milk, minute break-

fasts, ice cream, sherbert, pie fillings, confectionery, beer, desserts, salad dressings, fruit syrups, flavoring, icings, and jellied poultry and fish soups.

In other industries, it is utilized in insect sprays, water base paints, inks, cloth sizing, paper sizing, thread sizing, shoe stains, shampoos, ointments, emulsions, tablets, finishing leather, graining leather, some printing processes, cosmetics and dental impression compounds.

As yet there are no extraction plants for carrageenin from Irish moss in Canada, so the dried product is exported to the United States and Denmark. It is estimated that a commercially profitable extraction plant could be supported only by an annual supply of 16 million pounds of wet Irish moss.

Nearly all the Irish moss harvested nowadays



Various marine plants are investigated at the Miminegash station, some gathered by divers. The plastic bag contains eel grass.

EARN \$1,000 IN ONE WEEK

While the Irish moss earnings of fishermen and their families vary considerably, and are largely dependent upon the weather and other unpredictable factors, moss harvesting, on occasion, can be remarkably profitable. During one week in July this year, two families working in the North Cape area of P.E.I. harvested Irish moss worth \$1,000 to each family. Several other families earned about \$600 (per family), and during the same period 20 boats raked moss from North Cape to Kildare, averaging approximately \$40 each per day. The moss was sold to plants at Miminegash.

is dried by mechanical dehydration rather than by sun and air, the traditional method. There are now half a dozen commercial-size dryers in Nova Scotia and Prince Edward Island and others are planned. The extract from a plant named *Furcellaria fastigiata*, which is dried by the same method as Irish moss, is called furcellaran and is also used as a stabilizer of solids, but it is darker in colour and not as versatile as the Irish moss extract.

Other seaweeds of the Atlantic Provinces which are utilized to some extent are *Ascophyllum nodosum* and *Rhodomenia palmata* (dulse). The former is a rockweed which can be ground for animal feed or processed to produce algin for stabilizing solids. Dulse, harvested in Nova Scotia and New Brunswick, is sun dried and eaten "as is". *Laminaria* (kelp) has also been harvested in some areas for the production of algin.

Federal and provincial governments as well as private industry are conducting surveys throughout the Atlantic coastal regions to determine, if possible, the extent of the marine plants resource. It is generally accepted that at the present time marine plants are under-utilized, but it is also recognized that with an increasing demand for the products to be derived from them, sound conservation will have to be practised. In Japan, where Miss MacFarlane, on behalf of the federal Department of Fisheries, made a study of seaweed cultivation, marine plants have been used for centuries



Irish moss, cleaned and dried, is packed for shipment to an extraction plant.

as staple articles of food and as raw material for colloidal extracts. There is no reason that, subjected to proper research and development programs, the various species available to Canada cannot be similarly exploited to the fullest possible extent. Self-renewing and cultivated crops could then provide a regular and bountiful harvest year after year.



The Marine Plants Experimental Station at Miminegash.

New Regulations For B.C. Salmon Fishing

Measures to increase the earning power of British Columbia salmon fishermen and to permit more effective management of the salmon resource by controlling the entry of fishing vessels into the fishery will be put into effect in 1969.

Fisheries Minister Jack Davis announced September 6 that the new regulations will curtail the size of the fishing fleet and, on a long-term basis, reduce production costs. He stressed, however, that boats presently fishing for salmon would not be deprived of fishing rights. Any person will still be able to buy and sell these salmon vessels.

Government studies and briefs from both fishermen's organizations and industry groups have sought limitation of licences, Mr. Davis said.

The new regulations call for two categories of vessels based on recorded commercial landings of salmon in 1967, or in the current year up to September 6. In either category transfer of vessel ownership will be allowed with the salmon fishing licence accompanying the vessel.

In the first or A category will be those vessels with a production of 10,000 pounds or more of pink or chum salmon or the equivalent in other species based on the following formula:

one pound of sockeye or coho equals three pounds of pinks or chums;

one pound of spring salmon equals four pounds of pinks or chums.

In terms of landed value of production this would be equal to about \$1,250.

Salmon licences for the vessels in this category will be renewable annually. If a vessel is to be newly licensed in the salmon fishery, it must replace an A category vessel.

SMALL VESSELS

In the second or B category will be those vessels with a production of less than 10,000 pounds of pink or chum salmon or the equivalent in other species reported in 1967, or in 1968 prior to September 6. These vessels may be re-licensed for salmon fishing annually but cannot be replaced by a new vessel. Most of the vessels in this category are small vessels and in terms of commercial catch account for

approximately one per cent of the value of the total salmon production. This regulation will allow the small vessels to continue in operation.

Vessels that were licensed for salmon in 1967 or 1968 that did not record any commercial landings in 1967, or prior to September 6, 1968, will not be licensed for salmon in 1969.

The salmon licence of a vessel that is removed from the fishery by an accident or lost at sea will be cancelled and cannot be replaced. However, the fisherman suffering such a loss will be free to purchase another licensed vessel in either category.

An Appeal Committee will be set up to consider the licensing of vessels that do not meet the above qualifications because of special circumstances. Representatives of fishermen and industry groups will be asked to serve as advisers to the Departmental Committee.

The Minister said that new vessels built for ownership and operation by native Indians under the Indian Fishermen's Assistance Program would be exempt from the provisions of this plan.

It is the intention of the Minister to increase the vessel licence fee to engage in the salmon fishery from \$5 to \$10 in 1969, the first step in increasing the value of the salmon fishing privilege.

It is anticipated that as the fishing privilege becomes more valuable due to the reduction of the size of the fleet, vessel licence fees for salmon fishing will be further increased. Currently the cost to salmon fishermen is \$10 for a commercial fishing vessel registration, \$5 for validation to engage in the salmon fishery and \$5 for a personal fishing licence.

Mr. Davis pointed out that the new steps were the first in a continuing series to establish a firmer economic base for all segments of the industry. He added that a review of their effect would be made in 1970.

He said the new measures would supplement, in the interests of a more profitable salmon industry on the west coast, the conservation measures and the research programs that are in progress to ensure a continuing and increasing supply of the salmon resource.

Pink Salmon Find New Home in Newfoundland

BY ARTHUR A. BLAIR

Fisheries Research Board of Canada
Biological Station, St. John's, Nfld.

NEWFOUNDLAND is the home of the Atlantic salmon, *Salmo salar* Linnaeus, but at the present time pink salmon, *Oncorhynchus gorbuscha* (Walbaum), of the Pacific Ocean are striving to make a new home for themselves in the southeastern corner of the island, specifically in North Harbour River which is a small stream at the head of St. Mary's Bay.

In 1958 an investigation of the prospects of establishing Pacific salmon in Newfoundland was undertaken by the Fisheries Research Board of Canada with the permission and co-operation of the Department of Fisheries of Canada. The Nanaimo

Station of the Board did the general planning and procured the eggs, and the St. John's Station planted the eggs and studied the survival at various stages in the river and in the sea. The species chosen to be investigated first was the pink salmon. Others may be tried later, especially the sockeye, *Oncorhynchus nerka* (Walbaum).

So far the eggs used in these experiments have come from British Columbia streams: Indian River, Glendale River, and latterly Lakelse River, which is a small tributary of the Skeena River. They are taken in the fall from salmon which are ready to spawn, fertilized, and incubated in a

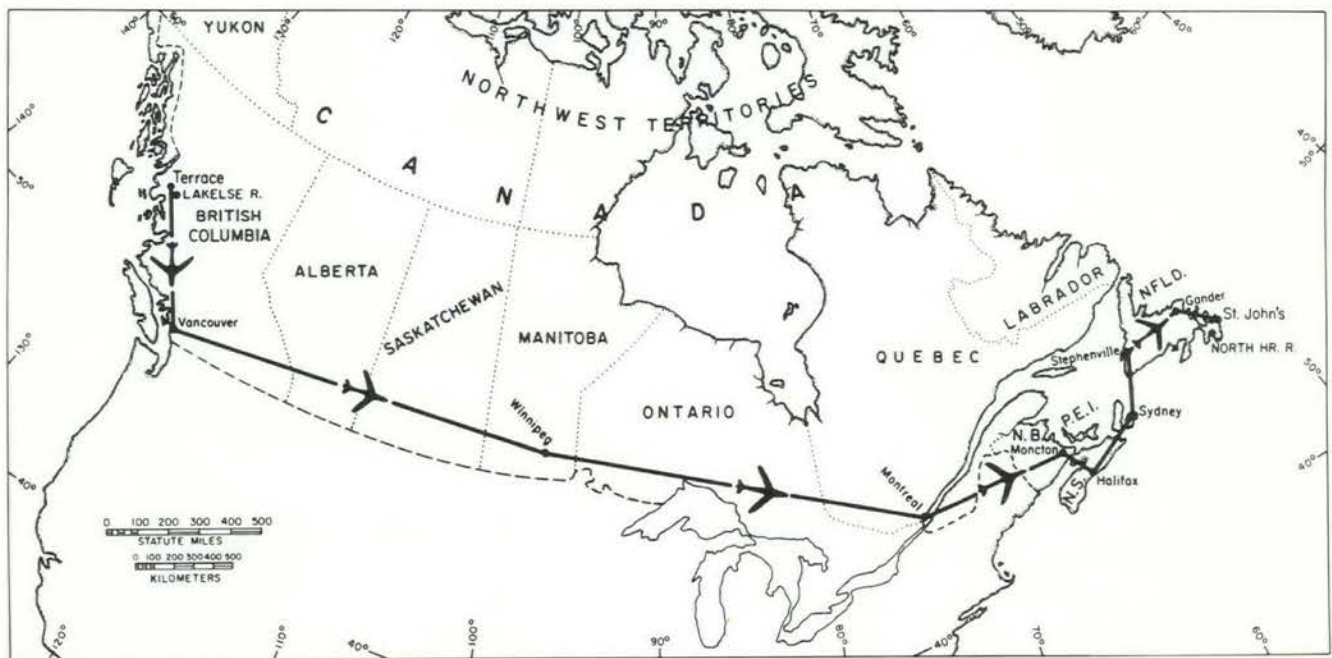


Fig. 1 - Air journey of pink salmon eyed eggs from Lakelse River, B.C., to North Harbour River, St. Mary's Bay, Newfoundland.

hatchery to the eyed stage when they can be handled without causing mortality. They are then packed in fibreglass cases (100,000 eggs) or foam plastic cases (80,000 eggs) for an air journey of 4,000 miles from Terrace, B.C., to St. John's, Nfld., where they are trucked 65 miles to North Harbour River in St. Mary's Bay on the south coast of Newfoundland (Fig. 1).

Having reached their destination they are planted at the rate of 400 eggs per square foot in gravel ranging in size from 3/4 to 3 inches in

diameter in a channel having a capacity of 10 million eggs and in which the flow of water is controlled.

The time of hatching varies from November to February but the alevins or sac fry remain in the gravel until sometime in April or May when the yolk is absorbed and the fry leave to go to sea. At this time they are about one inch long. Survival to this stage (from the planted eggs) has been good, estimated to be 82 to 91%.

The fry in large schools can usually be followed making their way seaward close to shore

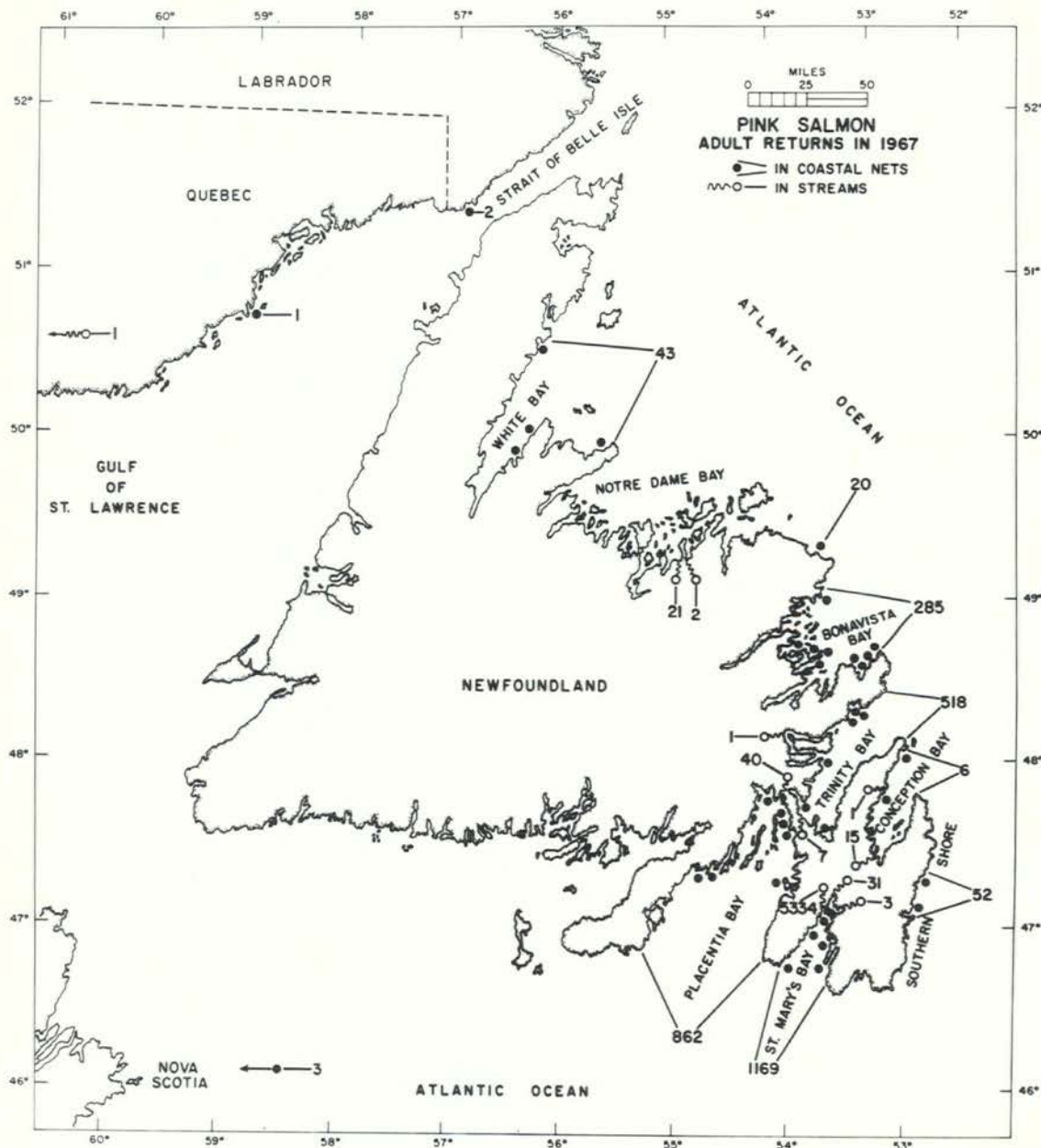


Fig. 2 - Distribution of adult pink salmon in 1967 in coastal nets and in streams, mainly North Harbour River, the home stream.



Fig. 3 - Fence for counting adult pink salmon entering North Harbour River.

on the west side of the estuary and bay, until about the end of June. They are well out in the bay when contact with them is lost but later on the larger juveniles are often seen at various places in the bay. By October they are around 8 inches long. They have also been seen in large numbers in adjacent Placentia Bay. Just when they leave the bays or coastal waters is not known because so far in Newfoundland waters they are next seen the following year as adult salmon of 3 to 6 lb.

In 1967 the numbers that survived to maturity in the Atlantic Ocean and found their way to the coastal waters of Newfoundland from June to September were beyond expectations because they were much greater than returns from previous experiments in this series of transplants. The known adult returns from the earlier experiments consisted of 1 in 1961 from a transplant of 0.25 million eggs in 1959, 49 in 1964 from a transplant of 2.5 million eggs in 1962, and 638 in 1966 from a transplant of 3.4 million eggs in 1964. In 1967, however, the total known returns were 8,440 from a transplant of 3.3 million eggs in 1965.

Compared with the earlier experiments the returns in 1967 are encouraging but this should not be surprising because there are many factors which can contribute to variations in returns from year to year. An even better return is expected in 1968 from 5.9 million eggs transplanted in 1966 but this may not materialize because conditions for survival in the sea might not be favorable.

The first indication of better than usual returns in 1967 was when the strange salmon reported in the salmon net fishery on the east coast of Newfoundland were examined and found to be pink salmon. The fishermen knew they were not Atlantic salmon because of the small scales which came off easily but since learning they were an introduced species they often refer to them as the "new" salmon and to the Atlantic salmon as "our" salmon.

Some fishermen were reluctant to admit catching pink salmon in case it was contrary to the salmon regulations but so far there are no regulations in Newfoundland specifically governing the capture of pink salmon. Reports of catches by commercial gear in the sea or of salmon seen in rivers were received from fishermen, anglers, and officials with the federal Department of Fisheries, the latter being extremely interested and helpful (Fig. 2).

In Newfoundland commercial catches were made on the eastern part of the island only, from White Bay southward along the east coast and as far west on the south coast as Placentia Bay.

DISTANT CATCHES

Distant commercial catches numbered 6 only, 2 in Labrador, 1 in Quebec, and 3 in Nova Scotia. Of the fish which entered streams, 5,334 were enumerated at a counting fence (Fig. 3-4) in the home stream of North Harbour River and 122 were



Fig. 4 - Pink salmon in North Harbour River below the counting fence on August 16, 1967.

seen in other streams as follows: Placentia Bay-40 in Come by Chance River; St. Mary's Bay-31 in Colinet River and 3 in Salmonier River; Conception Bay-15 in North Arm River (Holyrood) and 1 in Salmon Cove River; Trinity Bay-7 in Chance Cove River and 1 in Shoal Harbour River; Notre Dame Bay-2 in Loon Bay River and 21 in Indian Arm Brook; and Quebec-1 in Great Watchichou River. It is thus apparent that wandering was quite limited, especially for a transplanted species which is noted for wandering in its native Pacific waters. Also there are hundreds of streams in Newfoundland that could have been attractive to them.

The adult run into North Harbour River was most interesting. It extended from July 28 to September 23 but most of the fish entered during the first week of September. From the middle of August on they accumulated just below the mouth of the river in tidal water, going back and forth with the tide and some entering the river on the rising tide. The water in the river was low but on September 2 when it rose 2 inches the river was

alive with salmon moving upstream, water being splashed in all directions because there was still very little water in the river. That day the count at the fence was 1,559 but the run reached a peak of 1,734 the following day.

Spawning observations indicated that the salmon made good use of 5 miles of the main river and 1 mile of a tributary stream. Some areas were favored over others but there was no evidence of crowding. Females slightly outnumbered males and the egg deposition was estimated to be 4.4 million. Egg samples indicated a survival to the fry stage in 1968 of 87% or 3.8 million which is 800,000 more fry than went to sea in 1966 and produced the favorable adult returns of 1967.

If the adult returns to North Harbour River in 1969 are equally as good, it will be evident that a self-sustaining run has been started which is the ultimate goal of these experiments. Thoughts could then be turned to the development of a pink salmon fishery for commercial fishermen mainly, but perhaps eventually for sport fishermen as well.

How to Remove a Fish Hook

(EDITOR'S NOTE: The following article is reprinted from the June, 1968, issue of "Commercial Fishing", published in Auckland, New Zealand.)

Hooks embedded in the hand or fingers are one of the many occupational hazards faced by fishermen.

The most common method of removing an embedded fish hook is to force the hook onwards until the point pierces the skin again, then file or break off the barb and draw the curved part of the hook along the track of entry. This is known as the "push through" method.

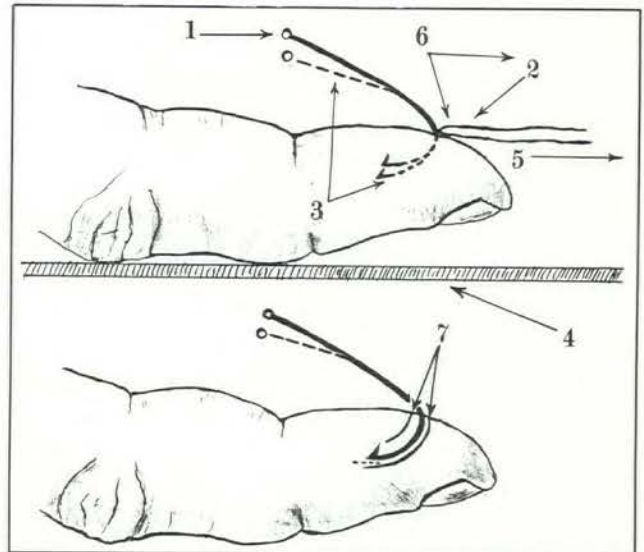
Circumstances can arise, however, when the hook will have to be pushed through a considerable distance by a curved route before the barb emerges from the skin. When this occurs a small incision is sometimes made down to the barb before the hook is pulled out backwards. This is the "pull out" method. Both operations can be extremely painful unless a local anaesthetic is administered.

A quicker method has been described by Dr. Theo Cook, of Curramulka, South Australia, in the *Medical Journal of Australia*. He says it is used by fishermen in St. Vincent's Gulf who flick the embedded hook out with a piece of string, dip the finger in the sea and continue fishing.

Dr. Cook says that medical colleagues to whom he referred the method had not heard of it and most of them expressed disbelief at the practice.

The doctor describes the string method as follows:

A piece of ordinary string is made into a loop, the ends are wrapped firmly around the manipulator's right index finger, and the loop, some 18 inches or 45cm. long, is placed over the shank. The fish-hooked finger is placed upon a firm surface, the eye pointing to the left of the manipulator, who then grasps the eye and shank with the thumb and index finger of his left hand, which rests upon the patient's hand. He holds the shank rigid and depresses it. This disengages the barb and is painless provided that the hook is not moved sideways.



1. Eye and shank of fish hook. 2. Centre of loop of string. 3. Effect of slight depression of shank, with subsequent disengagement of barb. 4. Patient's finger on bench. 5. Direction of sharp pull on string. 6. Direction followed by hook when string is jerked—that is, upwards, then far across the room. 7. Track of entry of barb and hook. Dotted line shows disengagement of barb with depression of shank.

The string is slowly straightened out horizontally in the plane of the long axis of the shank. This is a trial run made for two purposes: (i) to make sure the string will not tangle itself on the coat buttons; (ii) to bring the centre of the loop gently against the curve of the hook. The tip of the manipulator's left third finger then holds this central point of the loop of string against the juncture of the hook with the patient's finger. The manipulator's right hand is brought back to the hook and suddenly jerked away again, with full follow-through, in the same direction as in the trial run, spinning the hook back out of the finger without enlarging either the track or the hole of entry.

For hooks larger than a size 1 whiting hook, a double loop and a loop length of 24 to 30 inches (51 to 75 cm.) are used. Full-sized snapper hooks present a quite different mechanical problem.

\$8,000,000 Babine Project Passes the Halfway Mark

CONSTRUCTION is progressing well on a gigantic salmon development program in British Columbia to augment by 1,000,000 sockeye the annual production of the Skeena River system. Contracts totalling more than \$2,300,000 have been awarded within the past year by the federal Department of Fisheries for the current stages of the \$8,000,000 complex centered at Babine Lake in the province's north-central region.

Now in the fourth year of a seven-year construction schedule, the program is intended to expand and improve the sockeye rearing potential of the main basin of Babine Lake. Work was begun in 1965 on a combination of projects on two Babine tributaries, Fulton River and Pinkut Creek, with the objective of increasing salmon fry output to the lake by 100,000,000 annually.

Fulton River flows eastwardly through two small lakes, Chapman and Fulton, to empty into Babine Lake at Topley Landing. Immediately downstream from Fulton Lake, the river plunges down over a 40-foot falls, and it descends a further 150 feet through rock canyon and narrow valley. Natural spawning occurs in the four miles of river downstream from the falls.

Because much of the salmon egg mortality under natural stream conditions results from fluctuating water levels, a system of flow control combined with artificial spawning channel construction is being built to improve egg survival to the fry stage. The first of two spawning channels was completed in 1965. The 4,800 foot channel can accommodate 22,000 spawning sockeye and has a potential annual production of 12,000,000 fry. Built

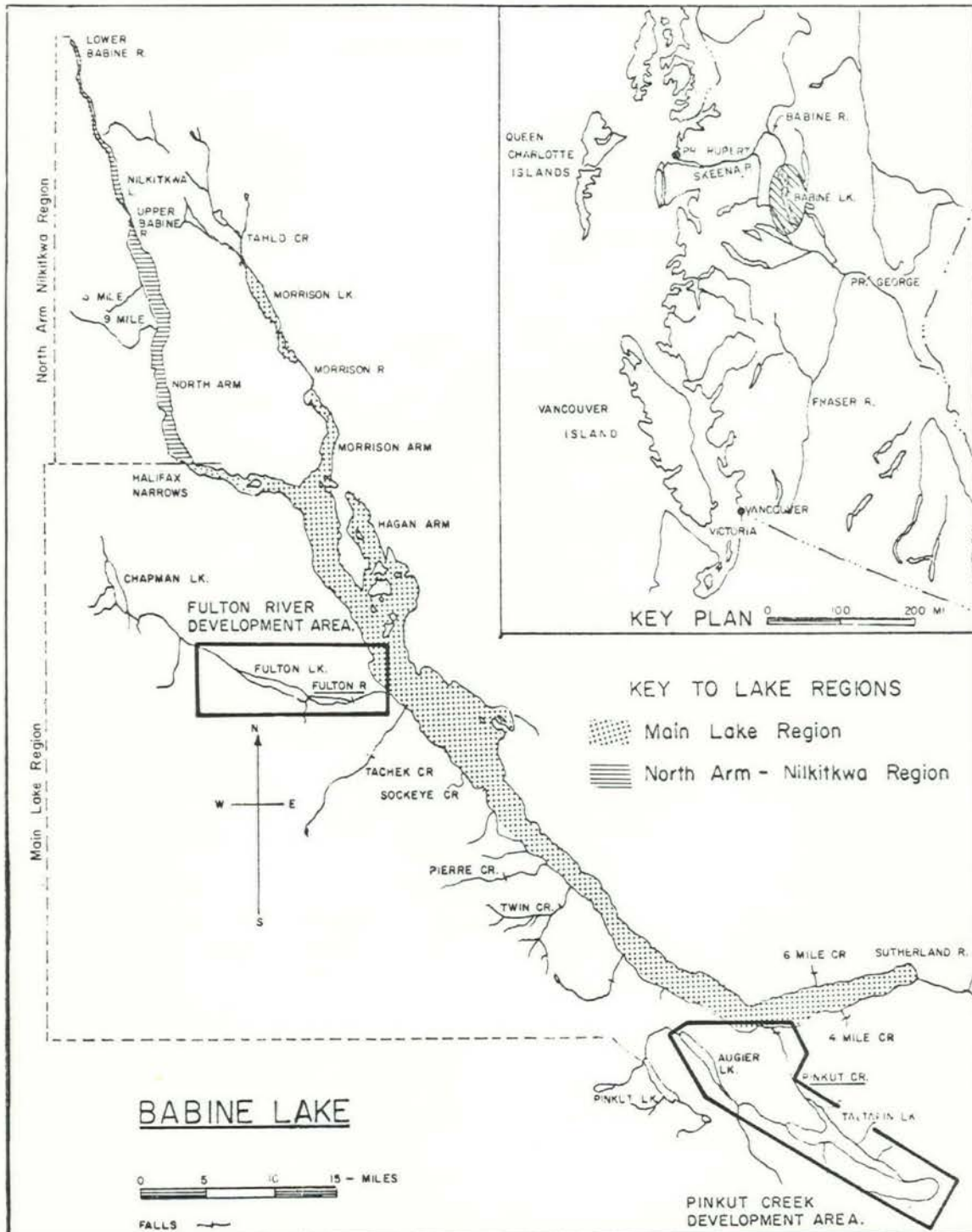


Panoramic view of the sockeye salmon spawning channel adjacent to the Fulton River, completed in 1965.

alongside the Fulton River, it features a unique divider wall of timber and concrete construction arranged to form sections of the channel so as to make maximum use of the limited land area available. Egg-to-fry survival has been encouragingly high to date.

A storage reservoir to make possible the regu-

lation of water flow in Fulton River and its adjacent spawning channels will be created with the completion of a dam now under construction at the eastern end of Fulton Lake. The flow control works for regulating outflow from the lake consist of a vertical gate-shaft, a concrete-lined tunnel, 12 feet in diameter and 500 feet long, and a valve house located at the



Location of the \$8,000,000 Babine Lake Salmon Development project.

tunnel outlet, several hundred feet downstream from the dam.

Construction of the flow control works was begun in 1967 under contracts totalling \$945,000 awarded to Manning Construction Co. of Vancouver. Building of the 25-foot concrete storage dam commenced this summer under a \$473,670 contract awarded to Northern Construction Co. & J.W. Stewart Ltd. of Vancouver.

Scheduled to go into operation in 1971, the storage dam will raise the level of the lake, flooding approximately 1,800 acres of undeveloped lakeshore area. Within the next three years, this area is to be cleared of forest cover. First contracts for this work have been let this year, including one for \$60,000 to Alpine Clearing Ltd. for clearing.

Establishment of a second Fulton River spawning channel a short distance downstream from Channel No. 1 involves some engineering and construction problems, since the elevation of the channel site is 40 feet above that of the river. To overcome this difficulty, engineers decided to convey water for the channel directly from Fulton Lake, nearly two miles upstream, using a combined supply tunnel and pipeline. Originating from the regulating tunnel, the smaller (7.5 feet diameter) tunnel extends for 3,800 feet. A pipeline carries the water the rest of the way to the channel.

Contracts for construction of this second spawning channel, were awarded, as follows: \$186,065 to F.D. McDougall Excavating Ltd., Vanderhoof, B.C., for earthworks; and \$115,000 to Alkurt Construction Co., Prince George, B.C., for the supply of spawning gravel and concrete aggregates.

More than three miles (17,000 feet) long and 50 feet wide, Spawning Channel No. 2 is designed to accommodate 135,000 spawners. With an anticipated survival rate of 40 per cent, production should reach 68,000,000 fry. Channel construction is due for completion in 1970.

SECOND PHASE COMPLETED

At Pinkut Creek, in the southern end of Babine Lake, the second major phase of the development program concluded with the completion of a spawning channel in mid-August.

Natural spawning in Pinkut Creek, the second most important sockeye stream in Babine's main basin, is confined to 1,200 yards of stream, as further

penetration upstream is blocked by an impassable falls. The development program here consists of flow control works and storage dam, and spawning channel construction in low-lying land adjacent to the main spawning grounds at the river mouth.

Flow control works were built at Taltapin Lake through which Pinkut Creek flows on its descent to Babine. The final contract covering spawning channel construction -- valued at \$375,746 -- was awarded to Three Mile Mill Ltd. and Astra Construction Ltd. as a joint venture. Construction was completed on time for use by spawning sockeye this year. This channel -- 8,000 feet long and 40 feet wide -- is designed to accommodate 54,000 spawners with an expected fry production of 37,000,000. A second stage channel, 12,000 feet long, is to be added at a later date.

Fish Meal Symposium

An international symposium on fish meal and fish oil is planned for September 22-24, 1969, at Fredericton, New Brunswick. The symposium, sponsored by the New Brunswick Research and Productivity Council, will cover production, processing, utilization, and marketing of fish meal and fish oil. Papers are invited on any of these subjects, and may be written in either English or French.

Further details may be obtained from: International Symposium on Fish Meal, New Brunswick Research and Productivity Council, P.O. Box 1236, Fredericton, N.B.

H.C.L. Ransom Retires

H.C.L. Ransom, of Ottawa, retired Sept. 12 as Administrative Officer of the Fisheries Prices Support Board. He had been associated with the Prices Support Board continuously since 1947.

A native of Montreal, Mr. Ransom graduated from McGill University with a B.Sc. in electrical engineering. Following service with the R.C.A.F. during the Second World War he joined the Department of Reconstruction and Supply.

While with the Fisheries Prices Support Board, Mr. Ransom helped organize the International Fishery Commissions Pension Society. Mr. and Mrs. Ransom plan to spend their retirement in Victoria, B.C.

Test New Treatment To Protect Wood From Marine Borers.

BY M.L.H. THOMAS

Fisheries Research Board of Canada Biological
Sub-Station, Ellerslie, P.E.I.

EVER SINCE man has been sailing the seas of the world in wooden vessels, shipworms and other borers have created problems. D'Anghiera, writing in 1516 of the return of Christopher Columbus to Jamaica during his fourth voyage, stated: "Their return to Jamaica, which is the island lying south and near to Cuba and Hispaniola was accomplished with great difficulty, for their ships had been so eaten by worms that they were like sieves and almost went to pieces during the voyage. The men saved themselves by working incessantly bailing out the water that rushed in through the great fissures in the ship's side and finally, exhausted by fatigue, they succeeded in reaching Jamaica. Their ships sank....".

This story has been repeated many times over and for hundreds of years men have been seeking methods to protect wood from marine borers. At the same time man has compounded the problem by distributing borers virtually throughout the world in the wooden bottoms of his ships.

Of course the problem is not confined to ships. Borers attack almost any wooden structure in the sea, including fishing equipment, piers, wharves, etc. Perhaps one of the most famous and serious situations to be caused by borers occurred in Holland about 1730. Much coastal land in Holland had been reclaimed from the sea and farms and even towns were below sea level and protected by dykes faced with wood. Prior to 1730 no trouble with borers had been encountered but from that time borer attack

was so severe that dykes were destroyed and towns threatened.

Maritime marine wood borers

Borings in wood in sea water in the Maritime Provinces of Canada are caused by two different borers. These are the shipworm (*Teredo navalis*) which are often called "worms" and the gribble (*Limnoria lignorum*).

Shipworms

Although they resemble "worms" in their elongated appearance, shipworms are really a type

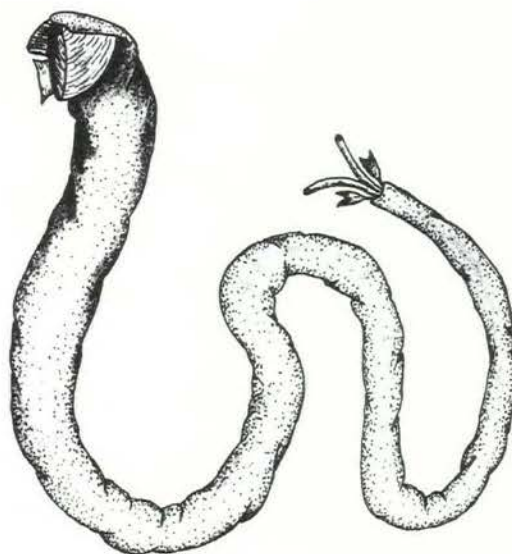


Fig. 1 - An adult shipworm removed from its burrow in the wood. One of the two shells is shown on the side of the larger end (about half life size).

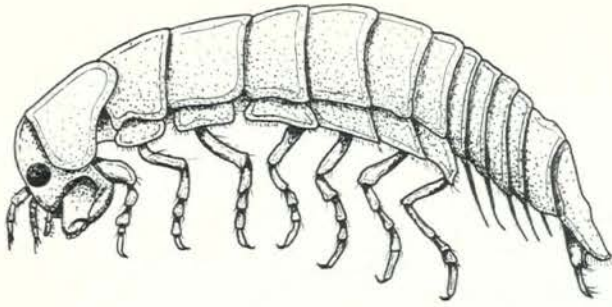


Fig. 2 - An adult gribble (much enlarged).

of clam or technically a bivalve mollusc. If a shipworm is carefully removed from its burrow in the wood, its two shells, which show that it is a clam, can be seen as small objects at the larger end. These altered shells have toothed edges and are used by the shipworm as jaws for boring through the wood. Figure 1 shows a shipworm that has been removed from its burrow.

In Malpeque Bay, P.E.I., where shipworms have been studied, they breed from June to September. Breeding occurs between water temperatures of 60 and 75°F and consequently in other locations the breeding season may be longer or shorter according to temperature. Young shipworms, released into the water as tiny larvae, swim for a short period before settling on wooden surfaces; there they bore in using their shells. Growth following settlement may be very rapid. In Malpeque Bay they are sexually mature in about 6 weeks and produce at least two generations per year.

As the animal grows, it elongates the burrow into the wood and may attain a length of over one foot. However, it always remains attached at the surface of the wood where it first entered. The burrow is lined with shell material and can be closed at the opening by two pallets, shown on either side of the tail, Figure 1. Food is obtained both by filtering the water drawn in through the opening of the burrow and also from the excavated wood, which is eaten.

Shipworms can live in brackish water and can even survive in completely fresh water for a period by closing off their burrow. Shipworms can survive long periods of near freezing water temperatures and can also survive air exposure for many days—in cool places where the wood does not dry out.

Gribbles

Unlike shipworms, gribbles belong to the group of animals technically known as crustacea,

which also includes the well known shrimps, lobsters and crabs. Gribbles are smaller than shipworms, adults reaching only about 3/8th of an inch. Figure 2 shows an adult. Gribbles make much smaller burrows than shipworms, up to about 5/8 inch long; these excavations normally are confined to the surface 1/4 inch of the wood. Wood is eaten as food. In the Bay of Fundy, gribbles breed from July to December and further south do so all year round. The young are released in an advanced stage of development and are able to start burrowing immediately. Gribbles cannot survive where there is an appreciable amount of fresh water but will breed at lower temperatures than shipworms.

Differences in temperature and salinity requirements of the two borers result in differences in their distribution and abundance. Shipworms, although occurring almost throughout the Maritimes, are most common in warmer water areas, particularly the southern Gulf of St. Lawrence and the Bras d'Or Lakes. Gribbles are present throughout the Maritimes but appear to be more common in the cooler water areas such as the Bay of Fundy and the outer coast of Nova Scotia. Shipworms tend to be the major borers in river or estuarine areas, where fresh water occurs.

Damage caused by borers

Shipworms can do much more extensive damage to wood in a short period than can gribbles. This is because shipworm burrows are larger and extend deep into the wood, whereas gribbles remain at the surface, only gradually eating it away. Figure 3 shows an X-ray photograph of wood infested by shipworm. It shows the long holes made in the wood as well as the shells of the shipworms (appearing as black crescents in the picture). Wood heavily infested by shipworm is often completely destroyed in two months, nothing remaining but a mass of burrows. Figure 4 shows the damage produced to a piece of wood exposed to shipworm for two summer months at Bideford, P.E.I.

Where gribble infestation is heavy, the wood is gradually eaten away and softened at the surfaces, which then washes away. Several years are usually required for destruction of timber.

Past and present methods of wood treatment

The ravages by these borers and the cost and inconvenience produced by the damage has spurred the search for effective methods of wood treatment. This search has employed countless people and

encompassed several centuries.

The oldest method of protection was simply to dry wood in the hot sun at frequent intervals. Charring the surface of the wood was also an early method but it was not very effective. A coating of tar was also used very early. Some woods were found which resisted attack but none in ready supply. The only really effective method of protecting wooden ships from attack was to sheath the hull with a hard material such as copper plates or to cover the entire bottom with broad headed nails.

In more recent times several protective coatings and paints have been developed. Creosoting under pressure is perhaps the best of these because it penetrates deeply into the wood but it is generally only used on wood for fixed structures, such as wharves. Additionally, creosoting is fairly expensive and adds greatly to weight. Some marine borers in other areas attack creosoted wood.

Ordinary paints and other coatings do give effective protection as long as they remain intact. Special anti-fouling paints rely for their protective action on poisons, usually compounds of the metals copper or mercury, which are incorporated into them. These poisons gradually dissolve into the water and the paint has to be replaced at intervals.

Currently, a popular coating is ordinary netting tar, which is used on lobster traps. A more effective coating, consisting of a mixture of tar, copper oleate and kerosene, is also in limited use but for best results must be applied hot. Copper

paint is almost universally used on boats but has disadvantages. It must be still wet when put in the water, it is fairly soft and has a short life, often necessitating re-coating in mid-summer.

All these methods, except pressure creosoting, have the disadvantage that damage to the coating will allow shipworms to enter and spread beneath the surface.

Experiments with a new treatment

Several years ago we learned of a new and promising treatment for wood which was claimed to stop marine borers. The treatment uses a new poison based on the metal tin, which is quite deadly or repellent to marine borers. The active ingredient is a chemical whose technical name is bis (tri-n-butyltin) oxide but which is usually referred to as TBTO. TBTO is a clear liquid which will not mix with water but mixes readily with mineral spirits (proprietary names Varsol, Irsol, etc.) or kerosene. The resultant mixture is thin and will readily penetrate deeply into dry wood. This chemical has the additional important advantage that it is strongly attracted to wood fibers and becomes firmly attached there. This means that TBTO becomes almost part of the wood and will only dissolve very slowly back into the water.

Experiments carried out at the Ellerslie Station over a three-year period tested varying concentrations of the chemical in several solvents on blocks of various woods as well as on boats, stakes, oyster trays and lobster traps. We have also

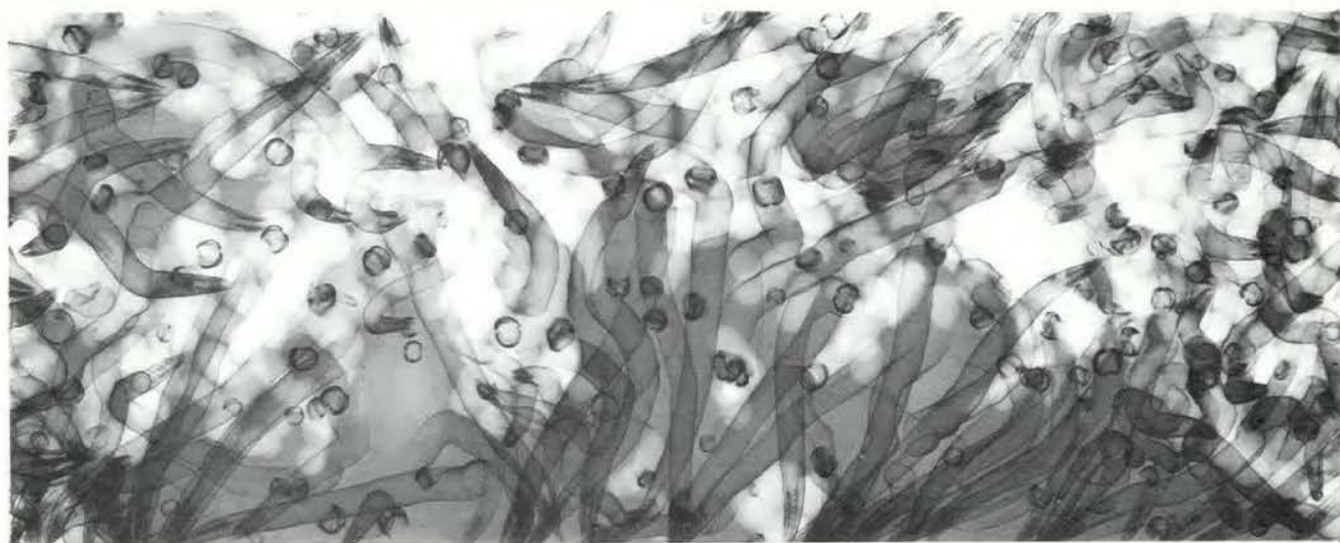


Fig. 3 - X-ray photograph of wood infested with shipworm. The shell material which lines the burrows can be clearly seen and the pairs of shells appear as dark crescents (Photograph reproduced by permission of D.B. Quayle).

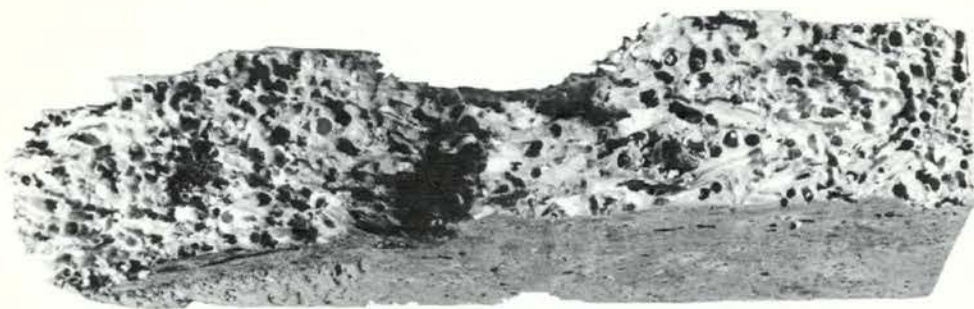
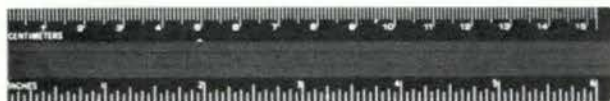


Fig. 4 - A piece of untreated spruce 2 x 4 exposed for two summer months at Ellerslie, P.E.I. The wood is a mass of burrows and crumbles readily. (Photo by P.W.G. McMullon).



checked for possible harmful effects on oysters and other useful animals.

Our tests have shown that a 2% solution of TBTO in mineral spirits or kerosene, brushed or applied by dip to dry or almost dry wood will give excellent protection against borers for at least two years. Penetration is sufficient to give moderate protection even where mechanical damage such as scuffing or scraping occurs.

Since success of this treatment depends on the TBTO combining with the wood, it is ineffective if applied over paint or on wet wood.

Its important advantages are ease of application, length of protection, ready penetration into wood and relatively low cost. Although TBTO is relatively expensive, the fact that it is used at low concentration, covers a large area, and lasts longer than former treatments makes it quite inexpensive to use.

Tests using TBTO on wood in close contact with oysters showed that the chemical does alter their normal growth pattern. It should, therefore, not be used on oyster trays or on wood that may be in contact with other edible shellfish.

Tests on the effects of TBTO on lobsters are still underway at the St. Andrews, N.B. Biological Station of the Fisheries Research Board of Canada. Until these tests are completed it would be wise not to use TBTO on lobster traps.

New anti-fouling paints incorporating TBTO

or related chemicals are now commercially available. Our test results with these paints show great promise and some important advantages over regular copper paint, the most important advantage of which is the production of a hard, smooth, durable surface which does not require frequent re-painting. Another property of special advantage to pleasure boat owners is that a wide range of bright colours is available.

Recommendations for the use of preservative solutions containing TBTO

The following methods are recommended where borers are a problem.

1. All new wood or wooden structures to be used in the sea (but not in contact with edible shellfish) should be at least surface dry, and brushed, or dipped for 2 minutes or more, in a commercial wood preservative containing 2% bis(tri-n-butyltin) oxide. Dipping is preferable where possible. If wood is to be worked (sawn or planed) after treatment, all newly exposed surfaces should be touched up.

2. On structures that will be painted, apply the preservative to the bare wood and let dry before painting. This will give a hull, for example, excellent protection even if the paint is chipped or scuffed. Apply only to bare wood. It will not penetrate paint, tar or other surface coatings.

3. For continuous protection of unpainted wood, the surface should be re-treated by brush or dip every two years.

4. Although the diluted chemical in the preservative solution you buy is not too poisonous,

take precautions with its use. Follow the directions on the can and DO NOT SPRAY.

Suitable preservatives

Although suitable preservative solutions and paints containing TBTO are being manufactured and sold, they may not be readily available in your area. It is expected that this situation will change as demand increases. Enquire at your paint dealer

for wood preservatives containing TBTO or bis(tri-n-butyltin) oxide. Explain that you know they are available and ask him to contact his supplier about them.

A list of commercial wood preservatives containing TBTO is available on request, from the Fisheries Research Board of Canada, Biological Sub-Station, Ellerslie, P.E.I.

Canada to Host Inspection Conference

Participants from up to 40 countries are expected to attend an international Technical Conference on Fish Inspection and Quality Control to be held in Halifax, N.S., July 15-25, 1969. Canada will be host country for the conference, sponsored by the Food and Agriculture Organization (FAO) of the United Nations. As many as 300 delegates and observers are anticipated.

Parties in Canada interested in participating in the conference are requested to contact the Inspection Service of the federal Department of Fisheries, Ottawa, for full details. The Department is providing liaison services for the conference.

Arrangements for the conference grew out of work of the Codex Alimentarius Commission, a joint

FAO-World Health Organization body established to formulate international quality standards for food products. Standards for several fishery products developed by the Commission are expected to be available to international trade within a few years. Inspection systems are considered necessary to ensure compliance with these standards. A Committee of Experts on International Standards for Fish and Fishery Products meeting in 1964 recommended a conference to provide for international exchange of technical information among technologists, industrialists and research workers.

The Halifax conference is designed to foster a general understanding of fish inspection principles and where possible, general agreement on the most effective inspection techniques.

N.W.T. Advisory Committee

The formation of a Fisheries Advisory Committee for the Northwest Territories was announced Sept. 12 by federal Fisheries Minister Jack Davis. The seven-member Committee, comprising representatives of the federal and territorial governments and of commercial, sport and domestic fishing interests, will advise on the management of fisheries resources in the greater part of Canada's northland. An inaugural meeting is planned shortly at Yellowknife, N.W.T.

Chairman will be Robert N. Gordon of Winnipeg, Man., Central Regional Director of the Department of Fisheries of Canada, who carries out the federal fisheries programs and responsibilities in the Northwest Territories. Other members appointed are: Dr. W.E. Johnson, Winnipeg, Director of the Freshwater Institute, Fisheries Research Board of Canada; J.H. Hitchcock, representing the Department of Indian Affairs and Northern Development; B.R. Styles,

Yellowknife, N.W.T., representing the Commissioner of the Northwest Territories; Douglas Finlayson, Yellowknife, a lodge operator and Secretary, Northwest Territories Tourist Association, Gestur Gudmundson, Hay River, N.W.T., representing commercial fishermen; and Chief Victor Beyonne, Fort Franklin, N.W.T., representing Indian and Eskimo fishermen.

Establishment of the Advisory Committee stems from the recognition that its formation is in the best interests of all users of the resource giving them a voice and participation in recommendations on all problems bearing on fisheries in the Territories.

It was decided that guidance in the form of terms of reference should not be restrictive and should be broad enough to bring forth any recommended scientific and economic studies as well as recommendations for the regulation of the various fisheries.

Marine Ecology Laboratory Studying Sea's Food Chain

BY MARTIN BLAXLAND

Fisheries Research Board of Canada Marine Ecology Laboratory, Bedford Institute, Dartmouth, N.S.

In the simplest terms "ecology" could be defined as the relationships of life to its surroundings. The Bedford Institute at Dartmouth, N.S., is the home of the Marine Ecology Laboratory of the Fisheries Research Board of Canada whose scientists are investigating the interrelationships of the many and varied living organisms of the sea both between themselves and the conditions in which they live.

Think for a moment of the multitude of life in the sea from the minutest phytoplankton many times smaller than can be seen by the human eye to monstrous creatures such as whales, tuna and the like. The way of life of the smallest to the largest is directly related and the marine society is but one huge supermarket stocking, instead of prepackaged food stuffs, varieties of living food to sustain the marine life itself. The whole society feeds upon itself and the common relationship in this marine life is, therefore, food.

There used to be a childhood jingle which went "Big fleas have little fleas upon their backs to bite 'em, little fleas have lesser fleas and so ad infinitum". Change fleas to marine biological life in all its forms and you have a good idea of what the marine ecologists refer to as a food chain. This leads upwards from the minute phytoplankton through various levels and sizes of species to the top level such as large cod and haddock. Most scientists recognize a total of four main links in this marine food chain.

If man is to improve the harvesting of the edible species in the food chain he must be certain what the effects will be if, for example, he fishes a certain species in one of the levels of the food chains. Does a species of the level above die out because man has stolen its own source of food from the level below? Will the level below increase in



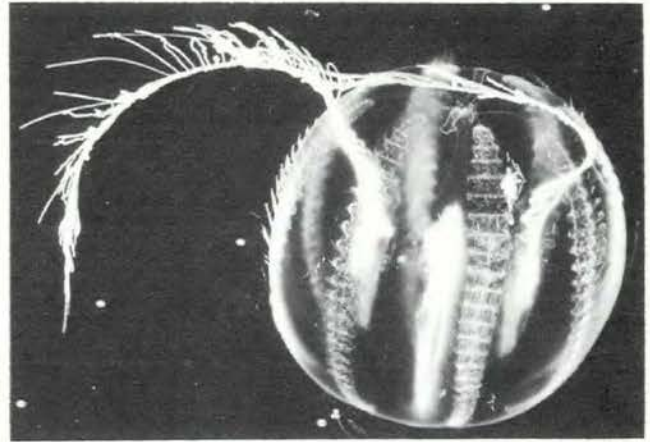
The Marine Ecology Laboratory's new research vessel, "Navicula", shortly to be added to several vessels already employed on ecological research programs.

size and numbers because its enemy in the level above it has been depleted by man?

These problems of relationships and interaction between marine communities are many and until the marine ecologists know with reasonable certainty the whole picture, we cannot be certain what effects, good or bad, fishing by man can have on the marine community itself.

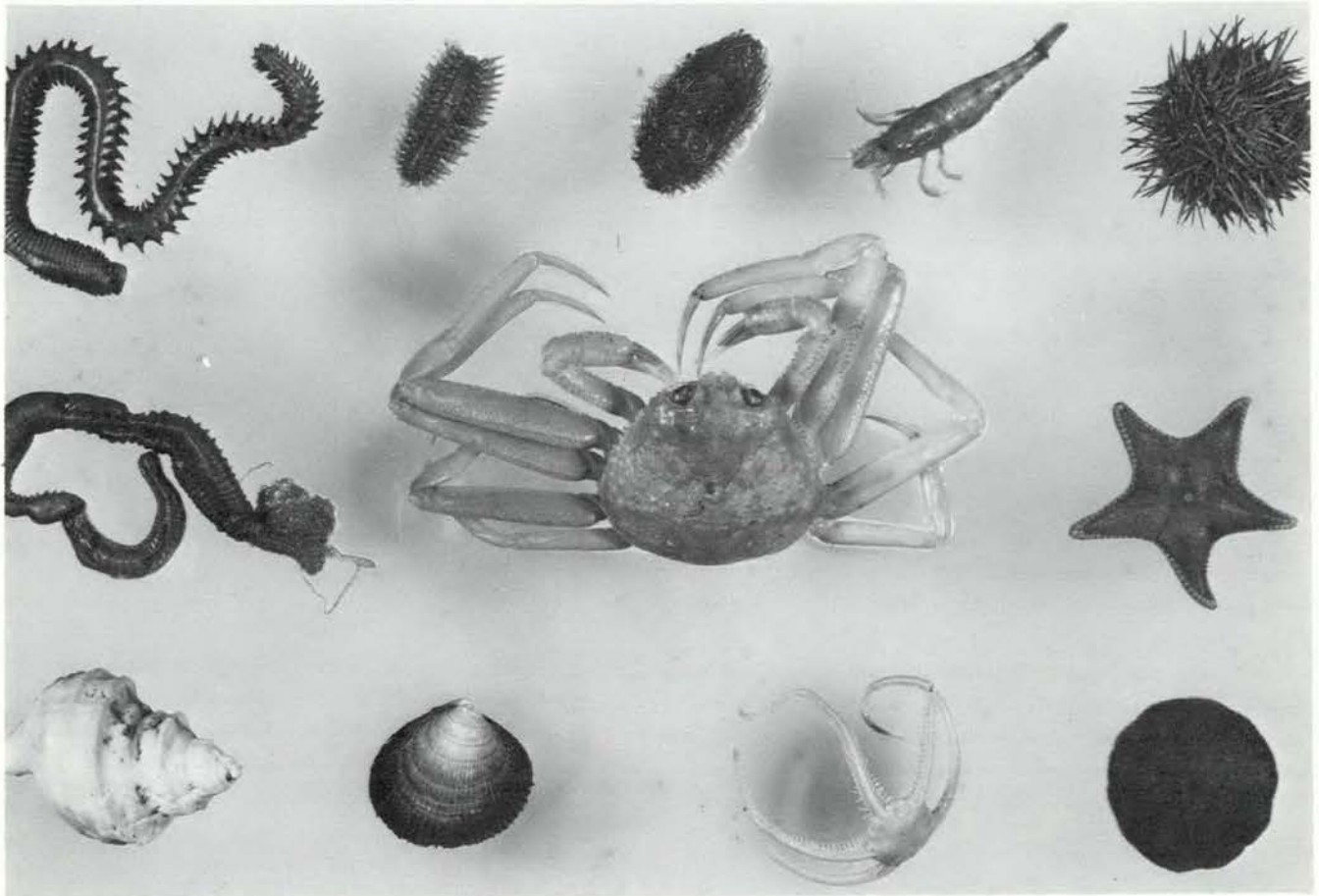
When these facts of marine life are fully understood, the scientists will be ready and competent to advise the fisherman which species can be fished without fear of over-kill and at the same time give him advice as to how he can expect to increase the abundance of one kind of fish by catching another type.

The Marine Ecology Laboratory at the Bedford Institute is only in its third year of business but through its complex studies, has already collected much knowledge. Theoretical calculations or models have been worked out to show roughly the amounts of



A greatly enlarged photograph of one of the higher forms of plankton, commonly known as the sea gooseberry.

food passed on from one level of the food chain to the next. For example out of say, 100 lbs. of phytoplankton—the first level, 10 lbs. would be created as zooplankton in the next level and so on through to the top level. Work is now continuing to find out how



Some of the many species of marine life.

much these models can be used as a guide to estimate total fish yields in Canadian Atlantic waters.

Perhaps, more important still, research is being made to test the theoretical calculations against actual transfers taking place in the food chains in the sea. The Marine Ecology Laboratory has already found some of the calculations to be wrong and now suspects the existence of important side chains breaking away from the vertical food chain.

One of these suspected diversions at present under investigation in St. Margaret's Bay near Halifax, N.S., is a food chain flowing from sea weeds through sea urchins which eat the weeds to lobsters which devour the urchins. Should research confirm that this is indeed an important food chain for lobsters, one of the next steps will be to obtain a complete understanding of the interaction and relationships of the growth of lobsters and seaweed harvesting by man.

The questions are easy to ask but the final answers must depend upon the detailed knowledge obtained by the scientists of the entire ecology. Will harvesting of sea weeds provide a more succulent fast and young weed growth for the urchins and lobsters? Is there a point at which man might "over crop" the sea weeds and hence compete with the urchins and lobsters in the food chain?

The old saying "you can't have your cake and eat it too" may be as important a dictum in the production of the sea as in the production of the kitchen!



Collecting marine life for ecology studies.

Seafood Eating Habits

The seafood-eating habits of Americans will be surveyed in detail through a year-long study planned by the U.S. Bureau of Commercial Fisheries.

Every two weeks during the study period, a representative sample of U.S. households with wide geographic coverage will report the type of fish and shellfish purchased, and the form of preparation. The first questionnaire is scheduled to be distributed in October.

Information on purchase and preparation of seafood will be related to such data as size, income,

and religion of household, occupation of the head of the household, and age and sex of its members.

The Bureau's Branch of Economic Research will receive quarterly survey reports and a final summary report next year at the end of the study period. The Bureau will use this basic information in its continuing study of factors affecting consumption of fishery products.

Results of the study will be published to provide the fishing industry and processors with information which will help them to serve consumer fishery product needs more effectively.

Fishery Statistics

SEAFISH: LANDED WEIGHT AND LANDED VALUE

	May - July 1967		May - July 1968	
	Landings ¹	Value ²	Landings ¹	Value ²
	'000 lb.	\$'000	'000 lb.	\$'000
CANADA - TOTAL	834,576	66,774	895,602	80,103
ATLANTIC COAST - Total	734,244	44,694	771,192	47,723
Cod	260,371	11,745	297,163	12,388
Haddock	27,919	1,701	25,435	1,828
Redfish	43,162	1,124	61,291	1,566
Catfish	1,873	62	3,257	122
Halibut	1,520	559	1,184	416
Other Flatfishes	104,048	3,332	95,608	3,206
Pollock, Hake, Cusk	15,450	597	18,777	649
Other Groundfish	4,022	51	2,959	32
Herring & Sardines	206,424	2,243	195,927	2,145
Mackerel	12,933	489	11,380	467
Swordfish	1,601	842	1,824	1,088
Alewives	6,472	104	6,841	125
Salmon	5,622	2,745	3,852	1,891
Smelts	107	13	99	8
Other Fish	9,482	212	8,233	120
Lobsters	24,898	15,416	25,075	15,627
Clams & Quahaugs	2,269	144	2,339	160
Scallops	4,795	2,646	6,509	4,373
Other Shellfish	1,276	100	3,439	334
Misc. Items	-	569	-	1,178
PACIFIC COAST - Total	100,332	22,080	124,410	32,380
Pacific Cods	5,260	431	6,989	519
Halibut ³	15,043	3,762	17,701	4,151
Soles & Other Flatfishes	2,405	178	4,578	276
Herring	22,305	380	365	28
Salmon	49,709	16,770	88,600	26,830
Other Fish	732	17	2,349	92
Shellfish	4,878	541	3,828	484
Misc. Items	-	1	-	-
BY PROVINCES				
British Columbia	100,332	22,080	124,410	32,380
Nova Scotia	211,004	16,716	219,315	18,667
New Brunswick	132,196	4,819	144,286	5,043
Prince Edward Island	18,361	5,118	18,399	5,496
Quebec	96,226	4,378	76,292	4,207
Newfoundland	276,457	13,663	312,900	14,310

¹ Fish and Shellfish only. ² All Products - Includes livers, seaweeds, tongues, scales, roes, skins, oil, seals, whales and bait worms. ³ Includes halibut landed in U.S. ports by Canadian Fishermen.

MID-MONTH WHOLESALE PRICES - JULY 1968

		Montreal	Toronto
		\$	\$
Cod fillets, Atl. fresh, unwrapped	lb.	.407	.490
Cod fillets, Atl. frozen, cello 5's	lb.	.335	.390
Cod fillets, smoked	lb.	.428	.507
Haddock fillets, fresh, unwrapped	lb.	.507	.630
Herring, kippered, Atl.	lb.	.278	.317
Mackerel, frozen, round	lb.	.210	.287
Lobsters, canned, Fancy	Case 48-1/2s	-	67.680
Sardines, canned	Case 100-1/4s	10.010	9.847
Halibut, frozen, dressed	lb.	.470	.523
Silverbright, frozen, dressed	lb.	.625	.650
Coho, frozen, dressed	lb.	.923	.947
Sockeye, canned, grade A	Case 48-1/2s	27.713	28.613
Pink, canned grade A	Case 48-1/2s	17.117	17.680
Whitefish, fresh	lb.	.483 ¹	.460
Lake Trout, frozen	lb.	.424	.547

¹ Dressed.

PRICES PER CWT. PAID TO FISHERMEN (Week ending July 13th)

	1967	1968
	\$	\$
Halifax		
Cod Steak	5.25	5.75
Cod Market	5	5.5
Haddock	8.5	9
Plaice	5	4.5-5.25
Black's Harbour		
Sardines	-	2
Vancouver		
Ling Cod	8-10	8-13
Grey Cod	6-7.5	7-7.5
Soles	6.5-9.5	8-9.5
Salmon (Redspring)	45-78	45-85

Fishery Statistics

FROZEN FISH STOCKS AS AT END OF JULY

	1967 '000 lb.	1968 '000 lb.
TOTAL - Frozen Fish, Canada	97,211	100,940
Frozen - Fresh, Sea Fish - Total	68,532	78,394
Cod, Atlantic, Fillets & Blocks	12,861	20,759
Haddock, Fillets & Blocks	7,049	4,418
Rosefish, Fillets & Blocks	6,634	7,174
Flatfish, (excl. Halibut)		
Fillets & Blocks	9,274	6,664
Halibut, Pacific, dressed & steaks	8,886	9,559
Other Groundfish, dressed & steaks	2,435	2,628
Other Groundfish, Fillets & Blocks	6,497	7,148
Salmon, Pacific, dressed & steaks	7,116	10,252
Herring, Atlantic & Pacific	669	552
All Other Sea Fish, all forms	4,538	5,638
Shellfish	2,573	3,602
Frozen - Fresh, Inland Fish - Total	9,335	7,133
Perch, round or dressed	1	1,023
Pickerel (Yellow & Blue) fillets	1,118	401
Sauger, round or dressed	1	343
Tullibee, round or dressed	290	100
Whitefish, round or dressed	1,234	1,458
Whitefish, fillets	185	141
Other, all forms	6,508	3,667
Frozen - Smoked Fish - Total	1,814	1,777
Cod, Atlantic	766	891
Sea Herring, kippers	551	463
Other, all forms	497	423
Frozen For Bait and Animal Feed	17,530	13,636

¹ Confidential, included with "Other".

SALT FISH STOCKS AS AT END OF JULY

	1967 '000 lb.	1968 '000 lb.
Salted and Pickled Fish, Atlantic Coast		
Wet-Salted - Total	21,786	18,842
Cod	17,583	14,530
Other	4,203	4,312
Dried-Salted - Total	6,032	11,799
Cod	5,388	10,820
Other	644	979
Boneless - Total	594	1,177
Cod	518	972
Other	76	205
Pickled - Total (barrels)	19,155	31,269
Herring	5,576	8,598
Mackerel	5,966	14,279
Alewives	7,613	8,392
Bloaters (18 lb. boxes)	128,695	253,546
Boneless Herring (10 lb. boxes)	¹	5,618

¹ Confidential

CANADIAN EXPORT VALUE OF FISHERY PRODUCTS MAY - JUNE

	1967 \$'000	1968 \$'000
TOTAL EXPORTS	33,295	39,715
By Markets:		
United States	24,864	31,172
Caribbean Area	3,430	3,364
Europe	4,345	4,454
Other Countries	656	725
By Forms:		
Fresh and Frozen	23,867	29,514
Whole or Dressed	5,408	5,287
Cod, Haddock, Hake	46	97
Halibut, Pacific	706	840
Salmon, Pacific	1,802	1,296
Swordfish	396	621
Other Seafish	1,006	836
Whitefish	533	556
Pickerel	331	383
Other Freshwater Fish, n.e.s.	588	658
Fillets, Blocks and Slabs	9,734	11,663
Cod, Atlantic	2,690	3,613
Haddock	1,466	1,584
Ocean Perch, Hake, Cusk, Pollock	1,058	983
Flatfish	2,760	3,666
Pickerel	314	328
Other Fillets and Blocks	1,446	1,489
Shellfish	8,630	12,467
Lobsters (in shell & meat)	6,613	9,273
Scallops	1,811	2,748
Other	206	446
Frozen Fish & Shellfish, pre-cooked	95	97
Cured	3,279	3,791
Smoked	183	352
Herring	56	194
Other	127	158
Salted, Wet & Dried	2,737	3,134
Cod	2,176	2,638
Other	561	496
Pickled	359	305
Herring	232	185
Mackerel	104	79
Other	23	41
Canned	3,547	3,629
Salmon	2,427	2,310
Sardines	825	819
Lobsters	106	227
Other	189	273
Miscellaneous	2,602	2,781
Meal	1,515	1,736
Oil	268	65
Other	819	980

Current Reading

FARMING THE EDGE OF THE SEA by E.S. Iversen. Published by Fishing News (Books) Ltd., London, Eng. Price: £4-5s.

With the increasing interest being shown in fish culture, particularly on the edge of the sea, this book appears at an opportune time.

The author, who is a professor at the University of Miami Institute of Marine Sciences was prompted to write the book as a result of the many enquiries he received about sea farming and its feasibility. He makes it clear that it is not a handbook or a "how-to" manual, but a review of the important principles of sea farming for anyone who is interested in general works on the sea. For more detail the reader is referred to specialized books and reports.

Marine and brackish water algae, molluscs, crustaceans and fishes presently being cultivated are discussed, including important facts about their life histories and their suitability for farming is evaluated. An evaluation is also given of the practicability of farming other species which are not as yet being farmed.

Shattering any ideas that fish farming is something new, Dr. Iversen points out that records show that oysters were raised by the Japanese as early as 2000 B.C. and by the Romans about 100 B.C., while in Java, laws to protect milkfish farmers from fish thieves were established as early as A.D. 1400.

The book is extremely well illustrated.

A GUIDE TO FISHING BOATS AND THEIR GEAR by Carval Hall Blair and Willits Dyer Ansel. Published by Cornell Maritime Press Inc., Cambridge, Maryland, U.S.A. Canadian distributor: General Publishing Co. Ltd., Don Mills, Ont. Price: \$6.25.

Intended for non-fishermen, this neat, compactly written and competently illustrated book seeks in a modest way to do for the world's fishing craft what Jane's "Fighting Ships" has done for naval ships. Within 142 pages—more than half of

them devoted to pen and ink sketches and wash drawings—are described basic commercial fishing methods and gear, and over 50 types of fishing vessels—trawlers, seiners, gill-netters, research vessels, and such exotic craft as Caribbean turtle schooners, Japanese crab factory ships, and Ceylonese outriggers.

In addition to its comprehensive outline of fishing gear and craft, the Guide provides for the benefit of the uninitiated a glossary of fishing and nautical terms, an index of the various types of vessel and equipment described, and a bibliography of reference material for further information.

The text was written by Captain C.H. Blair, a U.S. Navy officer who became interested in fisheries during a visit to England, and spent five years of spare time research on the subject. The illustrations are by W.D. Ansel, his brother-in-law, a history teacher and reserve naval officer.

INDEX AND LIST OF TITLES, Fisheries Research Board of Canada and Associated Publications 1900-1964. Compiled by Neal M. Carter. (Bulletin 164 of the Fisheries Research Board of Canada). Price: \$1.00

For the student or graduate fisheries scientist, it would be difficult to imagine a more worthwhile one dollar investment than this 650-page Index.

Dr. Carter, a former associate editor of the Fisheries Research Board of Canada and now living in retirement in West Vancouver, has achieved the monumental task of bringing together for the first time a list of, and index to, all FRB publications from 1900 to 1964. In addition he has compiled and indexed 1,416 articles which were published over the years but which never did get recorded or indexed in FRB lists.

The general index covers publications by subject and author, while the appendix lists titles of papers appearing in the FRB Contributions, Journal, Bulletins, Canadian Fauna Series, Progress Reports, Circulars, Studies and other publications.

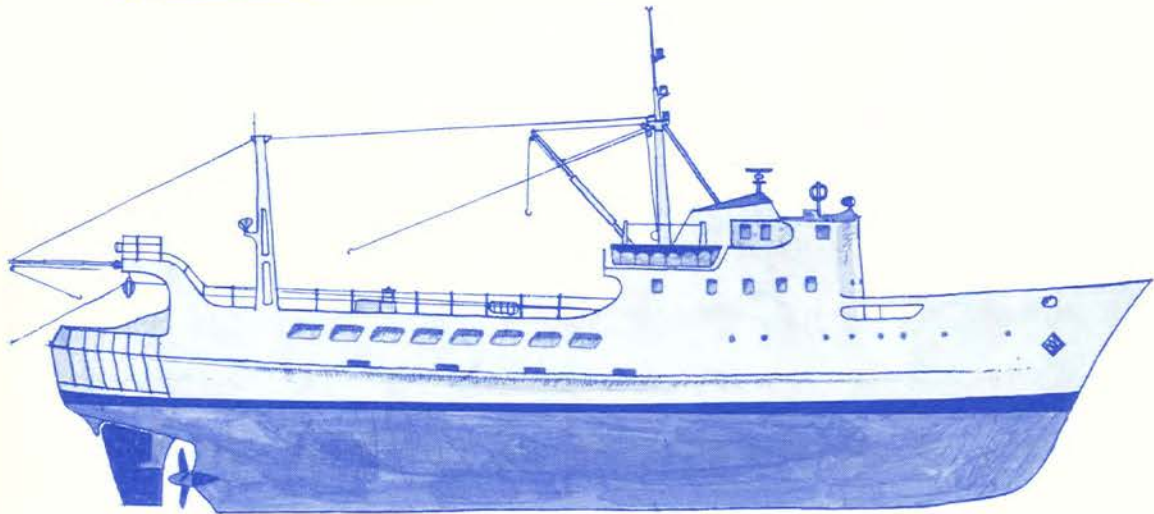
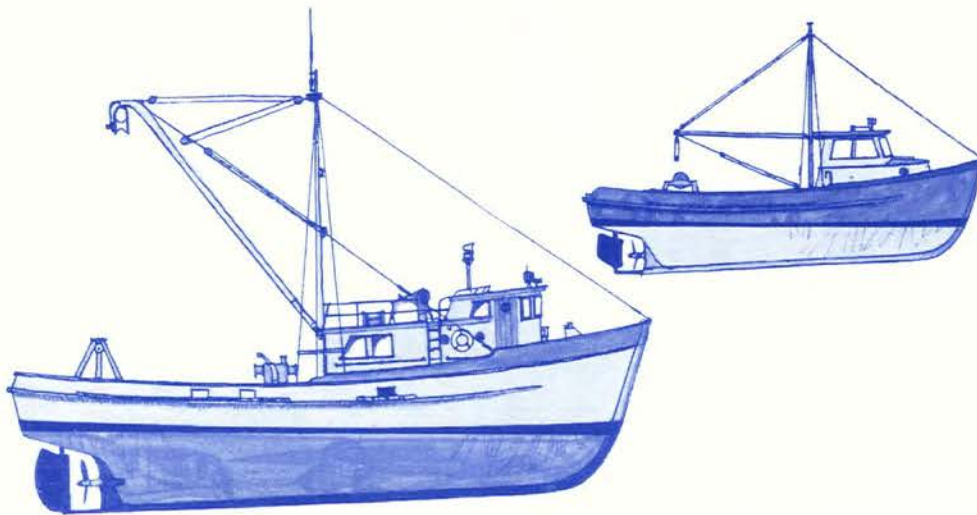
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DEPARTMENT OF FISHERIES



Ottawa, Canada



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(formerly Trade News) OF CANADA

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In This Issue

- ★ Report on Fishing Vessel Construction Materials Conference
- ★ Pacific Region's New Flagship Named at Victoria
- ★ Resource Development in the Maritimes and Newfoundland

Department of Fisheries of Canada, Ottawa

FISHERIES OF CANADA

(formerly Trade News)

Editor

E. H. HEARN DEN

Nov. 1968

C O N T E N T S

FEATURES

Fishing Vessels of Future Discussed at Conference	3
Resource Development in the Maritimes and Newfoundland	11
Longline Lures for Swordfish	26

NEWS ITEMS

Mrs. Jack Davis Names New Protection Vessel	9
Name Appeal Committee in Salmon Vessel Licensing Program ..	25
ICNAF Mesh Size Regulations Extended	27
Mobile Exhibits Tour Atlantic Provinces	28

FISHERY STATISTICS	29, 30
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COVER PHOTOGRAPH - The patrol vessel "Tanu", latest addition to the federal Department of Fisheries' protection fleet in the Pacific Region, undergoing trials off Victoria, B.C. See article on page 9.

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Conference Discusses Construction Materials

Fishing Vessels of the Future

BROADER horizons for the boat and vessel building industries with emphasis on materials applicable to Canadian fisheries were revealed in papers and discussions at the Conference on Fishing Vessel Construction Materials, held October 1-3 in Montreal. About 300 delegates, including representatives of materials manufacturers, shipyards, boat building companies, fishing industry leaders, and fisheries administrators, participated in the

conference sponsored by the Federal-Provincial Atlantic Fisheries Committee. Dr. A.W.H. Needler, federal Deputy Minister of Fisheries, was the conference chairman.

Thirty-three papers were presented by specialists from Canada, the United States, Japan, South Africa, and several European nations. The busy conference program covered Canadian and world



Inspecting a model of a 97-foot GRP combination fishing vessel made for the Industrial Development Service of the federal Department of Fisheries on display at the Conference on Fishing Vessel Construction Materials are, left to right: Eric Gosse, Maurice Lessard and Dr. Leonce Chenard, respectively deputy ministers responsible for fisheries in the provinces of Newfoundland, Quebec, and New Brunswick; L.S. Bradbury, Director, Industrial Development Service; and Dr. A.W.H. Needler, Deputy Minister of Fisheries of Canada.

developments in the use of old and new materials for fishing craft construction, the respective merits of each material – wood, steel, plywood, aluminum, ferro-cement and fibreglass reinforced plastic – as well as construction techniques.

The final conference session, Comparative Assessments and Future Outlook, was particularly stimulating in that its purpose was focused directly on the total economic effect of material choice. David Fraser, Commercial and Marine Services Ltd., Montreal, presented a paper on "Estimated Hull Work and Material Content for 100-foot Combination Fishing Vessels in Different Materials". This

C.T.C. PRESIDENT GUEST SPEAKER

Modernization of the Canadian fisheries is necessary to attract young men by prospects of a good career, reasonable living standards and status in the community, Canadian Transport Commission President, Hon. J.W. Pickersgill, told a Conference banquet Oct. 2. He advised, however, against any hasty scrapping of the inshore fishery because he would rather see men actively engaged in this fishery than on welfare. Mr. Pickersgill represented a Newfoundland riding in Parliament for 14 years before accepting appointment to his present position.

He was introduced by Dr. A.W.H. Needler, Deputy Minister of Fisheries, and thanked for his address by Mr. Maurice Lessard, Associate Deputy Minister, Department of Industry and Commerce, Quebec. Deputy Fisheries Ministers Brian Meagher of Nova Scotia, Eric Gosse of Newfoundland, Eugene Gorman of Prince Edward Island and Dr. Leonce Chenard of New Brunswick, who with Dr. Needler and Mr. Lessard make up the Federal-Provincial Atlantic Fisheries Committee, were also among head table guests. Hon. J.M. Harding, Nova Scotia Minister of Fisheries, also attended.

At the opening of the Conference Oct. 1, an official welcome on behalf of the City of Montreal was expressed by Mr. Leonard Leblanc, Municipal Councillor for Saraguay. Tribute was paid by Dr. Needler to the late Premier of Quebec, Hon. Daniel Johnson, and a minute of silence was observed in his memory.

was followed by Professor Harry Benford's paper, "Economic Criteria in Fish Boat Design".

Prof. Benford was emphatic that material selection had an influence on both initial investment cost and the life-time economic performance of a vessel, and he insisted that this must not be lightly dismissed.

The session heard final summarizing presentations on all the materials under discussion from J.R. Elder, steel; W.S. Hines, wood; J. Brandlmayr, plywood; R.A. Campbell, aluminum; T.M. Hagenbach, ferro-concrete; D.A. Eisenhauer, single-skin plastics; and K.B. Spaulding, cored plastics.

OPEN SYMPOSIUM

Newfoundland Deputy Minister of Fisheries Eric Gosse, then introduced the open symposium, conducted by Professor Benford. His immediate



Sounding the bell for the banquet highlighting the social side of the Conference on Fishing Vessel Construction Materials at Montreal. Left to right: Dr. A.W.H. Needler, Ottawa; Capt. James Thompson, Lossiemouth, Scotland; L.S. Bradbury, Ottawa, Hon. J.W. Pickersgill, President, Canadian Transport Commission; Capt. Merrill Rodgerson, Shelburne Co., N.S.; and Hon. J.M. Harding, Minister of Fisheries of Nova Scotia.



Opening of the first session of the conference. Left to right: T. Isogai, J. Saethre, S.T. Mathews, Jan-Olof Traung, Maurice Lessard and Dr. A.W.H. Needler.

Efficiency Key Factor in Materials Choice?

Fishing vessels of the future will make greater use of new construction materials developed by modern technology, but a combination of materials rather than exclusive use of any one of them may be incorporated in future vessel design, according to a keynote conference paper presented by Jan-Olof Traung, Assistant to the Director, Fishery Resources and Exploration, with the Food and Agriculture Organization's Department of Fisheries in Rome.

He indicated that the choice of materials should be based on their contribution to fishing efficiency rather than on any savings in construction cost, which he suggested would be minor in relation to overall costs of fishing enterprises.

Mr. Traung and co-author Oyvind Gulbrandsen, also of FAO, predicted that fibreglass reinforced plastic, "the greatest breakthrough in small pleasure boat construction since the (Second World) War", will be used more and more for fishing boats below 40 ft. which can be standardized and produced in very great numbers. This material will probably encounter

"hard competition" from ferro-concrete, another newcomer in the boat-building field, for boats in the 40-70 ft. range. In wooden boat construction, they recommended study of the manufacturing techniques of lamination in order to cut down present high labour costs.

INDUSTRY VIEW

There is no "best" material for construction of all the vessels operating in Canada's diverse fishing industry as this depends on the requirements of the fishery, the fisherman and the availability of capital, Richard I. Nelson, President of the Fisheries Council of Canada told the Montreal Conference. He cited four requirements which, in the viewpoint of the fishing industry, an ideal material should provide: low initial cost, easy and inexpensive maintenance, safety and comfort for the crew and a reasonable life span.

A large number of fishing vessels will be required in the coming years, and co-ordinated efforts of designers, builders, fishermen, operators and government will be needed to produce the most effective craft possible, he said.

request was for the authors to identify some "cons" in their own materials. It emerged that there are disadvantages in every material examined, but as might be expected, each author spoke strongly in favour of his particular choice. Everyone believed, however, that each type of construction and material involved had a place in specific applications.

The final floor period and major conference segment consisted of a discussion and summary which brought forth several important points:

1) Ferro-cement was a major interest to many people. However, since this is a manufactured medium, all the tests which have been internationally undertaken or are contemplated should be examined

and exchanged to allow more rapid and thorough appreciation of its potential.

2) Mr. Jan-Olof Traung believed that environmental determination of stress patterns in boat hulls is important. This view was directly related to the continuation of lab tests and full scale tests of actual ship's structures in different materials. Classification societies and structural research establishments should be encouraged to participate in such an activity, which he hoped would be sponsored by someone very soon.

Mr. Traung reiterated the comment in his paper that reduction in crew is also a significant influence to the overall cash flows in a fishing



A section of the federal Department of Fisheries' display area at the Conference on Fishing Vessel Construction Materials.



Members of the Federal-Provincial Atlantic Fisheries Committee, sponsors of the Conference. Left right: Eric Gosse, Eugene Gorman, Maurice Lessard, Dr. A.W.H. Needler, Dr. Leonce Chenard and Brian Meagher.



A general view of the participants at the Conference on Fishing Vessel Construction Materials.

vessel. He was thankful that the F.P.A.F.C. was sponsoring the forthcoming Conference on Automation and Mechanization in the Fishing Industry, which he was sure would be of immeasurable world-wide importance.

3) Feasibility studies based on accurate cost estimates and economic principles must be conducted before the commitment of funds to ensure that the investment to be made can be profitable.

4) As a plea on behalf of engineers, Professor Benford hoped that the vessel construction and fishing industries would throw away their tendencies to keep construction costs and operational data secret. It is mandatory that such information be made available to those who are trying to develop the industry.

EXCHANGE OF IDEAS

Dr. Needler in his concluding remarks thanked those involved in the organizing of the conference and all of the people who had taken time to attend. He was impressed particularly by the breadth of discussion on such an important topic. He believed this would lead to further progress and to the continued exchange of ideas, two of the principal objectives of the F.P.A.F.C.

While acknowledging that economics are a principal consideration, Dr. Needler was pleased



An informal discussion during a break in the conference. Left to right: W.J. Milne, W.G. Scott, W.E. Bonn and D.J. Fraser.

that all sizes of vessels had been discussed, as each vessel class and each fishery had widely different economic circumstances and performance. It was his view that small and medium sized vessels must not be overlooked because of the technical glamour of larger, more costly equipment. Inshore and near inshore fisheries contribute a significant dollar input into Canadian fishing economy.

Many new ideas seem imminent in the vessel and materials world, but he considered that while mothership operations, for example, might collect the cream of the fishery resources expeditiously, the medium size range of unit particularly, and the smaller inshore boat, will continue to play a big part in the Canadian fishing vessel effort for some time to come.

Great Lakes Fishery

The 1967 commercial fisheries catch from the Great Lakes has increased for the third consecutive year. Canadian and U.S. fishermen reported 124.8 million pounds, the largest harvest since 1956.

U.S. fishermen took 80.1 million pounds, an increase of 12.3 million pounds over 1966, while the Canadian catch amounted to 44.7 million pounds, about 3.1 millions less than the previous year.

The increase in U.S. production can be attributed largely to intensification of the alewife fishery in Lake Michigan. Total catch from Lake Michigan was almost 57.2 million pounds – a record for the lake and exceeding the production from Lake Erie, normally the No. 1 producer.

Lake Erie catches declined substantially – by 3.6 million pounds in Canadian waters and 1.1 million pounds in U.S. waters. The Canadian catch in Lake Superior was up by 705,000 pounds, while the U.S. production declined. Lake herring, once very prominent, continues to decline.

Both U.S. and Canadian fishermen reported increased catches in Lake Ontario, with white perch the dominant species. Whitefish, formerly the main species, now is almost non-existent.

In Lake Huron, U.S. and Canadian fishermen caught fewer fish than in 1966. The decrease is attributable primarily to smaller landings of chubs.

Mrs. Jack Davis Names New Protection Vessel

The latest addition to the federal Department of Fisheries' protection fleet, the patrol vessel *Tanu*, was officially named in a ceremony September 7 at Victoria, B.C.

Federal Fisheries Minister Jack Davis, in accepting the vessel for the Department, said the *Tanu* had been designed and equipped to carry out its multiple functions with a high degree of efficiency.

Discussing the role the *Tanu* will play in the Department's operations in the Pacific Region, the Minister declared: "The high demand for protein food has stimulated the expansion of distant water fisheries over all the oceans of the world. The North Pacific ocean is no exception and within the past decade Russian and Japanese fishing fleets have intensified and expanded their fishing efforts from the Bering Sea to the Gulf of Alaska and within the past four years to the waters off the coasts of British Columbia, Washington and Oregon. Stocks of groundfish, hake and ocean perch have been intensively exploited by these foreign fleets, perhaps even to the detriment of the expansion of our own fisheries.

"Protection of our fisheries resources lying within the twelve mile fishing zone will be the



Mrs Jack Davis christens the "Tanu" in traditional manner, assisted by Mr. John Wallace, of Yarrow's Ltd. shipyard, Victoria, B.C.



Part of the crowd which attended the naming ceremony of the "Tanu", the Department of Fisheries new Pacific Region flagship.

primary role of the *Tanu*. Patrol of the offshore limits of Canadian fisheries waters to protect against the incursion of foreign fishing fleets into the Canadian fishing zone will be of paramount importance. Patrol activities will also range over the high seas from Cape Flattery to the Bering Sea fulfilling Canada's commitments under such treaties as the North Pacific Halibut Fishery Convention and the North Pacific Fisheries Convention. In addition to patrol activities, however, the vessel is designed and fitted to carry out scientific studies on the high seas."

COST \$2.8 MILLION

Built at a cost of \$2.8 million, the *Tanu* is equipped with everything needed to conduct modern scientific research work while at sea on salmon, tuna, halibut and herring as well as general oceanographic studies.

In addition to a complete laboratory, the vessel has an inert saltwater system, a thermo bath and is equipped to do experimental seining, longlining, and gillnetting for salmon and other pelagic fish as well as various types of trawling.

The hull is of steel construction with an aluminum superstructure. In addition to the hull,



Mrs. Ken Harley of Skidegate, B.C., one of the few surviving descendants of the Indian village of Tanu, chats with Regional Director W.R. Hourston.



Federal Fisheries Minister Jack Davis on the bridge of the "Tanu" with Captain R.F. McLellan

the rudder, shafting and propeller have all been strengthened for navigation in ice.

The *Tanu*, the largest of the Department's Pacific Region fleet of 40 vessels will serve off the coast of British Columbia, but with a long-range capability can accompany the halibut fleet to the Bering Sea and remain at sea with them in any weather.

The *Tanu* has a complement of 22 men, with accommodation for 34 crew and scientists. The new vessel is 179 feet 5 inches long with a beam of 32 feet

Mrs. Jack Davis, wife of the federal Minister of Fisheries, officiated at the naming ceremony.

Choice of the name *Tanu* pays tribute to early west coast history and honours the Haida Indian village of Tanu on the east coast of the Queen Charlotte Islands, decimated by disease before the turn of the century.

A special guest at the ceremony was Mrs. Ken Harley of Skidegate, B.C. one of the few surviving descendants of Tanu village. This early village was famed for its artisans and carvers and, appropriately, its legendary huge canoes.

Resource Development in the Maritimes and Newfoundland

Review of 1967 Activities

MARITIMES REGION

THE PRESSURES being exerted on the fishery resources are increasing with time in such forms as water pollution, increased demand for water through multi water-use projects and increased demands upon existing stocks of fish and shellfish by fishermen and anglers. The responsibility for ensuring that the objective of developing enlightened conservation measures falls on the Department of Fisheries with the Resource Development Service being responsible for developing and implementing technical means and methods for achieving the goal.

The Resource Development Branch, Maritimes Region, is continuing to increase its efforts to gather the basic data necessary to know the resource it is working with by proceeding with programs designed to study insecticides, and other pollutants, and their effects on basic limnology and ecology; to study the productive capacity of waters; to study the effects of hydro-electric development on fisheries; and the effects of harvesting rates on salmon, trout and shellfish populations.

It is Utopian to think that this work can proceed without regard for the problems of the day. In actual fact there is a very large input to the day-by-day routine problems which cannot be covered adequately in an annual report but which in aggregate makes a major contribution to the successful operation of the Branch. These efforts are typified by the work that goes into pollution control and fish protective activities such as those

associated with the Mactaquac hydro-power development project on the Saint John River.

The Branch's fish culture stations were planned and built in an earlier era when transportation was not convenient and costs generally were lower. Over the years technology has advanced and costs have risen markedly. A preliminary evaluation of current operations of the fish culture stations indicated that certain economies could be obtained with little effect on the total production of salmon and trout. The new Mactaquac smolt rearing station is designed to supply the salmon smolts that would have otherwise been provided by natural reproduction from the Saint John River and its tributaries above Mactaquac had the dam not been built. As a result of these factors operations at four stations, Haley Brook and Grand Falls in New Brunswick, and Grand Lake and Nictaux Ponds in Nova Scotia, are being terminated. Arrangements are being completed to absorb the people effected by this action in comparable employment within the fish culture division.

Two significant advances were made in the development of the oyster hatchery concept into a commercially feasible enterprise. Modifications resulting from these advances were incorporated in the Ellerslie hatchery and are expected to increase the production capacity by a factor approaching two. They are also being built into the pilot commercial hatchery which is presently under construction for

completion in the spring of 1968. This is a joint undertaking by the Resource Development Branch and Fisheries Research Board.

BIOLOGICAL DIVISION

One of the most urgent tasks facing the biological division is to document the capacity of our waters to produce fish. Faced by insatiable demands by other water users, we must be prepared to show how the resource is being destroyed and how to minimize damage in the face of changes that may be inevitable. Furthermore, we must devise means of restoring to productive capacity, lost areas of production. In order to effectively discharge these obligations, a large number of ecological facts must be made available for immediate use. Although many of the biological programs presently underway are directed towards the procurement of these facts, a large increase in effort is needed. The substantial increase in biological staff made during 1967 will help to provide impetus to this task.

The following summaries indicate our approach to these problems and outline some of the progress we have made during the past year.

SALMON INVESTIGATIONS

Saint John River

The investigation of the salmon-power problem on the Saint John River was continued and expanded in 1967. A study of the native downstream smolt migration was begun and the first adult brook stock collection for the Mactaquac Hatchery was implemented. The tagging of adult salmon in the Saint John Harbour and at Westfield to obtain information on the distribution and timing of the salmon run was continued throughout the 1967 season.

Installation of the temporary fish passage facilities in the Mactaquac sluiceway openings was not implemented as planned because of problems associated with the dam construction and high water levels. As a result, anadromous fish migration above this point was blocked throughout the season, except for a few short periods of low water levels when conditions were favourable for a few fish to move through the sluiceway openings.

Weekly monitoring of water quality on the river from above Edmunston to below Fredericton revealed that a chemical block existed further upstream from the physical block. Dissolved oxygen content on the 100-mile stretch of river from

Edmunston to above Hartland was well below the 5 p.p.m. level considered adequate for fish life. This condition existed from mid-July to the end of August. The regions of most severe oxygen depletion were at Grand Falls headpond, Beechwood headpond, and immediately below Florenceville. Oxygen levels dropped below 2 p.p.m. at these locations. Normal conditions were found above Edmunston and below Hartland on the main stem as well as on the Tobique and Aroostock rivers. The pollution conditions on the main river is attributed mainly to waste disposal at the Edmunston pulp mill and the frozen food plant at Florenceville. Plans are being considered to improve effluent discharge at these two sources of pollution.

The first collection of salmon brood stock for the Mactaquac Hatchery was made by means of a salmon trap net just below the Mactaquac sluiceway. The net was fished at this location from June until November and 1,077 salmon and grilse were selected for hatchery brood stock purposes. These fish were trucked from the Mactaquac site to holding ponds at New Mills and Miramichi Fish Culture establishments. All brood stock fish were tagged and fin-clipped for identification at spawning time.

In order to seed the river above Mactaquac with native fish, excess salmon and grilse not required for brood stock were trucked above the dam and released in the river. This trucking operation provided a spawning nucleus of over 1,200 salmon and grilse that otherwise would have been lost to the river above Mactaquac.

The investigation of the Saint John River smolt run was continued and expanded in 1967. Two new smolt sampling stations were established on the system above Mactaquac. Work on the development of gear to trap smolts on the main river below Mactaquac was accelerated and several types of sampling gear were tested. Little success was obtained with this gear during the regular smolt migration season, but a new picket trap installed later in the season looked promising and will be tested along with other methods in 1968.

Miramichi River

On the Miramichi River, the salmon and smolt trapping operations at Millbank provides an annual index on timing and magnitude of the downstream smolt run and the upriver adult salmon migration. In 1967, the smolt count at the Millbank trap was 17,957 which is 50 per cent higher than the 1966 count, but still below the average yearly count for

the period of 1960 to 1965. The run extended from June 3 to June 30 with a peak period from June 16 to 20 which is about a week later than observed over the past twelve years. This late migration reflects the extended cold weather experienced in northern New Brunswick during the April and May period.

A total of 999 salmon and 7,713 grilse were counted in the upriver traps during the period May 20 to November 8. This figure represents the lowest number of salmon taken since the operation began in 1954. Two peaks occurred in the adult run; one in late June-early July, and the other in September-early October. The early run was composed mainly of grilse with only a few two sea-year or older salmon taken. Most of the salmon were taken in the late run.

Big Salmon River

Investigation of the early-late run phenomenon of salmon was continued at Big Salmon River, Saint John County, N.B. This involved the release of tagged hatchery-reared smolt of known early and late run origin to Big Salmon River and a check on the time of return to freshwater of subsequent adult stock by means of a counting fence located at the mouth of the river.

Complete data was not obtained on the run because the counting fence was washed out on three successive occasions during the fall upstream migration. Returns of adults for early-run stock followed the timing pattern observed in 1966 when entry to the river was concentrated in June and July. Return of adults from the late-run stock was very small and not as consistent in the time of entry to the river. No returns for the 1965 release were recorded and the few grilse returns from the 1966 releases entered fresh water from late July to late September.

DEVELOPMENT

East River, Sheet Harbour

Good progress was made in the salmon rehabilitation program for East River, Sheet Harbour. A preliminary assessment of the techniques involved was started in 1967.

The first tests were conducted on the experimental louver installation. The louvers are a series of metal slats placed in a V-formation in the power canal to divert downstream migrants to a by-pass channel and away from the turbine in-



Salmon trap on the Miramichi River, N.B., to evaluate the annual smolt run and adult salmon migration.

take. Each slat is set at right angles to the direction of flow, and the smolts, on approaching the slats, tend to avoid them while continuing downstream and thus are guided to a by-pass channel located at the bottom of the V-formation.

Hatchery-reared smolts were used to test the efficiency of the louver installation in deflecting fish to the by-pass channel. Initial testing revealed an average guiding efficiency of 60 per cent but modifications to the by-pass structure increased the efficiency to 85 per cent in later tests. Minor changes in the by-pass design are required to improve hydraulic conditions and these will be implemented in 1968. Large amounts of trash also interfered with the louver efficiency and corrective measures are planned for 1968.

Sampling of the East River by electro-seining in 1967 showed that of the 77 salmon transferred in 1966 some had spawned successfully. Fry population density was high (50-60 per 100 square yards) in sections of known spawning sites and the numbers decreased upstream and downstream from these sites. Electro-seining samplings showed that the limits of distribution for the fry from known spawning sites were 1½ miles upstream and 2 miles downstream.

The smolt run in West River, the adjacent control stream, was sampled for the second consecutive year and the peak of this run coincided with the remnant smolt run of Grant River (an East

River tributary smolt migration diverted at the louver installation).

Medway River

Biological investigations were undertaken on the Medway River to assess the feasibility of using controlled flow to increase salmon production. As an initial effort, a pre-flow control study was started in 1967. This involved the sampling of smolts at several points on the main river and tributaries, assessment of juvenile salmon populations, sampling of the bottom fauna of the stream and checks on the movement and spawning activities of adult salmon. Abnormally high water levels hampered the sampling operations and complete counts of smolts and adults were not obtained. A small portion of the smolt run was captured and tagged. Scale samples show that 90 per cent of this portion of the run were two years of age. Electro-seining indicated good populations of salmon fry in the areas sampled, but low or nil populations of parr. A high salmon redd density (up to 5 per 100 square yards) was found on the Westfield Branch, one of the better spawning areas on the river.

Porter's Lake

The feasibility of utilizing brackish water areas for increased production of salmon and trout is under investigation by the biological division. As a start in this development program, a preliminary biological investigation was undertaken at Porter's Lake, a body of brackish water located about 20 miles east of Halifax. Information on limnological conditions and fish populations were collected throughout the season.

The lake is divided into two main parts, a small, relatively deep upper section and a larger, shallower lower section. Gill net sampling showed that speckled trout were present in both the upper and lower sections of the lake, and all trout samples taken were three years of age or older.

Supplementary Lake Rearing

Plans were initiated in 1967 to investigate supplementary lake rearing of Atlantic salmon in the juvenile stages. The project envisions the poisoning of a small-size lake to remove competitor and predator species, followed by stocking with salmon fry for rearing to the smolt stage. Several lakes in Nova Scotia were examined during the early summer and a suitable study area was selected. The work on supplementary rearing was curtailed in late summer

because of a shortage of staff.

Sea Pool's Project

A commercial company, Sea Pool Fisheries Limited, is interested in the salt water rearing of salmon and trout to a marketable size. A biologist from the Branch was assigned to plan and execute an applied research program in support of this project. Operational difficulties were encountered by the Company during the latter part of the year, so this research program has been delayed.

TROUT INVESTIGATIONS

During 1967, trapping facilities were maintained on Trout Brook, a tributary to Lake Ainslie, Cape Breton Island, between mid-May and September 30. The object of the trapping was to assess the numbers of speckled trout moving up and down Trout Brook and to relate these movements with changes in lake and stream temperatures. The major movement of trout from Lake Ainslie to Trout Brook occurred during July when a total of 1,216 trout were trapped as they moved upstream. More than 600 of these passed upstream on July 11 and 12. Very few trout moved upstream in June; 50 trout moved upstream in August, and none in May or September. During the latter part of September, juvenile trout moved downstream; but with the advent of high water, it became impossible to adequately measure this movement because of problems with the sampling gear.

During the period of August 16 to August 23, 400 dead trout were counted. Trout mortalities have been observed over a number of years at Trout Brook. Huntsman (MS, 1936) reported pronounced trout mortalities in Trout Brook in 1923, 1934, and 1936. During 1967, water temperatures were high in Lake Ainslie forcing a large number of trout to move to the colder waters of Trout Brook. A prevailing north wind creates a shallow sandbar at the mouth of Trout Brook, and temperatures over the bar exceeded 80 degrees F. at the surface and 75 degrees at the bottom, during the period of heavy mortalities. Nearly all dead trout examined showed heavy fungus growth on gills and fins and were heavily parasitized by the fish louse *Argulus*. Many trout had their caudal fins completely eaten away. Some trout which reached the traps had over 50 parasites attached to them. It is interesting to note that during 1966, of 126 trout taken by gill nets in the lake, none were observed with external parasites. During this same period, some trout angled at the mouth of Trout Brook were examined and all had a few *Argulus* copepods; however, these fish appeared in good condition. Both lake and brook temperatures were cooler in 1966 than



A section of the rearing tanks at the new Mactaquac fish hatchery built by the New Brunswick Power Commission and operated by the federal Department of Fisheries.

in 1967. It appears that trout pick up these parasites as they enter the brooks and that the infestation is much heavier when temperatures rise and large numbers of trout congregate at the mouth of the brooks.

OYSTER INVESTIGATION

A new biological investigation was initiated in 1967 to develop and evaluate new techniques for the efficient management and extension of the oyster industry. A primary function is the practical development of research findings such as those provided by the oyster hatchery program at Ellerslie. Close liaison has been maintained with the Fisheries Research Board with regards to commercial hatchery development, and it is expected that our work will allow for an increase in basic research much needed in this field.

Studies were begun on commercial spat collecting techniques, assessment of the relative efficiency

of various types of commercial spat collectors, assessment of the effect of fouling on spat settlement, design and assessment of experimental oyster rearing trays, spat transfer mortality, Malpeque disease monitoring, and development of oyster survey techniques such as the determination of spat-fall frequency by means of shell-weight.

The experiments on commercial spat collecting techniques have given us information which, if applied, should increase the efficiency of spat collection at the Oyster Culture Station.

Further studies are necessary to determine the factors controlling natural spatfall. These will be initiated in 1968.

Some preliminary work has been carried out on the design of rearing trays and their relative efficiency. An experiment was conducted in which two control trays with solid wood tops were compared with four experimental trays. Results indicated that

screen-topped and plastic-topped trays gave better growth in both shell-length and shell-weight. The mesh size of the tray bottom also appeared to have an effect on both length and weight.

POLLUTION INVESTIGATIONS

Industrial Effluents

The new Scott Paper Company, pulp and paper mill, went into production at Abercrombie Point, Nova Scotia in the fall of 1967. The effluent from this 500-ton bleached kraft mill is being treated in Boat Harbour Lagoon to reduce the toxicity and BOD to acceptable levels. A monitoring program is being conducted to ensure that effluent quality is being maintained.

The effluent from Fraser Companies Limited new 500-ton bleached kraft mill at Newcastle, N.B. continues to pollute the Miramichi River. Caged fish tests carried out during the summer indicated that the pollution was severe in the Northwest Miramichi River near the mill. Negotiations are continuing concerning adequate effluent treatment for this mill.

An announcement was made early in 1967 that St. Anne Pulp and Paper Company would construct a new hardwood pulp and paper mill on the Saint John River at Nackawic, N.B. Because the mill is located on the Mactaquac flowage, primary, secondary, and tertiary treatment will be required to render the effluent harmless to fish.

The effluent from Anil Canada Limited hard-board plant is causing conditions unfavourable to fish life in the lower part of East River, Chester, in Nova Scotia, as well as in a large section of Mahone Bay. When the floating aeration apparatus is added to the treatment lagoon, this condition should improve.

The wastes from base metal mining operations continue to be troublesome in some areas of north-eastern New Brunswick. Toxicity readings were low in the northwest Miramichi River below the Heath Steele Mine during most of the summer but were high throughout the remainder of the year. Steps have been taken by the company to improve their facilities which should help to control pollution during the winter months. Additional facilities are still necessary to control pollution during periods of heavy run-off.

Mine wastes continue to cause mortality of caged salmon parr in Little River below the Brunswick #12 development in spite of the large tailings

disposal facilities provided by the company. Negotiations were carried out with Nigadoo River Mines Limited and Chester Mines Limited concerning adequate effluent disposal facilities at their operations. Disposal facilities were completed at the Nigadoo mine during the fall. Negotiations are continuing regarding the Clearwater development of Chester Mines Limited which is scheduled to commence operating in 1968.

Agricultural Spray

The Department's bioassay program, screening commonly used pesticides, was continued through the 1967 season to cover five additional pesticides. Special studies were carried out to determine the degree to which aqueous solutions of pesticides retained their toxicity over a period of three days and the effect of relatively large quantities of poison over a relatively short period of time. The latter was accomplished by holding fish for a period of one or two hours in concentrations which are lethal in approximately 8 hours; then transferring them to clean water for further observations.

Forest Spraying in New Brunswick

Resource Development Branch Biological personnel continued to monitor the effects of forest insecticide spray on young Atlantic salmon and aquatic invertebrates in New Brunswick rivers. Stocks of young salmon in spray area streams were found to be below normal, indicating continued hazard to fish from DDT. Sumithion was found to be non-toxic to young salmon but caused significant reduction of aquatic invertebrates. Eels, which are both predator and competitor of young salmon, were found to be very scarce in spray area streams. Preliminary results indicate a substantial reduction in the budworm hazard for next year, and it is hoped that large-scale spraying will not be necessary in 1968.

SEISMIC EXPLORATIONS

Marine seismic surveys were conducted in the coastal waters of the Maritime Provinces by three oil companies, the Department of Energy, Mines and Resources, and by Maritime Technical Services Limited. Pan American Petroleum Corporation and the Department of Energy, Mines and Resources carried out conventional surveys in the Gulf of St. Lawrence during the fall. Hudson Bay Oil and Gas Company Limited and Texaco Explorations Company conducted surveys in the eastern end of Northumberland Strait and in the Gulf of St. Lawrence in areas north and east of Prince Edward Island. Maritime Technical Surveys Limited began a survey during

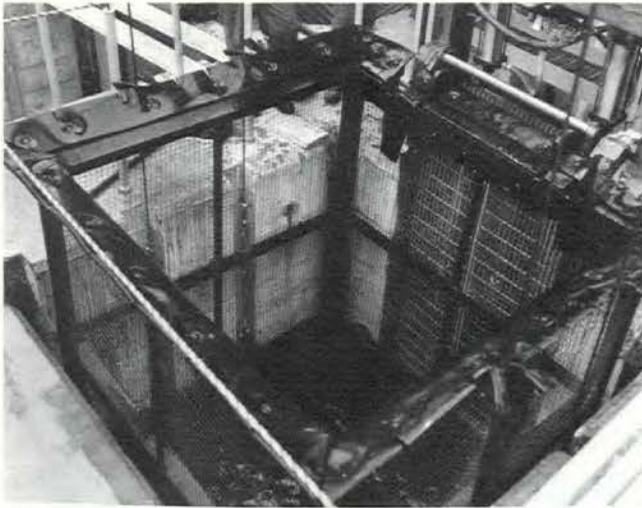


Photo sequence shows operation of the fish trapping and transfer facilities at the Mactaquac hydro power project. Top left - Fish trap being raised at the power dam; top right - Fish transfer truck backing into position under the trap; bottom left - Fish in trap being transferred to truck; bottom right - Salmon being released into a holding pond.

November for mineral resources other than oil along the coast of Nova Scotia bordering on the Atlantic Ocean. Non-lethal energy sources were used during these operations.

The Pan American reflection program and the EMR sonobuoy survey were monitored by the Department in order to protect the fishery resource of the area. The regulations imposed gave adequate

control over both programs.

WATER RESOURCE STUDY

The Atlantic Development Board is initiating and sponsoring a comprehensive study involving the analysis of, demand for and management aspects of water resources in the Atlantic Provinces. A long-term plan for the development of the water resources in the Atlantic Provinces will be prepared from the

information gathered during the first phase of this study. Information of the fishery resource has an important bearing on the water resource, so all pertinent information on the various fisheries in the Maritimes and Newfoundland is being gathered for incorporation with this study. One biologist of the Branch has been assigned to co-ordinate the gathering of this information and to provide liaison with other consultant groups involved in the study.

DISTRICT BIOLOGIST PROGRAM

The establishment of district biologists in the Maritime region was started in 1967. District biologists will be responsible for the gathering of biological data on Maritime waters that is urgently required for the overall maintenance, management and development of the various fisheries throughout the region.

The region has been divided into six districts, each one to be staffed by a biologist and a technician. At present three biologists have been hired. In 1967, they worked out of the Halifax headquarters on stream alteration projects in order to gain familiarity with their districts.

ENGINEERING DIVISION

The Mactaquac Hydro Power Development

The impoundment of the Saint John River behind the Mactaquac Dam commenced on November 3, 1967, when the sluices were closed and lake filling commenced. At this time, facilities for the fish species which use the river were substantially complete. At the dam, collection and transportation for adult fish migrating upstream is provided. A short distance downstream, a hatchery has been built to raise 500,000 salmon per year to smolt stage, to replace native smolts killed by the turbines during their down stream migration.

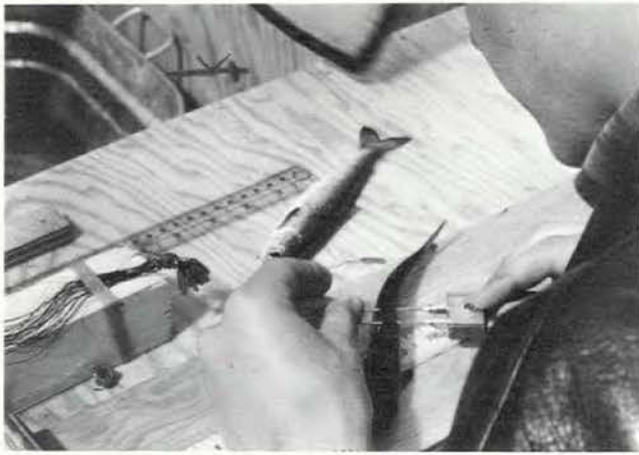
The fish collection facilities at the powerhouse were designed by the consultants for the project, H. G. Acres Limited, in consultation with the Department's engineers. The collection gallery has fish entrances above the three turbine draft tubes which will be used most frequently, and at each end of the gallery. Attraction water is supplied by pumping at low head from the tailrace. The pumping rate will normally be 575 cfs. Automatic sliding gates at the fish entrances provide for the greatest attraction at various tailwater levels. From the collection gallery, fish will enter a holding area from which they will have the option of entering one brail pool by an overflow weir or a second

brail pool by a vertical slot opening. An overflow weir connects the two brail pool sections to permit further segregation of species. It is hoped that sorting of salmon from the coarse fish species will be achieved by this arrangement.

The fish that are collected will be loaded into tank trucks and driven to their destination. A proportion will be selected for brood stock for the hatchery, while the bulk of the salmon will be liberated in the upper reaches of the river to provide for sport fishing and natural spawning. It is anticipated that salmon may be trucked up to 150 miles so that they can be released above all man-made obstructions in the river. Three tank trucks have been provided. This system will be operated from the spring of 1968.

The Mactaquac hatchery has been designed and built by the New Brunswick Power Commission to a functional design prepared by the Department's engineers. Co-operation between the Commission and the Department has continued throughout the design and construction of the hatchery. The hatchery provides for jar and tray culture of eggs and alevins, for the raising of fry in indoor tanks, and for the maturing of juvenile salmon to smolt stage in semi-outdoor ponds. The two rearing wings of the hatchery, respectively 327 feet and 367 feet long, enclosed over a width of 45 feet, contain a total of 17 bays. Each bay provides 12 rearing tanks, each 6' - 3" by 9' - 6" and gives access to two of the 36' x 36' parr rearing ponds. All of the plumbing and mechanical feeding equipment is thus under cover and can be operated without difficulty throughout the winter. The ponds and tanks are of concrete, and with the central outlet drainage system and a high flow rate, are expected to be self-cleaning.

A considerable investment has been made to ensure the reliability and quality of the water supply. The demand will reach a maximum of 19,000 imp. g.p.m. Water can be drawn from three levels of the Mactaquac reservoir and is brought to the hatchery by 7600 feet of 30-inch concrete lined steel pipe. This river water is supplemented by ground water drawn from three wells at the hatchery site. The wells can provide 4500 imp. g.p.m. with year-round stability of temperature. Thus the mixture will be cooler in summer and warmer in winter than river water, which will contribute greatly to the productivity of the hatchery. The water will be passed through an aeration tower prior to delivery into the hatchery. Water discharged from the hatchery will be returned to the river via a half-mile long



Tagging salmon smolt from the Miramichi River.

channel. Grown smolts will be released via this channel and will, therefore, be under observation when they first gain their freedom.

First-class facilities have been provided for the staff, including areas for laboratory work and administration. The Fish Culture section of the branch commenced operations in the hatchery in November although construction was not complete at that time.

Oyster Hatchery Development

The appointment during the year of a mechanical engineer and a technician marks the expansion of the development effort being applied by this division to the experimental oyster hatchery program. Progress has been made this year on several of the engineering problems relating to the supply of clean, heated sea water to the hatchery. This season's operation of the newly installed Teflon heat exchanger indicated that the long standing electro-chemical corrosion problem is under control.

The development of the mobile hatchery was delayed because no reasonable tenders were received for the construction of the complete unit. The trailer has been built by contract, and the specialized mechanical equipment will be installed by the Department's technicians. First trials are expected early in 1968 and the hatchery will be ready to begin field work as soon as sea water temperatures permit.

Fish Culture Stations

At Florenceville Station two new Burrows' type rearing ponds were built to replace old long ponds. This pond design was developed on the U.S. West Coast and is expected to be self-cleaning. Each pond is 50' x 18' overall with a divider wall

in the mid-section of the centre-line. Circulation is created by high velocity jets at opposite corners of the pond, and by streamline flow guides. This is the first application of the design in the Maritimes. Dry food storage facilities were also built at this station.

The construction of twenty new rearing ponds with the necessary water supply line commenced in November at the Mersey Station. The concrete ponds are of the self-cleaning, Swedish design, 25 feet square. The water supply, 3,000 g.p.m., will be drawn from the Nova Scotia Power Commission dam in lieu of a fishway water supply. Stationary, self-timing, electrically operated feeders will be installed. The station will raise mainly Atlantic salmon for stocking in the area.

The maintenance of the Department's fish culture stations was continued, and improvements were effected at a number of them.

Development Projects

At the East River, Sheet Harbour rehabilitation project, the installed facilities were subjected to a season of testing. These tests were essentially to prove their performance from the biologist's point of view, but assistance was given by the engineering staff in assessing the hydraulic performance of the louvers. Returns of adult fish are not expected for several years. A smolt counting fence was built on the Fifteen-Mile Stream to help evaluate the progress of the rehabilitation program. Investigations are being made to find ways of providing for the considerable quantity of water which is diverted through the louver by-pass and is thereby lost for power generation.

Topographic and hydrographic surveys were made on several Nova Scotia rivers which are considered to have possibilities for development. On the La Have River, the Parnell Dam with its fishway, which has been out of commission for many years, was the focus of attention. Surveys were made of the main Branch above this obstruction. Detailed surveys of potential dam sites at Molega and Tupper Lakes were made in connection with the flow control investigation on the Medway River. An inventory survey was made on the St. Mary's River. Potential sites for a counting fence on the Tobique River, New Brunswick were surveyed.

Fishways and Obstructions

Extensive repairs were made to the White Rock fishway in Kings County, Nova Scotia after a landslide had destroyed the lower portion of it. The work

was carried out by the Nova Scotia Light and Power Company Limited to the approval of the Department. In association with A.R.D.A. engineers, a number of functional plans were prepared for fish passage facilities at several small dams in Prince Edward Island. Liaison was maintained with A.R.D.A. engineers responsible for the Musquodoboit River flow control program. The usual minor stream obstruction reports were received and investigated by the engineering staff and appropriate action taken.

OYSTER CULTURE DIVISION

The Oyster Culture Division and the Fisheries Research Board of Canada continued to work in close co-operation in carrying out a joint oyster culture program in 1967.

The figures available at this time would indicate an overall decrease in pounds landed for the three Maritime Provinces but a slight increase in the Maritimes. The decrease in pounds landed shows in Prince Edward Island and mainland Nova Scotia with an increase in New Brunswick and Cape Breton Island. The most marked increase was in the Miramichi area where the catch almost doubled again this year to over 3,800 boxes with a landed value of about \$58,000. The overall landed value for the Maritimes is slightly higher than \$600,000.

The spring fishery in the Miramichi River area was down in 1967 to insignificant proportions. The spring fishery in Summerside Harbour in 1967 showed a decrease of ten fishermen from 1966 but showed an increase of 1164 boxes in 1967 over 1966. The amount of oysters landed from Summerside Harbour in 1967 was slightly over 9,000 boxes.

It is interesting to note that the large public bed in Caraquet Bay where a new type of drag was used this spring for cleaning the bed showed some very promising results.

Seed Production

A total of 602 boxes of seed oysters from the seed farm at Conway Narrows was sold to lessees in 1967.

The seed farm at Conway Narrows is still improving and should continue to do so with extensive use of the mechanical shellfish harvester which tends to firm up the bottom and keep the eel grass in check.

Leasing and Surveys

The demand for oyster leases continued high during 1967 and again the number of applications

exceeded the number of areas surveyed. This was due, in part, to the fact that the survey parties were engaged for much of the time during the summer months in work other than oyster lease surveying. Two survey crews were in the field during the year, one based at Ellerslie, P.E.I. and the other one at Richibucto, N.B. This is one crew short of the normal complement due to the resignation of one of the surveyors.

Both survey crews were engaged for seven weeks in a complete examination of an area in Kent County, New Brunswick lying between the southern extremity of Richibucto Village Bay and the northerly tip of Kouchibouguac Lagoon, containing Richibucto Village Bay, Richibucto Harbour, Kouchibouguacsis Lagoon, Koichibouguac Lagoon, the Aldouane, St. Louis and Kouchibouguac Rivers. This examination revealed the presence of a large area of suitable oyster growing bottom, some of it exceptionally good.

Six Public Health Shellfish Closure boundaries were established and marked with concrete monuments in Prince Edward Island, five in Nova Scotia, and four in New Brunswick for a total of fifteen.

Two public fishing area boundaries were established and marked with concrete monuments. Two experimental eel grass plots were surveyed for the Fisheries Research Board, one at Bideford, Prince Edward Island, and the other at Neguac, New Brunswick.

One hundred and fifty-six new areas were surveyed for oyster leases and thirty-four old areas were resurveyed in the three Provinces during 1967.

The total number of oysters leases in effect at the end of 1967 was 1,948 with a combined area of 5,451 acres. 1,076 of the leases containing 3,316 acres are located in Prince Edward Island; 661 leases containing 1,600 acres are located in New Brunswick and the remaining 211 leases containing 535 acres are located in Nova Scotia.

Progress in Oyster Hatchery Development

In 1967 development of commercially applicable methods of raising seed oysters on a mass scale under controlled conditions was continued. This included improvements in rearing of oyster larvae and food culture, and large scale rearing tests at Ellerslie.

During the winter investigations into some aspects of larval rearing techniques were conducted.

It was found that by holding larval cultures at a temperature (76° F) slightly above normal room temperature and routinely adding inexpensive antibiotics larval growth rates were almost doubled. Larvae started to set at 12-15 days rather than the normal 19-21 days.

Tests were made on inexpensive ways of sterilizing sea water for the culture of larval food. It was found that pasteurization is both inexpensive and effective.

These two modifications represent significant advances in the development of commercial techniques and have been incorporated in the routine hatchery operation. The increase in larval growth rate almost doubles the production capacity of any operation. The pasteurization technique would allow a commercial operation to supplement the larval food supply if necessary.

The newly installed teflon heat exchanger was tested exhaustively during the year. It has given trouble free operation, adequate supplies of warm water and the requisite temperature control.

Complete tests were conducted on the all-plastic disc type filters which were tested briefly



Electro-seining during salmon investigations on the Bartholomew River, N.B.

in 1966. These perform adequately, back flush well and would be suitable for a commercial larval rearing operation in locations where silting is not as extreme as at Ellerslie.

Trials were conducted of cement coated plastic collectors, Though toxicity of a cement coating is still a problem, these were found to have advantages over the standard cement-coated wood veneers and were used on a large scale. Testing of new collectors, of similar design, made of polyethylene and with no coating is now underway.

Pilot Commercial Oyster Hatchery

Preparations are in progress for the next phase of hatchery development, pilot commercial operation.

A portable hatchery unit has been developed and is under construction. It will be placed in operation in 1968. In addition less complex units are being contemplated for a number of locations. The aim of this program is to test the suitability of new areas for hatchery operation, and attempt to simplify the techniques and obtain cost estimates.

FISH CULTURE DIVISION

For the second consecutive year, production has been controlled by a specified and scheduled program. This is a detailed plan of production designed to tie production solidly and accurately to the capabilities of the ponds and water supplies. The number of eggs incubated is now based upon the rearing potential of the ponds rather than the incubation capacity of the station. All weak or inferior fry are now discarded as quickly as possible. A new technique for accurately determining the number of live fry on hand has been introduced. There is concrete evidence that these and other measures being adopted are contributing toward the achievement of improved production and overall efficiency.

It has now been established that salmon can be reared satisfactorily on 100 per cent dry diet and this has become feeding policy. All of the salmon production stations were on a 100 per cent dry food diet for salmon in 1967. A satisfactory diet for speckled trout has not yet been found and 15 per cent supplemental meat is necessary to avoid a scalister condition. In 1964 meat requirements were 500,000 pounds and this has been reduced to 75,000 pounds as a result of the increased use of dry feed. The average conversion factor in 1967 was 2.1 with an average cost of thirty-five cents per pound of fish produced.

Experiments with feeding techniques and frequency confirm that considerable additional growth

can be obtained by extra feedings early in the morning and during the evenings. Results show there is good reason to feed small quantities frequently. This can be achieved most effectively with automatic feeders. The reduction in labour and increased production justify the installation of such equipment.

Control of Parasites

Two chemicals, formalin and malachite green, are now used exclusively for prophylactic treatment of fish and eggs to control external parasites. The points of concern for next year are proper automatic application equipment and determining proper frequencies of application at some stations. Use of chemicals and metering systems has eliminated much labour in picking eggs and handling fish thus avoiding the adverse effects of manual methods.

Brood Stock

The demands of the new smolt rearing station at Mactaquac necessitated the taking of 1,000 wild adult salmon from the Saint John River. These fish were selected and tagged then moved to Miramichi where they were kept in the holding pond until they were spawned in the fall.

Brood stocks of rainbow and brown trout have been reduced by 50 per cent and all are now at the Yarmouth fish culture station. The Saint John and Antigonish stations are the only ones with speckled trout brood stock.

By comparison, brood stock kept on a basically dry food diet produced 1.8 as many eggs per female as those kept on a meat diet.

OPERATIONS

Many improvements have been made to existing facilities by the replacement of outdated equipment, such as egg incubation units and distribution units with modern equipment. Anti-fouling paint is being used on the ponds at a number of stations. A total of 210 ponds have been painted to date. This paint reduces significantly the time required to clean ponds and eliminates algae growth.

Pond Construction

Four new ponds have been completed at the Florenceville Station and twenty are now under construction at the Mersey Station. The addition of these ponds will effectively improve the productive capacity at both stations.

Distribution and Transfer Units

Two new adult salmon transfer tank trucks were put into use this year at the Mactaquac Station.

These units are equipped with water circulation and aeration systems and an independent oxygen supply. They are designed to eliminate handling of fish both in the loading and unloading operations and will be used in connection with the permanent fish-handling facilities at Mactaquac.

Three small 150-gallon distribution tanks were used this year in the transfer and distribution of fish. These units have water circulation and aeration systems and proved quite effective.

Automatic Feeders

Feeding experiments have demonstrated that feed waste is reduced and better growth achieved by dispensing the dry feed automatically with the result that the conversion factor is improved. A total of 41 automatic feeders are now in use at six fish culture stations in the plan to convert to the use of dry feed at all stations.

Mactaquac Station

By far the greatest project undertaken in 1967 by the Fish Culture Division has been the Division's participation in the development of the design of the Mactaquac Fish Culture Station. Constant liaison was maintained with the Resource Development and New Brunswick Electric Power Commission Engineers in order to advise on the operation requirements of the plant equipment.

NEWFOUNDLAND REGION

Along with its counterpart in the Maritimes, the Resource Development Branch, Newfoundland Region, is chiefly concerned with the management of anadromous and freshwater fish species. Much of the work concerns salmon and trout which, because of their dependence on the freshwater environment during part or all of their life history, are especially sensitive to environmental changes resulting from increasing industrial use of water and residential expansion.

Therefore, the branch is heavily engaged in the maintenance of existing stocks (provision of fish passages at dams, maintenance of minimum flows, and anti-pollution work) and development of new and enlarged stocks. The latter phase involves creating new areas of water accessible to fish, provision of spawning channels, introduction of new species, investigation of the use of hatchery products, removal of old obstructions, and introduction of new species of fish.

The Newfoundland branch also investigates seismic exploration programs in fish-bearing waters,

and lays down precautions by companies carrying out such operations; provides support for special investigations by university researchers; is involved in a program to determine the suitability of Newfoundland coastal waters for oyster production, and, generally, provides scientific advice on matters within its jurisdiction.

During 1967 a full time staff of 30 persons – about half of whom were biologists and engineers – were engaged. During the season for field operations, the staff is more than doubled by the hiring of students and other workers for field projects.

The following paragraphs give a general appraisal of what was achieved by the Branch in 1967.

EXPLOITS RIVER

The Exploits River, largest on the Island of Newfoundland, has been accessible to Atlantic salmon and sea trout in the past for about 20 per cent of its area due to an impassable obstruction located near the town of Grand Falls. During the past several years, engineering and biological surveys have been conducted to determine the feasibility of making upstream areas, which comprise the other 80 per cent of the river system (about 3,000 square miles), available for fish production. These studies have been additionally complicated by the presence of two large industrial concerns on the river, and the fact that the river receives domestic wastes from the towns of Grand Falls and Windsor and several smaller municipalities. These studies have indicated that this river system, which now supports a spawning population of Atlantic salmon of some 2,000 adults could, if access were provided to the area between Grand Falls and Red Indian Lake, support a spawning population of at least four times as large as that which is now produced. If this area were successfully developed in the next few years, the next stage would envisage similar development for an equally large area above Red Indian Lake.

The first spawning channel for Atlantic salmon anywhere was constructed in 1962-63 at Upper Indian River, Baie Verte Peninsula. This was designed to offset the effects of a water diversion for hydro purposes by the Bowater Company. Construction costs were assumed jointly by the Company and the Department of Fisheries. It is operated solely by the Department. The purpose of the channel was to replace several miles of natural spawning area, lost by water diversion with some 10,000 square feet of artificially prepared area.



Netting salmon for transfer to Noel Paul Brook spawning channel, 150 miles away.

Favourable incubation conditions provided in the channel since 1963 have resulted in an annual egg to fry survival rate of 40 to 50 per cent. This is three to four times the survival that could be expected if the same number of salmon spawned naturally in the river. Although these results are encouraging, final evaluation can only be made when fish which were produced there return to the commercial and sport fisheries and to the river for spawning. A counting fence on the lower part of Indian River makes it possible to count all adult salmon as they migrate upstream. Information gained here will aid in determining whether or not the increase and production in young salmon will be reflected in a similar increase of adult fish.

SMOLT TAGGING PROGRAM

Since 1959, salmon have become an increasingly important part of a commercial fishery off the southwest coast of Greenland. From tagging programs carried out in that area by several nations it is known that the stock of salmon being fished originates in the rivers of several European nations, as well as those of Canada.

In March, 1966, as part of an investigation to ascertain the impact of the Greenland salmon fishery on Canada's Atlantic salmon stocks, it was decided to begin a large scale smolt tagging program to identify the origin of fish taken in this fishery, including those from Newfoundland region. An important part of this program is the selection of a suitable river in Labrador for smolt tagging and adult enumeration operations.

Selection of a Labrador river involved much field study. Preliminary surveys were conducted in

1966 and 1967 on 16 rivers in the area from Forteau River in the South to Shellbird River in the North. On some of these, temporary counting fences were erected to determine the size and nature of their sea run populations. Although a final decision as to the river on which to locate a field station for smolt tagging and other activity has not yet been made, it appears that a suitable site has been located and construction of accommodation and other facilities should begin in 1968.

WATER POLLUTION

The Branch is involved in water pollution prevention and abatement insofar as pollution may be deleterious to fish life. It is well known, of course, that wastes from industry or from domestic sewage can diminish, or even destroy, desirable fish populations. Branch efforts in pollution control, therefore, are two fold: to prevent new areas of pollution from becoming established and, in the case of existing pollution, to find ways of remedying it.

In 1967, agreement was reached with three mining companies to either impound their wastes in "safe" areas or disperse them so as to render them nontoxic to fish life. Negotiations continued with other companies to abate other sources of pollution. The Department's efforts in this regard have met with some encouraging degree of success in recent years.

During 1967, investigations were conducted on fish life of such activity as DDT stream larvaciding for blackfly control, wastes from pulp and paper mills, and wastes disposal from mining operations. A regular monitoring program is maintained in areas where pollution is, or may become, problematic. A continuing

program of water sample analysis is conducted in critical areas. As part of this work, many hundreds of chemical and biological analyses are carried out each year in the Branch's chemical and bio-assay laboratory located at Bishop's Falls. Some analysis is also conducted at a smaller lab in St. John's. It is expected that, coincident with increased industrialization and population growth generally, such work will have to be increased in the future.

The development of hydro-electric power, with its accompanying dams and water diversions, poses a serious threat to the maintenance of fish populations that require access throughout river and lake systems to complete their life cycle. At present all proposals for hydro-electric development are brought to the attention of the Department by the Newfoundland and Labrador Power Commission. Necessary biological and engineering investigations are carried out by Resource Development Branch staff, and requirements put forward for the protection of the fish resource. Negotiations are held with the Commission officials to ensure that measures to prevent unnecessary destruction of these resources are incorporated into these developments.

Among developments of this nature that have received considerable attention during the past year are the Bay D'Espoir Power Development (especially Grey and White Bear River Diversions), Churchill Falls Power Development, and the proposed Terra Nova River Development. In each case, all reasonable precautions necessary to ensure a continuance of anadromous fish populations have been required of the developers by the Department.

427-Ton Catch

The landing in the early part of September of 427 tons of herring at the Nova Scotia port of Pubnico marked another breakthrough in the rapidly developing field of midwater trawling on the Atlantic coast. The record catch was made in 30 hours of fishing by the 156-foot stern ramp trawler *J.B. Nickerson* of Riverport, N.S.

The midwater trawl operations are being sponsored jointly by federal and provincial governments and the industry. The latest project, using a stern ramp vessel for the technique, is being carried out under the technical supervision of W.W. Johnson, of the federal Department's Industrial Development Service, in co-operation with the Nova Scotia Depart-

ment of Fisheries. The skipper of the *J.B. Nickerson* is Captain Leo Mercer, of Lunenburg.

The 427-ton catch was made in 12 tows on the Orphan Bank in the Gulf of St. Lawrence. The vessel's total landings of herring from August 19 to September 12 amounted to 1,625 tons. This amply demonstrates the economic potential of the method for stern trawlers.

Large quantities of herring are taken as a rule by purse seiners which operate over huge schools of fish; the midwater trawl is designed mainly for daytime fishing when the herring are dispersed and usually too deep for successful purse seining.

Name Appeal Committee in Salmon Vessel Licensing Program

The decision to limit salmon vessel licences in British Columbia in 1969, announced September 6 by federal Fisheries Minister Jack Davis, has been followed by the appointment of an Appeal Committee and the setting up of initial guidelines and appeal procedures.

Special circumstances which would warrant issuing a new 1969 salmon vessel licence without retiring an existing Category "A" vessel were considered at a meeting of representatives of industry and fishermen's organizations and Departmental officials. Recommendations arising from this meeting were reviewed by the Minister and approved as follows:

Appeal Committee: Members — Blake A. Campbell, Chief, Economics Branch, and M.P. Houghton, Chief, Conservation and Protection Branch, Vancouver; secretary — J.H. Ellis, Conservation and Protection Branch, Vancouver; ex-officio member — W.R. Hourston, Regional Director of Fisheries, Vancouver.

Guide Lines for Appeal: Special circumstances which will be considered as a basis for issuing a new 1969 salmon vessel licence to a fisherman in 1969 without retiring an "A" category vessel are as follows:

- (a) A vessel that was under construction or a vessel that was being reconstructed to be used for salmon fishing or a vessel for which a contract had been signed by the fisherman (valid proof being provided) prior to September 6, 1968.
- (b) A vessel owned by a fisherman who had a long historic record of salmon fishing prior to 1967 but who had not fished in 1967 or 1968 for exceptional reasons of a com-

passionate nature (such as prolonged illness.)

- (c) A vessel which had been lost irretrievably by a fisherman during the 1968 salmon season provided that the loss was not his fault and that the fisherman in question had not already acquired a licenced vessel for this purpose.

Appeal Procedures:

- (a) The appellant shall have the opportunity of presenting his appeal to the Departmental Appeal Committee in writing and/or in person;
- (b) If an appeal is rejected by the Appeal Committee the appellant may still make representation to the Minister of Fisheries; and;
- (c) Appeals should be submitted to the Appeal Committee of the Department of Fisheries prior to January 15, 1969 if the appellant wishes to obtain a salmon fishing vessel licence for 1969.

In order to assess the results of this program, as well as to maintain proper control, it is essential that purchases and sales of salmon fishing vessels be recorded in a proper manner. The Minister has stated therefore that a buyer of any vessel licenced to fish for salmon in either "A" or "B" category must advise the Department of Fisheries within 30 days of any change of ownership. Pertinent details of the transaction, including the price paid for the vessel, must be included. Failure to provide this information would place the validity of the vessel licence in jeopardy. Forms for this purpose are available at the Regional Office of the Department of Fisheries.

A person considering the purchase of a salmon fishing vessel is advised to check with the Regional Office of the Department of Fisheries on the status of the salmon licence for that vessel prior to making any commitments.

Fishermen are reminded that commercial fishing vessel licence plates and validation tabs are assigned to individual vessels and are not transferable. Where a new vessel is brought into the fishery to replace a Category "A" salmon vessel, a new licence plate will be issued and the salmon vessel validation number of the retired vessel will be cancelled.

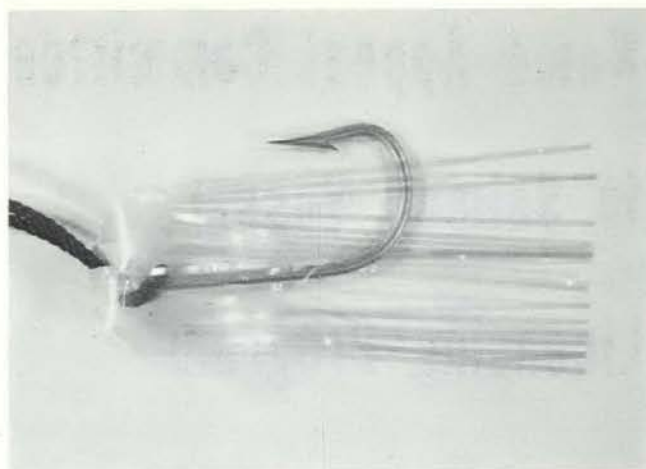
Longline Lures for Swordfish

BY J.S. BECKETT

Fisheries Research Board of Canada
Biological Station, St. Andrews, N.B.

Canadian swordfish longline fishermen were interested to read, earlier this year, of a lure designed to enhance the visual attractiveness of dead fish baits. Reports in a number of fishery periodicals described the success of trials with the lure off Japan, in which the catch of tunas was increased by 54% (although the data given indicates a rise of 39%) in comparison to baits without lures.

The lure, patented under the name "Korin" by the Ebisu Fishing Gear Manufacturing Co. of Yaizu, Japan, is a piece of thin plastic material, 8½" x 2½", pointed and reinforced at one end. The plastic is translucent with narrow bands of the seven colours of the rainbow running along the long axis. The iridescent effect of the colours is enhanced under water. The free end of the lure is shredded into thin strips 7 inches in length, giving a "grass-skirt" effect. The "Korin" is put on the hook by



The Korin lure in fishing position.

piercing the reinforced end and pushing it along the shank before the bait.

The lure was tested by the author recently during a longline cruise to the Grand Banks aboard the Fisheries Research Board of Canada's research vessel *E.E. Prince*. They were fished on approximately alternate hooks on nine sets, although considerably more hooks were set each night without lures than with lures. The total number of fish taken with lures and without lures is shown in the accompanying table. The hook rate (average number of fish taken on each 100 hooks) allows a direct comparison between the catch of the two categories.

The table shows that swordfish and blue sharks were caught at a higher rate on "Korin", while the other species were caught at a lower rate. The last two groups were not taken in sufficient numbers to be considered in any analysis. Indeed, it is questionable whether enough swordfish were taken to draw a meaningful conclusion.

The explanation of an increased catch of blue sharks may be that the lures are only effective during the daylight, and, since blue sharks feed mostly by day, they would be susceptible to the lures. On the other hand, swordfish feed mostly at night when the lures are least effective. In this respect, the catch rates during the one clear moonlit night, when the lures might be effective at night, were no different to those on the overcast dark nights.

While 27 swordfish may not be sufficient for statistical significance, further experimental fishing is indicated, as even the 0.1 fish per 100 hooks

Fish Catch on Baits with and without Korin Lures
(Total Numbers and Catch per Hundred Hooks)

Species	No. of fish caught & catch rate per 100 hooks			
	Without Lure		With Lure	
	No.	%	No.	%
Swordfish	16	0.81	11	0.93
Blue Sharks	100	5.01	80	6.75
Other Sharks	19	0.90	10	0.80
Tunas	3	0.15	1	0.08
Lancet fish	4	0.20	2	0.16
Total all species	142	7.15	104	8.77

No. of hooks set without lure - 1,998

No. of hooks set with lure - 1,185

increase obtained by using the lures, if a real increase, would mean an additional 15 fish for a ten set trip averaging 1,500 hooks per night.

The cost of the lures was approximately \$67 per 1,000 including air freight from Japan. The lures stood up well during use, most lasting the nine sets they were fished. The labour involved in fishing the "Korin" is not great and they can be put on the gear (they appear to work best on the ganging just above the hook) during the run to the fishing area. Replacement of missing lures after each haul is simplified by stowing the gangings needing new lures in a separate tub.

The "Korin" have already been used by some swordfishermen who claim varying success. But as no attempt has been made to compare the catch with that taken on baits without the lure, it is difficult to evaluate these results. The present study, while not showing any great advantage in the use of the lures, does show they are not detrimental and that for a small outlay at the start of each trip, the rewards may be significant.

Harbours Conference

Frank Dopplinger, of the Industrial Development Service of the federal Department of Fisheries, is shown at the Conference on Fishing Harbours and Port Markets, held September 23-28 in Bremen, West Germany, by the Food and Agriculture Organization of the United Nations.



F. Dopplinger

Mr. Dopplinger represented the Department at the conference, which provided an insight into problems of fishing harbour construction and maintenance problems under a variety of hydrological and climatological conditions in many parts of the world.

ICNAF Mesh Size Regulations Extended

The Canadian Government has passed an Order-in-Council confirming Canada's acceptance of changes in regulations governing the fisheries in the northwest Atlantic. Federal Fisheries Minister Jack Davis said that Canada, along with 13 other members of the International Commission for the Northwest Atlantic Fisheries, is concerned with the effects of the heavy fishing on the fish stocks in the area.

The new regulations approved will include additional species of fish under conservation measures establishing minimum mesh sizes for the nets used. For years cod and haddock have been covered by these regulations. The minimum mesh sizes, ranging from four to four-and-a-half inches and dependent upon the particular area being fished and the type of gear used, are designed to permit the escapement of fish under commercial size.

In all ICNAF fishing areas northeast of, but not including, Georges Bank off New England to the coast of Labrador, flounders will be included in the minimum mesh size regulations. In the Grand Banks area which extends westward and southward more

than 600 miles, halibut and Greenland halibut are included in the regulations. In the northern section of the Grand Banks, redfish come within the minimum mesh size restrictions.

For the purpose of administration the 200,000 square miles of fishing waters in the ICNAF area are divided into five sub-areas. The control system now in operation calls for each nation engaged in fishing operations to be responsible for the enforcement of ICNAF regulations for its own nationals. Canada, for instance, sends patrol vessels to the fishing banks with authority to board Canadian fishing craft. At the fish landing docks, officers of the federal Department of Fisheries Conservation and Protection Service board Canadian fishing vessels to check mesh sizes to ensure that regulations are obeyed.

Canada was one of the original signatories to the international convention when it was set up almost 20 years ago. The 14 member-nations comprise Canada, Denmark, France, Germany (federal republic), Iceland, Italy, Norway, Portugal, Poland, Romania, Spain, the United Kingdom, the United States and the Union of Socialist Soviet Republics.

Mobile Exhibits Tour Atlantic Provinces

Two specially-constructed trailers featuring displays of fisheries conservation and development work undertaken by the federal Department of Fisheries, have been on tour in Newfoundland and the Maritimes since mid-summer.

The brightly-painted blue and white caravans, measuring 20 ft. by 10 ft., contain live fish displays in 50-gallon tanks, as well as photo and poster exhibits illustrating activities of the Department of Fisheries and the Fisheries Research Board of Canada. Another feature is a simulated sea bed set in the floor and protected by a glass plate. Each trailer is also equipped with an automatic slide projector for daylight viewing.

The caravan touring Newfoundland featured fisheries resource development work and pamphlets outlining the Department's activities in this sphere were distributed to visitors. Among places visited was St. John's, where the trailer was on display during the Canadian Institute of Forestry Conference.

Fisheries industrial development was highlighted by the display in the trailer which toured the Maritimes. Places visited by this unit included fisheries exhibitions at Shippegan, Yarmouth, Shelburne and Lunenburg, N.S., and Souris and Tyne Valley, P.E.I. Fisheries Minister Jack Davis was among the many visitors to the trailer while it was on display at Lunenburg.



Federal Fisheries Minister Jack Davis (standing in righthand doorway) was among those who visited one of the Department's new display trailers at the Lunenburg fisheries exhibition.

Fishery Statistics

SEAFISH: LANDED WEIGHT AND LANDED VALUE

	May - August 1967		May - August 1968	
	Landings ¹	Value ²	Landings ¹	Value ²
	'000 lb.	\$'000	'000 lb.	\$'000
CANADA - TOTAL	1,190,399	90,659	1,269,820	103,913
ATLANTIC COAST - Total	1,032,506	55,180	1,088,653	59,983
Cod	339,711	15,253	365,394	15,250
Haddock	36,183	2,176	31,562	2,280
Redfish	71,849	1,878	96,688	2,504
Catfish	2,551	81	3,697	137
Halibut	1,891	690	1,487	542
Other Flatfishes	134,346	4,259	119,200	3,991
Pollock, Hake, Cusk	22,890	884	25,258	869
Other Groundfish	5,809	67	4,284	38
Herring & Sardines	336,277	3,577	360,580	3,958
Mackerel	14,536	545	14,191	551
Swordfish	2,551	1,252	3,220	1,752
Alewives	6,492	104	7,033	128
Salmon	6,226	3,049	4,737	2,281
Smelts	147	17	123	11
Other Fish	9,925	251	8,984	172
Lobsters	26,014	16,135	26,340	16,466
Clams & Quahaugs	3,194	205	3,295	230
Scallops	6,021	3,312	7,884	6,426
Other Shellfish	5,893	214	4,696	447
Misc. Items	-	1,231	-	1,950
PACIFIC COAST - Total	157,893	35,479	181,167	43,930
Pacific Cods	7,070	577	8,254	617
Halibut (3)	18,950	4,746	21,496	5,120
Soles & Other Flatfishes	3,831	265	5,306	321
Herring	22,338	382	367	28
Salmon	98,539	28,816	137,167	36,910
Other Fish	1,368	44	4,238	384
Shellfish	5,797	648	4,339	550
Misc. Items	-	1	-	-
BY PROVINCES				
British Columbia	157,893	35,479	181,167	43,930
Nova Scotia	334,659	20,588	355,706	24,390
New Brunswick	187,880	6,267	216,773	7,007
Prince Edward Island	24,547	5,913	28,124	6,402
Quebec	124,342	5,363	109,540	5,335
Newfoundland	361,078	17,049	378,510	16,849

¹ Fish and Shellfish only. ² All Products - Includes livers, seaweeds, tongues, scales, roes, skins, oil, seals, whales and bait worms. ³ Includes halibut landed in U.S. ports by Canadian fishermen.

MID-MONTH WHOLESALE PRICES - AUGUST 1968

	Montreal	Toronto
	\$	\$
Cod fillets, Atl. fresh, unwrapped lb.	.407	.490
Cod fillets, Atl. frozen, cello 5's lb.	.335	.390
Cod fillets, smoked	.428	.507
Haddock fillets, fresh, unwrapped lb.	.507	.630
Herring, kippered, Atl. lb.	.281	.317
Mackerel, frozen, round lb.	.205	.287
Lobsters, canned, Fancy Case 48-½s	65.853	68.593
Sardines, canned Case 100-¼s	10.010	8.880
Halibut, frozen, dressed lb.	.474	.523
Silverbright, frozen, dressed lb.	.630	.650
Coho, frozen, dressed lb.	.920	.947
Sockeye, canned, grade A Case 48-½s	28.053	29.047
Pink, canned grade A Case 48-½s	17.117	17.740
Whitefish, fresh lb.	.483 ¹	.433
Lake Trout, frozen lb.	.440	.547

¹ Dressed.

PRICES PER CWT. PAID TO FISHERMEN (Week ending August 17th)

	1967	1968
	\$	\$
Halifax		
Cod Steak	5.25	5.75
Cod Market	5	5.5
Haddock	8.5	9
Plaice	5	4.5-5.25
Black's Harbour		
Sardines	2	-
St. John's, Nfld.		
Cod	-	2.25-3.25 ¹
Vancouver		
Ling Cod	8-12	8-10
Grey Cod	6-7.5	7.5
Soles	6-9.5	8.5-9.5
Salmon (Redspring)	40-79	50-88

¹ Round.

Fishery Statistics

FROZEN FISH STOCKS AS AT END OF AUGUST

	1967	1968
	'000 lb.	'000 lb.
TOTAL - Frozen Fish, Canada	108,317	112,040
Frozen - Fresh, Sea Fish - Total	77,669	87,787
Cod, Atlantic, Fillets & Blocks	12,299	21,008
Haddock, Fillets & Blocks	6,925	3,706
Rosefish, Fillets & Blocks	8,464	8,641
Flatfish, (excl. halibut) Fillets & Blocks	10,372	7,188
Halibut, Pacific, dressed & steaks	11,231	9,696
Other Groundfish, dressed & steaks	1,975	2,544
Other Groundfish, fillets & blocks	5,561	6,682
Salmon, Pacific, dressed & steaks	11,524	16,486
Herring, Atlantic & Pacific	815	1,086
All Other Sea Fish, all forms	6,158	6,669
Shellfish	2,345	4,081
Frozen - Fresh, Inland Fish, - Total	9,810	7,040
Perch, round or dressed	1	766
Pickerel (Yellow & Blue) fillets	1,185	480
Sauger, round or dressed	1	148
Tullibee, round or dressed	247	141
Whitefish, round or dressed	1,528	1,667
Whitefish, fillets	305	210
Other, all forms	6,545	3,628
Frozen - Smoked Fish - Total	1,843	2,408
Cod, Atlantic	626	930
Sea Herring, kippers	726	754
Other, all forms	491	724
Frozen For Bait and Animal Feed	18,995	14,805

¹ Confidential, included with "Other".

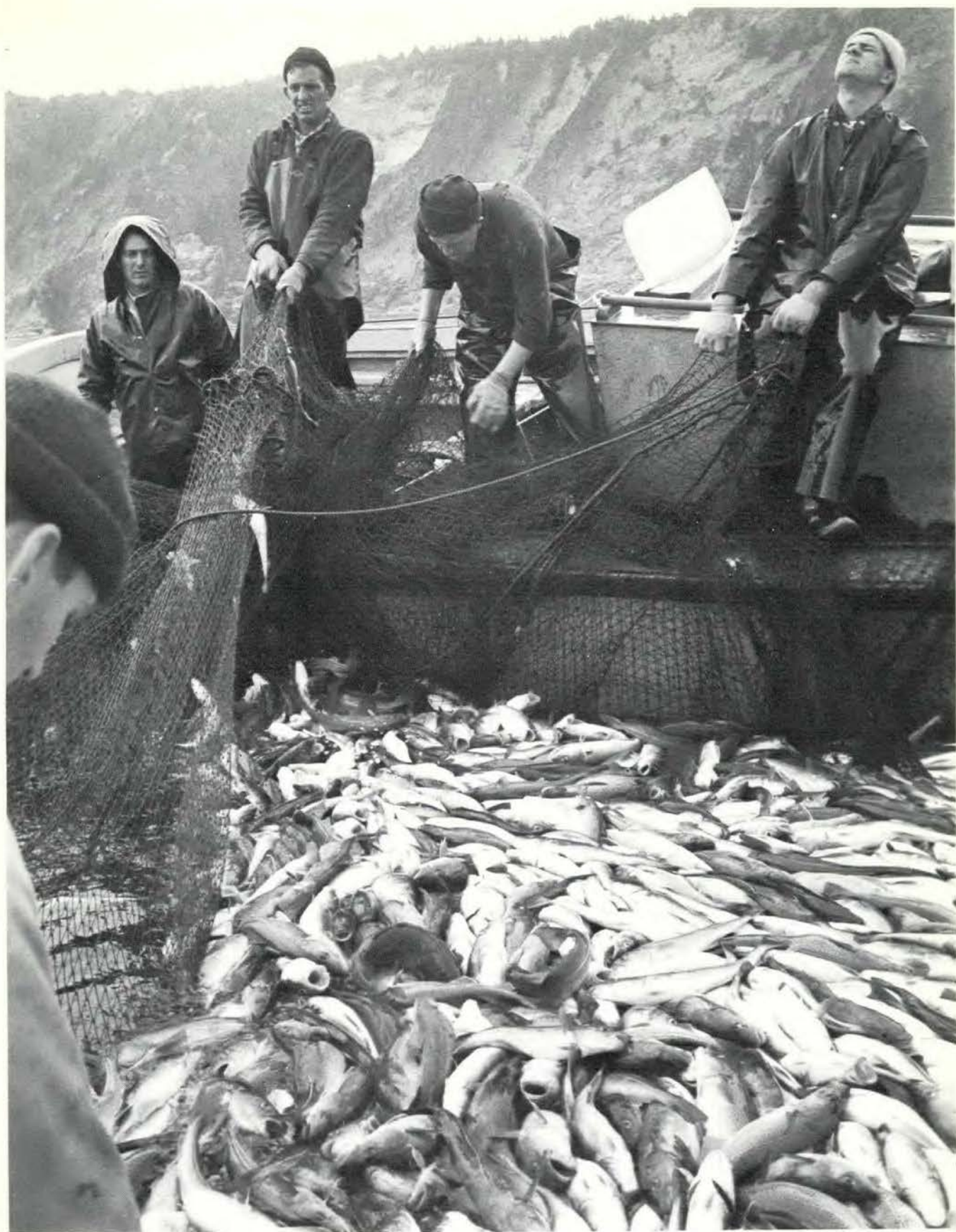
SALT FISH STOCKS AS AT END OF AUGUST

	1967	1968
	'000 lb.	'000 lb.
Salted and Pickled Fish Atlantic Coast		
Wet-Salted - Total	37,284	28,363
Cod	33,044	22,961
Other	4,240	5,402
Dried-Salted - Total	7,077	9,919
Cod	6,518	7,822
Other	559	1,188
Boneless - Total	419	1,344
Cod	375	1,102
Other	44	242
Pickled - Total (barrels)	29,057	20,278
Herring	9,433	8,887
Mackerel	11,705	7,627
Alewives	7,919	3,774
Turbot	1	-
Bloaters (18 lb. boxes)	304,980	335,561
Boneless Herring (10 lb. boxes)	-	9,804

¹ Confidential.

CANADIAN EXPORT VALUE OF FISHERY PRODUCTS MAY - JULY

	1967	1968
	\$'000	\$'000
TOTAL EXPORTS	54,851	63,056
By Markets:		
United States	42,856	50,736
Caribbean Area	4,706	4,117
Europe	6,280	7,120
Other Countries	1,009	1,083
By Forms:		
Fresh and Frozen	40,900	
Whole or Dressed	9,252	10,292
Cod, Haddock, Hake	72	144
Halibut, Pacific	1,194	1,171
Salmon, Pacific	2,828	3,013
Swordfish	1,073	1,465
Other Seafish	1,885	1,776
Whitefish	833	1,044
Pickerel	453	538
Other Freshwater Fish, n.e.s.	914	1,141
Fillets, Blocks and Slabs	16,324	19,404
Cod, Atlantic	4,685	6,150
Haddock	2,247	2,412
Ocean Perch, Hake, Cusk, Pollock	1,976	2,566
Flatfish	4,540	5,037
Pickerel	490	608
Other Fillets & Blocks	2,386	2,631
Shellfish	15,201	18,530
Lobsters (in shell & meat)	12,148	12,486
Scallops	2,718	5,409
Other	335	635
Frozen Fish & Shellfish, pre-cooked	123	218
Cured	4,823	4,939
Smoked	276	496
Herring	81	249
Other	195	247
Salted, Wet & Dried	3,979	3,996
Cod	3,206	3,440
Other	773	556
Pickled	568	447
Herring	391	259
Mackerel	117	88
Other	60	100
Canned	4,917	5,431
Salmon	2,973	3,312
Sardines	1,331	1,166
Lobsters	379	566
Other	234	387
Miscellaneous	4,211	4,242
Meal	2,294	2,441
Oil	414	111
Other	1,503	1,690



Inshore fishermen hauling in a heavy catch of cod off St. John's, Newfoundland.

Salmon Pie – A Hearty Dish

THERE'S more to a pie than meets the eye, or, to put it another way, a beautiful brown crust doesn't necessarily enclose fruit, or chicken, or beef. Salmon pie is a hearty dish, popular in far flung corners of the world.

In the Province of Quebec, Salmon-Potato Pie is an old-time, family favourite. In Russia, salmon is coupled with cooked kasha (buckwheat) or cooked rice and baked under flaky pastry for birthdays, anniversaries and other festive occasions.

With western canned salmon in excellent supply, now is a fine time to try your hand at this versatile dish. The following easy-to-prepare recipe has been kitchen tested by the home economists of the Department of Fisheries of Canada.



SALMON-POTATO PIE

- | | |
|-------------------------------------|---------------------------------|
| <i>1 can (15 1/2 ounces) salmon</i> | <i>1/2 teaspoon salt</i> |
| <i>1/2 cup chopped onion</i> | <i>1/8 teaspoon pepper</i> |
| <i>1/4 cup butter, melted</i> | <i>1/4 teaspoon savory</i> |
| <i>6 medium potatoes, cooked</i> | <i>Pastry for one-crust pie</i> |
| <i>1/3 cup milk</i> | |

Empty can of salmon, including liquid, into a bowl. Mash fish with a fork, combining it with the liquid. Sauté onion in butter until limp but not browned. Mash potatoes. Add milk, onion together with butter in pan, and seasonings. Whip until well blended and fluffy.

Place half potato mixture in a greased 9-inch pie plate or a 1-quart shallow baking dish. Cover with the salmon. Top with remaining potato. Cover with rolled out, pricked pastry. Brush lightly with milk.

Bake in a moderately hot oven, 400°F, for about 30 minutes or until crust is golden brown. Makes 6 servings.

DEPARTMENT OF FISHERIES



Ottawa, Canada

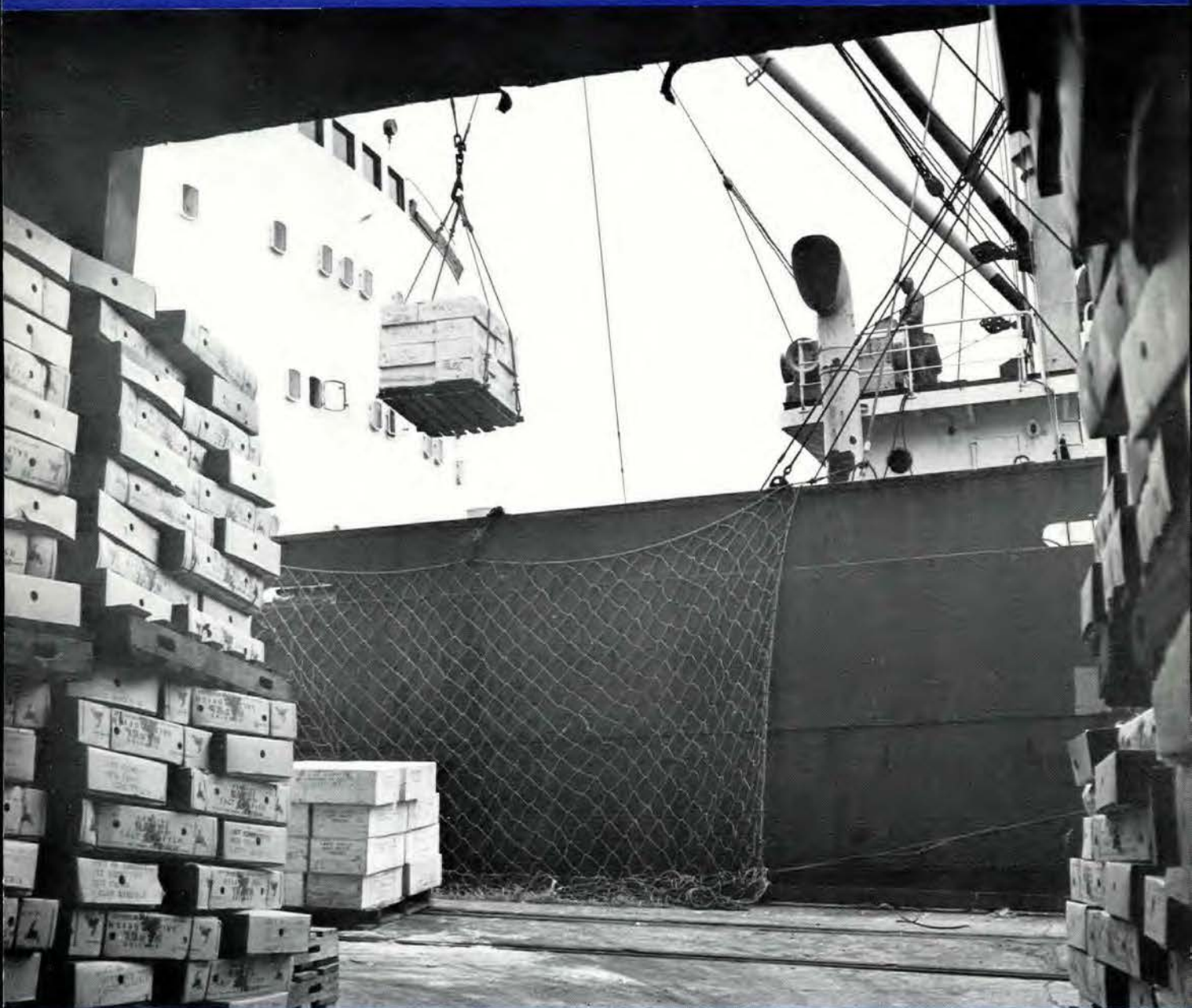


FISHERIES

(formerly Trade News) OF CANADA

Vol. 21 No. 6

Dec. 1968



In This Issue

- ★ Minister Urges International Co-operation
- ★ Canada Sends Fish to Nigeria-Biafra
- ★ Fisheries' Seal Denotes High Quality Fish

Department of Fisheries of Canada, Ottawa

FISHERIES OF CANADA

(formerly Trade News)

Editor

E. H. HEARNDEN

Dec. 1968

C O N T E N T S

FEATURES

'Fisheries of Canada' Seal Denotes High Quality Fish	8
Canada Sends Fish to Nigeria-Biafra	10
Scientists Take Fish Census for Future Harvests	12
Time, Gentlemen, Please!	15

NEWS ITEMS

Minister Urges International Co-operation	3
Fish is 'Magic' Food for Weight Watchers	4
Insurance Plan Cut	6
Urges Global Pact to Curb Marine Pollution	7
Aid for Indian Fishermen	7
Fisheries Conservation in the North Pacific	8
Mactaquac Fish Culture Station Officially Opened	9
TBTO - A Safe, Effective Treatment for Lobster Traps	14
U.S. to Build FPC Plant	14
Trawler to Test New De-Icing Device	16
A Salmon for the Prime Minister	16

FISHERY STATISTICS	17, 18
--------------------------	--------

CURRENT READING	19
-----------------------	----

COVER PHOTOGRAPH - Boxes of Canadian salted codfish are loaded aboard the freighter "Silver Crest" at Halifax for shipment to victims of the Nigerian civil war. The shipment, amounting to some 3,000 tons of fish, left Halifax in mid-October. Further details on page 10.

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Minister Urges International Co-operation

The need for close co-operation between Canada and the United States to ensure better management of the fishery resources of our continental shelf was expressed by the Hon. Jack Davis, Canada's Minister of Fisheries, addressing the American Commercial Fish Exposition, 68, in Boston.

Mr. Davis said that while Canada's exclusive fishing zone had been pushed out to the 12-mile limit, he felt

that the whole of the continental shelf should be subject to better management and conservation practices. In some places, such as the Grand Banks, the edge of the shelf extends hundreds of miles out into the Atlantic.

Mr. Davis expressed concern about the survival of the well known "bread and butter" species like the cod and the haddock which are being caught by our own fishing fleets using better gear. However, of greater concern, he said, was the assault by the "new, large and expanding fishing fleets from Russia, Poland and East Germany.

"Surely we are prepared to lead an international crusade which will make sure that we are not going to destroy the supply of some of these higher species for all time to come" he said. "What remains to be done now is to define the extent of this interest, not simply in terms of exclusive zones, but also for purposes of conservation — effective conservation — and good economic management as well".

Mr. Davis described the economic problems in the Canadian fishery and said they paralleled many in the U.S. He said that in some areas of Canada it was easier to



A section of the Canadian exhibit at the American Commercial Fish Exposition, 68, held at Boston, Mass.

attract men to the industry as standards of living were lower than in the affluent society which existed elsewhere. In most areas of the U.S. and Canada there was little incentive or appeal to enter the industry, as wages were higher in other fields. This was a problem he said, "when we have to compete with other fishing nations whose standards of living are a fraction of our own, and whose fishing fleets frequently operate without due regard to costs and the incomes which they can earn by selling their fish in the markets of the world".

Canada is launched on a program to make the fishing industry self-sustaining, Mr. Davis said.

"Our commercial fishery, like any other industry, must make a profit for the Canadian community as a whole. It must generate more benefits than costs, it must pay taxes and not deduct too many tax dollars. It must pay its way and not constitute a net burden on the Canadian community as a whole", he said.

FREE ENTERPRISE

Declaring himself dedicated to the free enterprise system, Mr. Davis said he believes that competition is "the best insurance that the consumer at the market end of the line will get his fish at lowest possible price". He added that too many obstacles to free enterprise, to free trade and to the effective marketing of fishery products exist.

"These barriers should be torn down, so that all these forces should be free to work for the common good. He said he had nothing but praise for the Kennedy Round—"for the series of negotiations and recent agreements which are doing much to reduce trade barriers, not only between Canada and the United States, but between our two countries and the rest of the world as well .

"Costs are coming down and prices are coming down and I hope that we will continue to press on—to press for more international red-tap-cutting, tariff-reducing, quota-eliminating understandings of this kind", he said.

Mr. Davis paid tribute to the quality control measures taken by Canada to ensure that the consumer received a high quality product on his table. He said Canada's fisheries scientists were carrying on experiments and research that would ensure world firsts, referring specifically to the world's largest salmon hatchery and rearing station at Mactaquac, New Brunswick, which he officially opened October 18. He said the hatchery was geared to produce 500,000 smolts annually.

Mr. Davis urged that the U.S. understand Canada's conservation programs and join with it in managing and preserving all off-shore fisheries as well as common inland fishing grounds. He said Canada's approach to international fisheries problems was one of broadening limits, not only the limits of exclusive fishing zones, but also the horizons of mutual assistance and co-operation in the area of marketing as well.

Fish is 'Magic' Food For Weight Watchers

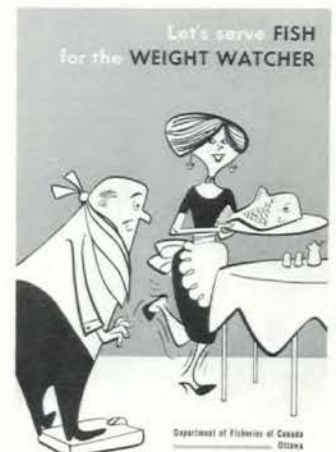
Among the most enthusiastic supporters of Canada's annual "Fish 'n' Seafood" month is an organization known as the Weight Watchers.

For them, fish is a "magic food".

In a recent letter to federal Fisheries Minister Jack Davis, Sheldon Reich, director of Weight Watchers of Montreal, points out the importance which the Weight Watchers have placed on the consumption of fish in their program.

"Our members are compelled to eat at least five fresh fish meals per week, for we have found fish to be a 'magic' food for a 'a slim, healthy life'" Mr. Reich says.

Weight Watchers, Mr. Reich adds, is an international organization in the weight reduction field with a membership of about 2,000,000 throughout the world and about 40,000 in Canada. Weight Watchers' activities consist of a carefully-planned eating program and regular attendance at weekly classes, designed to enable the overweight person to reach a realistic weight goal and maintain it.



The Department of Fisheries has for some years promoted fish as a low-calorie diet food through the booklet "Let's Serve Fish for the Weight Watcher". This booklet, which lists the species of fish low in fat content together with more than 50 appetizing kitchen-tested recipes, is obtainable free of charge from the Information and Consumer Service, Department of Fisheries, Ottawa.

'Fisheries of Canada' Seal Denotes High Quality Fish

BY J.G.K. BARRIE

THE truck bearing Canadian licence plates slows to a halt at the Canada-United States border. As the Customs Officer approaches, he spots the loading door seal reading "Fisheries of Canada". He knows another shipment of high quality whitefish from Canada will soon be on its way to the ready American market. The driver hands him the Certificate of Inspection and he sees this particular shipment of fresh fish came from Yellowknife in the Northwest Territories and is bound for market in New York.

The story behind the Fisheries of Canada seal and the Inspection Certificate had its beginning hundreds of miles away in the freshwater lakes of the Central Region. From the moment the fisherman removed the whitefish from his nets, it was a race against time to get the fish to market as quickly as possible. Co-operating with the fishermen were the packing plant, transportation companies and a member of the field inspection staff of the federal Department of Fisheries, who inspects and certifies the quality of the fish before it is exported.

The inspection techniques used by the field staff are constantly under review with an eye to improvements. For example a scientific method using ultrasonic waves to test for quality is a project of the Fisheries Research Board's Freshwater Institute in Winnipeg. While results and tests are promising, nothing as yet has replaced the experienced hand and trained eye of the qualified field staff. Perhaps the best tribute to these high standards is reflected in the quality found in fish shipments approved for export.

The present practice of sealing trucks carrying export fish is a new development that is proving successful to all concerned in getting the product to United States markets. Prior to July, 1968, when seals were first placed on export shipments, the Department of Fisheries of Canada and the U.S. Food and Drug Administration shared a common concern about the quality of whitefish arriving at American distribution points. Of particular concern was whitefish, since this species accounts for the



A Department of Fisheries officer has carried out an inspection of a consolidated shipment of fish at a Winnipeg fish plant. It will be sealed and only opened at its destination in Newark, New Jersey, several hours later.



Fishery officer affixes seal to shipment of whitefish bound from Yellowknife, NWT, to the Chicago market.

greatest volume in the total of all freshwater fish shipped to the United States.

Yet on arrival in the United States the fish in a considerable number of shipments had failed to meet the U.S. standards of quality. This fact prompted the U.S. Food and Drug officials to re-examine a high percentage of the Canadian inspected and certified fish before accepting shipments in their consumer markets. This duplication of inspections was not only time consuming, but expensive as well.

As a result of a meeting between the two departments concerned, it was agreed that whitefish passing the Canadian standards of inspection, would be shipped into the United States by a transport vehicle that was sealed by Canadian fisheries officials. The signed certificate of inspection accompanying each shipment bears the seal number and date, together with other pertinent information. If, for any reason, the seal has to be broken, it must be done by a fisheries officer or customs official.

The Department of Fisheries maintains twelve offices in the Central Region staffed by qualified permanent inspectors. When they affix the "Fisheries of Canada" seal on a truckload of fish, it is like a badge of merit, for it signifies another shipment has met the exacting requirements of the Department of Fisheries. No better guarantee of quality can be obtained for the product.



Fishery officer hands the driver a certificate of inspection bearing date, time and number of the seal. He is now cleared with the Department of Fisheries to make a fast run to Chicago with his shipment of quality whitefish.



Field staff of the Department of Fisheries pay special attention to refrigeration of fish during transit. Here an officer checks to see the setting is at the desired -15 degrees F. This will be frequently checked by the transport company en route and by U.S. officials at the destination point.

Insurance Plan Cut

Immediate discontinuance of an experimental low-cost federal insurance plan to fishermen which gave them coverage for loss of their fixed fishing gear such as weirs, fish traps, working and storage buildings and equipment stored in them was announced October 25 by Federal Fisheries Minister Jack Davis. He said the reason for the abandonment of the plan at this time was insufficient participation by fishermen.

The Fixed Fishing Gear and Shore Installations Indemnity Regulation, which became effective on a trial basis in most provinces on February 1, 1966, was designed to be self-supporting. But since its inception losses have been greater than expected and the plan has been running at a deficit.

During the 1967-68 period fishermen in the provinces covered by the plan purchased 350 policies for a total insured value of \$718,295, Newfoundland and Nova Scotia being the provinces where the most policies were taken out. In the same period total claims paid out amounted to \$26,313. Total of premiums collected was \$7,089.

All existing policies will be honoured but there will be no renewals after they have expired.

Urges Global Pact to Curb Marine Pollution

The need for a global pact to control the growing menace of oil and all other forms of marine pollution, including the dumping of pesticides and other radioactive wastes, has been urged by an official of the Food and Agriculture Organization of the United Nations.

Roy I. Jackson, FAO Assistant Director-General for Fisheries, said international legislation must be broadened and strengthened to forestall not only "accidental" pollution, as typified by the Torrey Canyon oil tanker disaster, but all other types including release of "potential pollutants" and "deliberate use of ships to discharge pollutants of all kinds into seas and coastal areas."

Addressing the Third International Conference on Oil Pollution of the Sea in Rome, Mr. Jackson called for a world-wide monitoring system including use of "unmanned oceanographic buoys" and space satellites to gather information on the discharge of pollutants into the sea.

Suggesting that this information be incorporated in a broad international convention, he said:

"I believe the time has come to consider the formulation of such a convention, with reference to reporting discharges, controlling, restricting or prohibiting deliberate discharges of specified noxious substances and to the problem of monitoring and enforcement."

Such a pact, he added, should provide for a permanent commission or other machinery to ensure its continued enforcement and effectiveness, and to identify "particularly noxious substances" and means for their control.

In stressing the need for such a pact, Mr. Jackson noted that the United Nations Geneva Conventions of 1958 on the law of the sea cite pollution but do not provide for reporting or control. He added that the oil pollution convention of the Inter-governmental Maritime Consultative Organization (IMCO) also does not fully meet the standards for pollution control.

He said the Torrey Canyon disaster, in 1967 off the coast of England, "did more than anything else to draw public attention to the dangers and consequences of accidents."

Pollution, he emphasized, was not limited to oil contamination but also involved industrial discharges of toxic chemicals and other wastes, dumping of radioactive materials, and normal sewage discharge.

Mr. Jackson told the three-day Conference that FAO had summoned an International Conference in 1970 to discuss the effects of pollution on fishing.

Aid for Indians

The appointment of a five-man Board to administer a new federal assistance program for Indian fishermen in British Columbia has been announced jointly by Hon. Jean Chretien, Minister of Indian Affairs and Northern Development, and Hon. Jack Davis, federal Minister of Fisheries.

Under this program, loans and grants will be paid to British Columbia Indians for the construction and purchase of fishing vessels, equipment, gear and shore facilities, and for fisheries training courses. The program, to cost \$4.6 million, will be phased over a five-year period. Funds will be provided by the Department of Indian Affairs and Northern Development.

Members appointed to the Indian Fishermen's Development Board are: James Gosnell, a native Indian of Aiyansh, B.C.; Robert Clifton of Comox, B.C., past president of the Native Brotherhood of British Columbia; T.F. Rothery, Development Officer with the Indian Affairs Branch, Vancouver; Leo Holthe, Manager, Gulf and Fraser Fishermen's Credit Union, Vancouver; and R.E. MacLaren, Assistant Regional Director, Department of Fisheries, Vancouver.

The Board elected Robert Clifton as chairman at its inaugural meeting November 8, and set up procedures for processing applications under the program. Requests from Indian fishermen for information should be addressed to: "Indian Fishermen's Assistance Program, 1155 Robson St., Vancouver 5, B.C."

MESSAGES TO THE NORTH

The Canadian Broadcasting Corporation has issued a reminder to those who have friends or relatives living in parts of northern Canada beyond reach of regular mail service, of the CBC's Northern shortwave service.

The CBC Northern Messenger, a program broadcast twice daily Monday to Friday, invites letters and messages for relay by shortwave. Messages for broadcast in French or English should be mailed to: CBC Northern Messenger, P.O. Box 6000, Montreal, P.Q.

Fisheries Conservation in North Pacific Ocean

The International North Pacific Fisheries Commission concluded its Fifteenth Annual Meeting at Seattle, Washington, November 8, 1968. The final plenary session of the Commission marked the conclusion of three weeks of study and discussion of various aspects of international co-operation for the conservation of high seas fisheries resources in the North Pacific Ocean.

During the two weeks preceding the opening of the annual meeting, scientists from Canada, Japan, and the United States reviewed the results of research carried out by the three countries in 1968 on the salmon, halibut, king crab, and groundfish resources and prepared summary reports of their findings for the Commission's guidance. The scientists also exchanged information on high seas fishing operations during 1968.

The Commission operates under the terms of the International Convention for the High Seas Fisheries of the North Pacific Ocean, which was signed by the three governments at Tokyo in 1952. The Convention provides for several kinds of action designed to ensure the maximum sustained productivity of the fishery resources of the North Pacific Ocean. In the case of fishery resources which are exploited by fishermen of two or more of the member countries, the Commission studies the need for conservation measures. These needs are indicated by the results of scientific research. If after a comprehensive study the Commission finds such measures necessary, it recommends specific actions to the member governments. They in turn include these measures in their domestic fishing regulations. For certain resources which the Convention characterizes as being already under full exploitation and under an effective program of research and management for conservation, the Convention provides that member countries which have not previously participated in the fishery for such resources will refrain from doing so.

ABSTENTION PROVISIONS

Under this provision Canada abstains from exploiting salmon in the eastern Bering Sea, and Japan abstains from fishing for salmon in the eastern North Pacific and Bering Sea east of 175°W. longitude. Japan also abstains from fishing halibut in the northeastern Pacific south of the Aleutian Islands and the Alaska Peninsula and from fishing for herring off most parts of the British Columbia coast. The Commission recommended no changes in the abstention provisions of the

Convention at this year's meeting. At the same time the Commission adopted a resolution recommending that the governments of the contracting parties give full consideration to the conservation needs of salmon stocks in the areas of intermingling when preparing fishing regulations for future operations.

One of the principal tasks on the Commission's agenda was to develop a set of halibut fishing regulations for the halibut fishery of the eastern Bering Sea in 1969. The Commission has been performing this function since 1963, when line fishing for halibut in that area first became open to fishermen from all three countries. For 1969, the Commission recommended conservation measures similar to those in effect in 1968. The Commission recommended that an extensive area in the southeastern Bering Sea which is a nursery ground for young halibut be closed to halibut fishing completely. The Commission was assisted by a consultant from the scientific staff of the International Pacific Halibut Commission.

In the Gulf of Alaska, the Commission's studies were focused on the effects on the halibut stocks of the expanding trawl fisheries for other species. Groundfish catch statistics were exchanged, and studies by the scientists of the three nations. The Commission approved a number of recommendations by its Gulf of Alaska Groundfish Committee for further research in this field. The Canadian and United States Sections of the Commission urged that greater efforts be made to obtain additional data on the inter-relationship of the trawl and longline halibut fisheries.

OCEAN PERCH STUDY

In its consideration of research on groundfish other than halibut in the northeastern Pacific Ocean the Commission approved the selection of Pacific ocean perch as the first species to be studied. Agreement was reached for an exchange of research data covering this species.

After reviewing the results of research on the king crab resources of the eastern Bering Sea, the Commission considered that the existing bilateral regulatory measures for king crab in the eastern Bering Sea, as a whole, are not adequate and agreed to forward its findings to the three Governments.

The Commission also received a request from the

Continued on page 9

Mactaquac Fish Culture Station Opened



Federal Minister of Fisheries and Forestry Jack Davis (left) joins forces with the Hon. H. Graham Crocker, Chairman of the New Brunswick Electric Power Commission, in a tape-snipping ceremony marking the official opening of the \$3.5 million Mactaquac Fish Culture Station, near Fredericton, N.B. A plaque commemorating the event was unveiled by the Hon. W.S. Bird, Lt.-Governor of New Brunswick (right). A two-day 'open house' was held at the station October 19 and 20, when the general public was invited to inspect the facilities.

INPFC Meeting

Continued from page 8

United States Government that the Commission undertake a study of the tanner crab resources of the eastern Bering Sea. The Commission agreed to initiate such a study.

The Commissioners reviewed the progress during the years of the Commission's program for publication of scientific reports written by scientists of the three countries. A number of major papers resulting from the Commission's research were published in English and Japanese versions in the INPFC Bulletin, including the

completion of a nine-part comprehensive report on North Pacific salmon.

Edward W. Allen was Chairman of the Commission at the 1968 annual meeting. New officers elected for 1969 are: S.V. Ozere of Canada, Chairman; Kenjiro Nishimura of Japan, Vice-Chairman; and Edward W. Allen of the United States, Secretary. Other members of the Commission are James C. Cameron, Carl E. Giske, and Donovan F. Miller for Canada; Yoshio Ohkawara, Shinji Miyoshi and Isamu Ikezaki for Japan; and Clarence F. Pautzke, Roger Kent and Fred P. McGinnis for the United States. The Commission agreed that its next annual meeting would be held in Vancouver, beginning November 3, 1969.

Shipment Totals 3,000 Tons

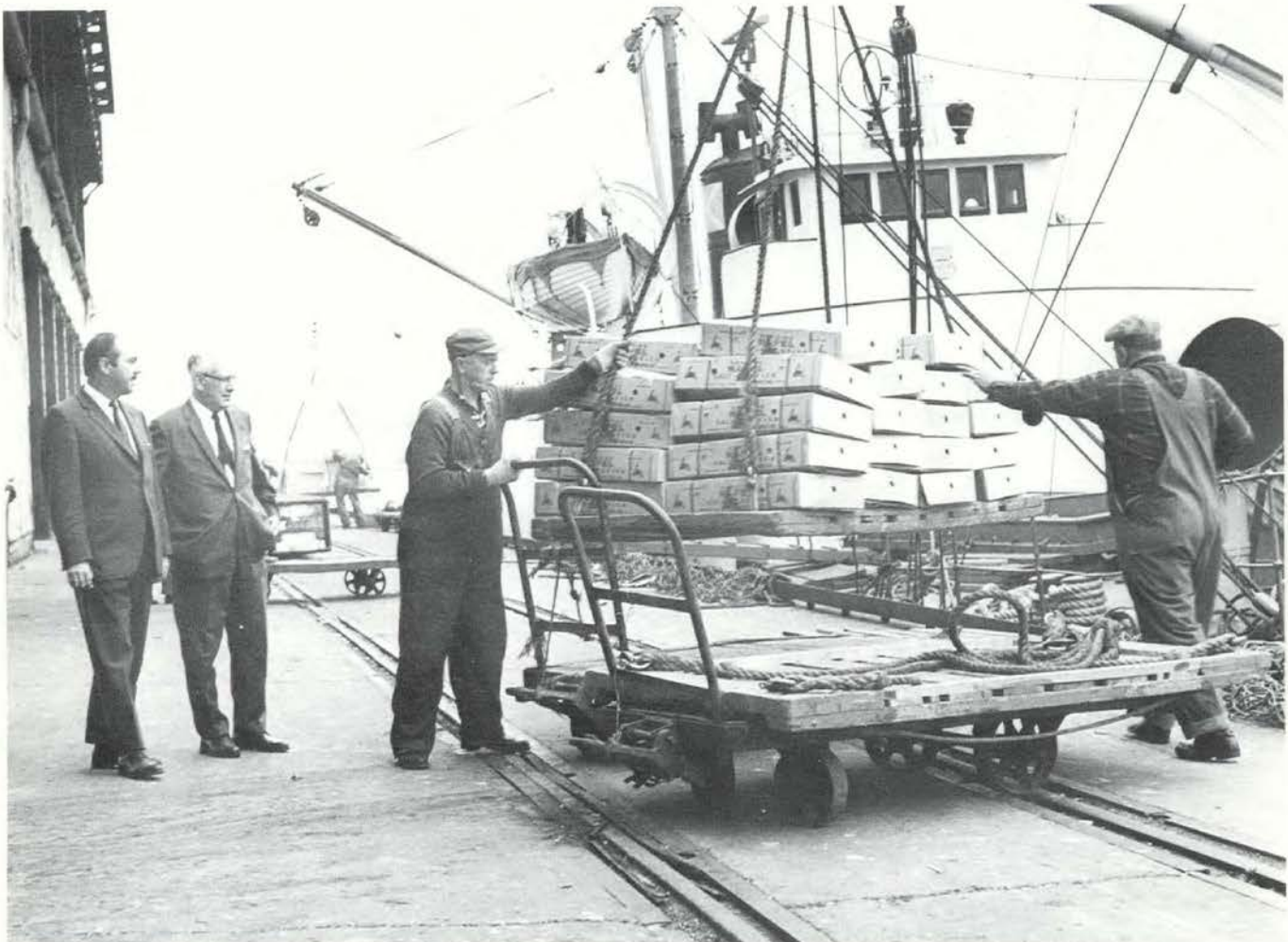
Canada Sends Fish to Nigeria - Biafra

More than 11,000,000 pounds of fish caught by Canada's East Coast fishermen is destined for the Nigeria-Biafra war zone to help alleviate starvation among the civilian population there.

A shipment of 6,500,000 pounds of salted codfish was loaded aboard the freighter *Silver Crest* at Halifax in mid-October; three sevenths of the mercy cargo is to be landed at the island of Fernando Poo for delivery to

Biafra and the remainder delivered at Lagos for distribution in Nigeria.

This shipment represents the entire 1967 surplus stock of salt fish purchased last July by the Fisheries Prices Support Board and is worth more than \$1,000,000. Some 650 tons of the total shipment were paid for by the Canadian Red Cross and various church groups and volunteer organizations, while the remainder was a con-



Part of a 3,000-ton shipment of Canadian dried salt fish for Biafra-Nigeria relief is unloaded from a Newfoundland freighter at Halifax. The shipment was delivered at Fernando Poo and Lagos last month.



Boxes of dried salt codfish are piled high in a Halifax warehouse before being loaded aboard a freighter bound for Nigeria. The 3,000-ton relief shipment from Canada is believed to be the largest assembly of salt fish ever seen on the East Coast.

tribution from the Canadian Government through the Canadian International Development Agency (formerly the External Aid Office).

Most of the salt fish had been held in storage at various places in Newfoundland and was transported from there to Halifax for shipment to Nigeria-Biafra. It is believed to be the largest assembly of salt fish ever seen on the East Coast.

On November 1, Fisheries and Forestry Minister Jack Davis announced that the Fisheries Price Support Board will call tenders for the supply of an additional

5,000,000 pounds of salted fish for Nigerian-Biafran relief, to be delivered early in 1969.

Mr. Davis said the new requirements will be drawn from stocks of fish still in the hands of East Coast fishermen. Suppliers of the salted fish would be required to buy equivalent quantities of the raw material from fishermen after November 1, 1968.

Dried salted fish, because of its high protein value, is a prime food requirement of relief organizations operating in Nigeria and other countries which are recipients of Canadian aid.

Scientists Take Fish Census for Future Harvests

BY J.G.K. BARRIE

"What will the freshwater fishing be like next year?"

If there is an answer to this question, it would probably be on file at the Fish Population Dynamics Section of the Fisheries Research Board's Freshwater Institute, located in Winnipeg, Manitoba. Both the question and answer is the subject for continuous research at the Freshwater Institute by those engaged in taking fish populations census, and tabulating the total resources of lakes, in order to arrive at a factual inventory. From these figures, trends in growth and related influences may be forecast.

It is no small task to take a census of the fish population of any freshwater lake or stream. However, the responsibility for this and that of gathering other scientific data is the concern of Dr. Lionel Johnson, Scientific Leader of the Population Dynamics Section, and his group of fellow scientists. Their continuing interest probes beyond the fish population of a lake to the study

of water temperatures, plant life and even the biography of a lake. Of prime concern is the amount of fish food in any lake and whether there is sufficient to support a greater and more varied fish population than is presently found there. To seek these answers, science moves to the field.

Preparation for a scientific field trip, during which a population census is taken, begins months in advance of the target date. Basic objectives are agreed upon by the Fisheries Research Board in Ottawa and the Freshwater Institute in Winnipeg. Once these have been established, Dr. Johnson and his group study and recommend a certain area of geographical location and lake that will probably be the one most likely to provide the clearest answer to the questions they pose. One project need not entirely be limited to one lake but may require several field trips to many lakes before the plan is completed. This scientific searching could also take as little as one month,



Conrad W. Haight and assistant Hugh Trudeau prepare to lower hand dredge for sediment samples from the bottom of Lake Kakisa, N.W.T., as part of a Fisheries Research Board of Canada investigation.

or as much as twenty years, before the final answers are found.

The field operation really begins to take form when the point is reached where scientists are assigned to the project and assistants are appointed. Then comes the vast amount of administrative and practical details involved in making sure food, clothing, shelter, boats, motors and fuel as well as the necessary scientific equipment will be on hand, at the right moment, at the base campsite. All must be ready and waiting to be moved quickly when word comes that conditions to proceed with the work are satisfactory. Determining factors in setting this time is the spawning season, high waters, or late ice break-up—all playing a part in the proper timing for the field trips.

For example, this year the continuing program being carried on at Great Slave Lake in the Northwest Territories was delayed due to late ice break-up in June. Conditions seemed right at nearby Kakisa Lake so word was given to proceed with the project planned for this lake.

The research team from the Fisheries Research Board unit at Hay River did not take long to set up their base camp and soon were ready to begin the tests that had been carefully planned seven months before. Their objectives were to take the census of the fish population of Kakisa Lake and record the facts by species, size and

weight. At the same time, samples of the lake water from specified depths were to be taken, as well as plankton specimens and samples of lake bottom sediment.

To take a census, nets with different gauges of mesh are set in predetermined areas of the lake and are lifted exactly 24 hours later. The catch is measured, counted and weighed by species. When different gauged nets are used, the growth and age of the fish can be determined and recorded for statistical use. Next, a few handfuls of the sediment of the lake bottom are taken by means of a small hand-operated dredge. This mud will later tell the scientists something of the history of the lake, what fish food and plant life will grow, any trace of pollution as well as other information.

As soon as the samples have been taken, the data recorded and the statistics listed, they are forwarded to the Freshwater Institute Laboratories in Winnipeg. Here, scientists of the Fish Population Dynamics Section begin to search out and interpret every shred of scientific evidence the results contain. By means of graphs and computers, a picture of the past, the present and for the future begins to take form. It is exacting work and could mean that after a month of probing results, only one or two unrelated facts emerge. However, when these are placed with others and brought together in the master plan, it will be another step in answering the question: "What will the freshwater fishing be like next year?"



Lone flag on lake bearing letters "FRB" tells commercial fishermen nearby that scientists are at work.



Manson bottles tell scientists about water temperature and fish food at different depths.

TBTO – A Safe, Effective Treatment for Lobster Traps

The use of a new chemical, known as bis (tri-n-butyltin) oxide, to protect wood from marine borers was described in the October, 1968, issue of FISHERIES OF CANADA. Recently completed tests to evaluate this material (referred to as TBTO) for the treatment of lobster traps are reported here.

BY D.G. WILDER and U.J. WALSH
Fisheries Research Board of Canada Biological Station,
St. Andrews, N.B.

The Canadian lobster fishing seasons are so regulated that in most areas lobsters are fished during the cooler months when damage from shipworms is not a serious problem. In the northern half of Northumberland Strait, however, the lobster fishing season is from August 10 to October 10. During this warm water period, shipworms may cause extensive damage to lobster traps. To avoid such damage, many fishermen in this area dip their traps in hot or cold tar shortly before the season opens. This reasonably effective but rather unpleasant treatment is reported to cost about 15 cents per trap. Some fishermen claim that freshly tarred traps catch fewer lobsters.

To evaluate the TBTO treatment for lobster traps, 20 new traps were dipped for 2 minutes in a 0.5% mixture of TBTO in varsol. About 2 gallons of the mixture were used up at a cost of roughly 7.5 cents per trap for materials. The treated traps and 20 untreated but otherwise identical traps were fished together off Miminegash, P.E.I., throughout the August 10 to October 10, 1964, season. There was no appreciable difference in the catch of lobsters from the treated and untreated traps.

Too few shipworms settled during the 1964 season to enable us to judge the effect of the treatment. We therefore fished the same traps without further treatment throughout the 1965 season. At the end of the season, the untreated traps averaged 33 worm holes per lath, the treated traps only 2 – a reduction of 94%.

NO DAMAGE TO LOBSTERS

Further tests were carried out to determine whether lobsters caught in treated traps would pick up harmful amounts of poisonous TBTO. Lobsters were put in TBTO-treated traps that were then held for 1 to 4 days in tanks supplied with running sea water. Under these severe test conditions many of the lobsters weakened and died. However, when lobsters in treated traps were held in the sea for 2 days under actual fishing conditions, they showed no ill effects over a 3-week period. If TBTO is used ac-

ording to instructions, lobster traps can be treated with little risk of damage to the lobsters. It is not recommended for the treatment of lobster cars or tanks where the water circulation is so reduced that lobsters could be exposed to harmful concentrations of TBTO for extended periods.

If the lobster traps are dry when treated and fished only 2 months each year, a 0.5% mixture of TBTO gives good protection from shipworms at low cost and with little risk of injuring the lobsters. For the treatment of wet traps, those made of green wood or those fished for longer periods, a 1% mixture of TBTO is recommended.

U.S. to Build FPC Plant

Award of a contract for the first U.S. Government large-scale fish protein concentrate demonstration plant has been announced by Secretary of the Interior Stewart L. Udall.

The plant will be built and operated by Ocean Harvesters, Inc., at the Port of Grays Harbor, Aberdeen, Washington.

Operations are scheduled to begin during the 1970 fishing season. The plant will use the solvent extraction process developed by the Department's Bureau of Commercial Fisheries (BCF).

The purpose of the plant is to demonstrate the feasibility of this process and to obtain design, engineering, and economic information to serve as a basis for construction of commercial plants by private industry. It will not be a commercial production plant.

Secretary Udall has described fish protein concentrate as "a lifeline to the future" for the world's 1.5 billion undernourished, many of whom are suffering from protein-deficiency diseases.

CANADIAN PLANT

Cardinal Proteins, of New York, announced Nov. 14 that it planned to erect a \$5,000,000 plant to manufacture fish protein concentrate at Canso, Nova Scotia. Production is expected to start within 12 months.

The announcement stated that the new FPC plant will be located next to the recently-constructed Acadia Fisheries plant and will use by-products from there in the manufacture of protein concentrate for world markets.

Time, Gentlemen, Please!

An ingenious system developed by a Department of Fisheries technologist has provided a solution to a vexing problem common to the organizers of conferences.

The problem lies in the tendency of people who present papers to "go overtime". With definite time periods allotted to upwards of 30 speakers in the course of two or three days, the entire proceedings can be thrown out of balance if someone reading a paper ignores the clock, and it is embarrassing for the chairman to be forced to use his gavel.

An answer has been found by Georges Imbeault, of the Department's Industrial Development Service. Mr. Imbeault has acted as timer for four major fisheries conferences in the past three years, and at the same time has taped all speeches and discussions for future reference.

He controls the participants by a device he designed and constructed, which tells each one how much time he has left, and whether he should speed up or slow down.

Mr. Imbeault follows the speaker's progress on a copy of the paper being presented. A green light, easily



The console which warns a speaker by means of illuminated panels whether he must adjust the speed of his delivery. Figures at top give 60-second "count-down" at end of time limit.

visible to the man at the lectern, tells him he is still within his time limit; illuminated panels in the warning console give him a count-down on his last 60 seconds, and finally a red light tells him to stop, no matter where he is in the course of his submission. Another panel on the console lights up to warn the speaker when he is "off mike".

The success of this speaker control system has resulted in requests from several other government departments for the loan of Mr. Imbeault's services and timing equipment to help make their conferences run smoothly.



Georges Imbeault, of the Department of Fisheries' Industrial Development Service, at the control panel of the speakers' timing device which he designed for use at conferences.

Trawler Off to Iceland To Test New De-Icing Device

A British trawler set sail for Icelandic waters last month with her skipper instructed to find "the worst possible weather conditions".

As well as carrying out normal fishing operations, the 431-ton trawler *Boston Phantom* will be testing new de-icing equipment developed by a British firm. The vessel has been granted special dispensation by the Icelandic Government to fish within the Icelandic 12-mile limit.

The de-icing equipment, a pneumatic device operated by compressed air, is an adaptation of equipment used to clear ice from edges of wings and tail surfaces of aircraft.

The system consists of sets of neoprene rubber overshoes and facings laid over parts of the ship's superstructure, such as masts, mast-stays and bridgefront. When ice forms, the equipment is inflated by compressed air — it requires only a pressure of 15 pounds to the square inch — and cracks the ice. Tests at the climatic test chamber of the British Aircraft Corporation Ltd. at Weybridge, England, have shown that up to nine inches of ice can be cracked and removed from a dummy mast and bridgefront at temperatures minus 15° C.

A sample set of the de-icing equipment has been

tested in the low temperature laboratory of the National Research Council in Ottawa and results have been described as "quite promising". Further tests will be carried out by the NRC this winter, possibly with the equipment installed on a Canadian fishing vessel.

BTR Industries, developers of the equipment, estimates that it would cost about \$9,100 to fit the equipment to a modern side trawler. The equipment is demountable, enabling it to be stowed away in the ship or left ashore during the summer months. It takes about one hour to fit the device to a trawler mast-stay.

A Salmon for the Prime Minister



Pacific Fish Chart

A color chart showing various species of sea fishes of the North Pacific coast has been produced by Vancouver Public Aquarium. The art work is the creation of Mrs. Gladys Clawson, staff artist of the Aquarium.

The marine fishes of the North Pacific are numerous and highly varied. They range from the giant 45-foot basking shark to two-inch sculpins. Water temperatures along the Pacific coast of North America are remarkably uniform, and associated with this fact, a continuous fish fauna extends from Alaska to California.

The most important commercial species in the north temperate zone are Pacific salmon, halibut and herring. Albacore and barracuda are important farther south. The chart presents most of the species common to the northern zone.

The chart is priced at \$2.00 and may be obtained from Vancouver Public Aquarium, P.O. Box 3232, Vancouver 3, B.C.

The Prime Minister, the Rt. Hon. Pierre Elliott Trudeau, admires a 30-pound fresh B.C. salmon presented to him by federal Fisheries and Forestry Minister Jack Davis to mark Canada's annual Fish 'n' Seafood month, promoted throughout October.

Fishery Statistics

SEAFISH: LANDED WEIGHT AND LANDED VALUE

	May-September 1967		May-September 1968	
	Landings ¹	Value ²	Landings ¹	Value ²
	'000 lb.	\$'000	'000 lb.	\$'000
CANADA - TOTAL	1, 472, 813	106, 268	1, 658, 843	122, 372
ATLANTIC COAST - Total	1, 275, 272	64, 586	1, 449, 298	72, 639
Cod	393, 132	17, 645	421, 931	17, 639
Haddock	45, 153	2, 711	40, 777	2, 995
Redfish	104, 239	2, 730	134, 949	3, 506
Catfish	2, 957	93	4, 133	152
Halibut	2, 294	842	1, 831	700
Other Flatfishes	154, 104	4, 897	145, 863	4, 924
Pollock, Hake, Cusk	28, 823	1, 128	31, 609	1, 084
Other Groundfish	7, 300	92	5, 299	45
Herring & Sardines	443, 539	4, 733	567, 844	6, 149
Mackerel	18, 368	689	18, 287	704
Swordfish	5, 104	2, 168	5, 114	2, 567
Alewives	6, 501	104	7, 037	128
Salmon	6, 251	3, 063	4, 773	2, 305
Smelts	208	25	301	26
Other Fish	10, 161	275	9, 129	188
Lobsters	27, 312	16, 969	28, 309	17, 874
Clams & Quahaugs	3, 730	242	4, 019	280
Scallops	7, 272	4, 010	9, 732	8, 152
Other Shellfish	8, 824	415	8, 361	816
Misc. Items	-	1, 755	-	2, 402
PACIFIC COAST - Total	197, 541	41, 682	209, 545	49, 736
Pacific Cods	8, 313	679	9, 385	727
Halibut ³	21, 740	5, 480	24, 462	5, 913
Soles & Other Flatfishes	4, 630	314	6, 385	387
Herring	28, 478	483	367	28
Salmon	125, 114	33, 851	157, 768	41, 494
Other Fish	2, 588	102	6, 062	524
Shellfish	6, 678	772	5, 116	663
Misc. Items	-	1	-	-
BY PROVINCES				
British Columbia	197, 541	41, 682	209, 545	49, 736
Nova Scotia	445, 984	25, 242	518, 854	30, 145
New Brunswick	239, 668	7, 770	315, 014	9, 844
Prince Edward Island	27, 181	6, 421	34, 900	7, 435
Quebec	146, 380	6, 111	145, 336	6, 370
Newfoundland	416, 059	19, 042	435, 194	18, 842

¹ Fish and Shellfish only. ² All Products - Includes livers, seaweeds, tongues, scales, roes, skins, oil, seals, whales and bait worms. ³ Includes halibut landed in U.S. ports by Canadian Fishermen.

MID-MONTH WHOLESALE PRICES - SEPT. 1968

		Montreal	Toronto
		\$	\$
Cod fillets, Atl. fresh, unwrapped	lb.	.407	.490
Cod fillets, Atl. frozen, cello 5's	lb.	.322	.390
Cod fillets, smoked	lb.	.428	.507
Haddock fillets, fresh, unwrapped	lb.	.507	.633
Herring, kippered, Atl.	lb.	.281	.317
Mackerel, frozen, round	lb.	.200	.287
Lobsters, canned, Fancy	Case 48-1/2s	66.353	70.133
Sardines, canned	Case 100-1/4s	10.048	9.880
Halibut, frozen, dressed	lb.	.476	.523
Silverbright, frozen, dressed	lb.	.630	.650
Coho, frozen, dressed	lb.	.920	.953
Sockeye, canned, grade A	Case 48-1/2s	28.053	29.047
Pink, canned grade A	Case 48-1/2s	17.450	18.970
Whitefish, fresh	lb.	.499 ¹	.433
Lake Trout, frozen	lb.	.440	.547

¹ Dressed.

PRICES PER CWT. PAID TO FISHERMEN (Week ending Sept. 14th)

	1967	1968
	\$	\$
Halifax		
Cod Steak	5.25	5.75
Cod Market	5	5.5
Haddock	8.5	9
Plaice	4	4.5-5.25
Black's Harbour		
Sardines	2	-
St. John's, Nfld.		
Cod	-	3-4
Vancouver		
Ling Cod	10-16	8-16
Grey Cod	6.5-7.5	7-7.5
Soles	6.5-9.5	6-9.5
Salmon (Redspring)	40-79	48-85

Fishery Statistics

FROZEN FISH STOCKS AS AT END OF SEPTEMBER

	1967	1968
	'000 lb.	'000 lb.
TOTAL - Frozen Fish, Canada	111,203	113,837
Frozen - Fresh, Sea Fish - Total	81,738	89,637
Cod, Atlantic, Fillets & Blocks	11,476	20,249
Haddock, Fillets & Blocks	3,042	3,330
Rosefish, Fillets & Blocks	10,270	8,823
Flatfish, (excl. Halibut)		
Fillets & Blocks	10,756	7,391
Halibut, Pacific, dressed & steaks	1	9,078
Other Groundfish, dressed & steaks	14,050	1,747
Other Groundfish, Fillets & Blocks	9,584	6,082
Salmon, Pacific, dressed & steaks	11,577	19,651
Herring, Atlantic & Pacific	932	759
All Other Sea Fish, all forms	7,731	8,485
Shellfish	2,320	4,042
Frozen - Fresh, Inland Fish - Total	10,015	9,218
Perch, round or dressed	2	763
Pickrel (Yellow & Blue) fillets	1,323	669
Sauger, round or dressed	762	551
Tullibee, round or dressed	214	219
Whitefish, round or dressed	1,521	1,716
Whitefish, fillets	282	162
Other, all forms	5,913	5,138
Frozen - Smoked Fish - Total	1,657	2,366
Cod, Atlantic	498	1,064
Sea Herring, kippers	724	685
Other, all forms	435	617
Frozen For Bait and Animal Feed	17,793	12,616

¹Confidential - Included with "Other Groundfish, dressed and steaks".

²Confidential - Included with "Other, all forms".

SALT FISH STOCKS AS AT END OF SEPTEMBER

	1967	1968
	'000 lb.	'000 lb.
Salted and Pickled Fish, Atlantic Coast		
Wet-Salted - Total	50,346	39,646
Cod	44,293	33,229
Other	6,053	6,417
Dried-Salted - Total	16,259	9,864
Cod	15,575	8,685
Other	684	1,179
Boneless - Total	1,448	1,418
Cod	1,362	1,199
Other	86	219
Pickled - Total (barrels)	26,408	28,133
Herring	6,768	4,651
Mackerel	14,896	19,557
Alewives	4,744	3,693
Turbot	-	232
Bloaters (18 lb. boxes)	248,968	307,070
Boneless Herring (10 lb. boxes)	1	5,124

¹ Confidential

CANADIAN EXPORT VALUE OF FISHERY PRODUCTS MAY - AUGUST

	1967	1968
	\$' 000	\$' 000
TOTAL EXPORTS	77,752	90,285
By Markets:		
United States	57,521	70,806
Caribbean Area	6,301	4,852
Europe	12,050	11,741
Other Countries	1,880	2,886
By Forms:		
Fresh and Frozen	56,068	68,570
Whole or Dressed	14,746	16,578
Cod, Haddock, Hake	110	196
Halibut, Pacific	1,616	1,587
Salmon, Pacific	4,462	5,500
Swordfish	1,996	2,532
Other Seafish	3,156	2,897
Whitefish	1,395	1,553
Pickerel	650	751
Other Freshwater Fish, n.e.s.	1,361	1,562
Fillets, Blocks and Slabs	23,013	28,619
Cod, Atlantic	6,868	9,402
Haddock	2,935	3,133
Ocean Perch, Hake, Cusk, Pollock	3,341	4,253
Flatfish	5,996	7,124
Pickerel	698	951
Other Fillets and Blocks	3,175	3,756
Shellfish	18,149	23,097
Lobsters (in shell & meat)	14,084	14,607
Scallops	3,741	7,524
Other	324	966
Frozen Fish & Shellfish, pre-cooked	160	276
Cured	6,706	6,362
Smoked	463	644
Herring	204	359
Other	259	285
Salted, Wet & Dried	5,364	4,960
Cod	4,437	4,296
Other	927	664
Pickled	879	758
Herring	552	534
Mackerel	160	103
Other	167	121
Canned	8,499	7,386
Salmon	5,290	4,506
Sardines	1,737	1,492
Lobsters	945	908
Other	527	480
Miscellaneous	6,479	7,967
Meal	3,076	3,636
Oil	554	127
Other	2,849	4,204

Current Reading

CARP IN CANADA by H.R. McCrimmon. Bulletin 165 of the Fisheries Research Board of Canada, Ottawa. Price: \$2.00.

The author cites a threefold objective in writing this bulletin: (1) to document all known attempts to introduce the carp (*Cyprinus carpio*) into Canadian waters, (2) to define the 1967 distribution of the species, including reference to the origin of local populations, and (3) to appraise the present status and economics of the carp across Canada as a basis for its future management.

Established intentionally as a potential food fish in virtually all the major water sheds of the United States and in several Canadian waters, the carp's present distribution in Canada appears to have originated largely from plantings made in the Columbia, Mississippi, and Great Lakes basins. It is presently resident in the provinces of Quebec, Ontario, Manitoba, Saskatchewan, and British Columbia.

The author states that in spite of various recreational fisheries, the carp has not received general public acclaim as a sport fish in Canada, although angling, spearing and bow-fishing are increasing in popularity. He adds that public prejudice against the carp as a food and a sport fish which continues to hamper utilization of the species, can be overcome only by increased efforts in public education and product development.

The bulletin contains a summary of carp biology and is well illustrated.

HOW TO BUILD A FERRO-CEMENT BOAT by John Samson and Geoff Wellens. Published by Samson Marine Design Enterprises Ltd., Ladner, B.C. Price: \$9.75.

There's a saying – and many will vouch for the truth of it – that a boat is a hole in the water into which the owner continually pours money. The authors of this book contend that a ferro-cement boat, which they say can be built by any careful handyman in his backyard, is the cheapest floating hole afloat.

John Samson built his first cement boat in Canada – a 28-foot sailboat – some years ago, with

the result that he was inundated with requests for plans and construction details. Subsequently he formed a small company, engaged naval architects, and went into the business of supplying plans and building information for ferro-cement boats. The latest development is the writing of this book, with co-author Geoff Wellens, for the do-it-yourself boating enthusiasts.

Although aimed chiefly at amateur yachtsmen, the book includes plans for a variety of different types of craft, including a 38-foot salmon troller. A home-built hull for the latter class of vessel in ferro-cement is estimated to cost \$1,500.

The book is extremely well illustrated, in black and white and colour, and gives construction methods in detailed step-by-step fashion.

THE POLLUTION READER compiled by Anthony De Vos, Norman Pearson, P.L. Silveston, and W.R. Drynan. Published by Harvest House, Montreal. Price: \$3.50 paper; \$5.95 cloth.

The official report of the proceedings and background papers of the national conference on "Pollution and Our Environment", held in Montreal in 1966 under the auspices of the Canadian Council of Resource Ministers, is a formidable double volume running to some 2,000 pages. Most laymen interested in finding out more about pollution as it affects their daily lives would likely find this mass of information a highly indigestible package.

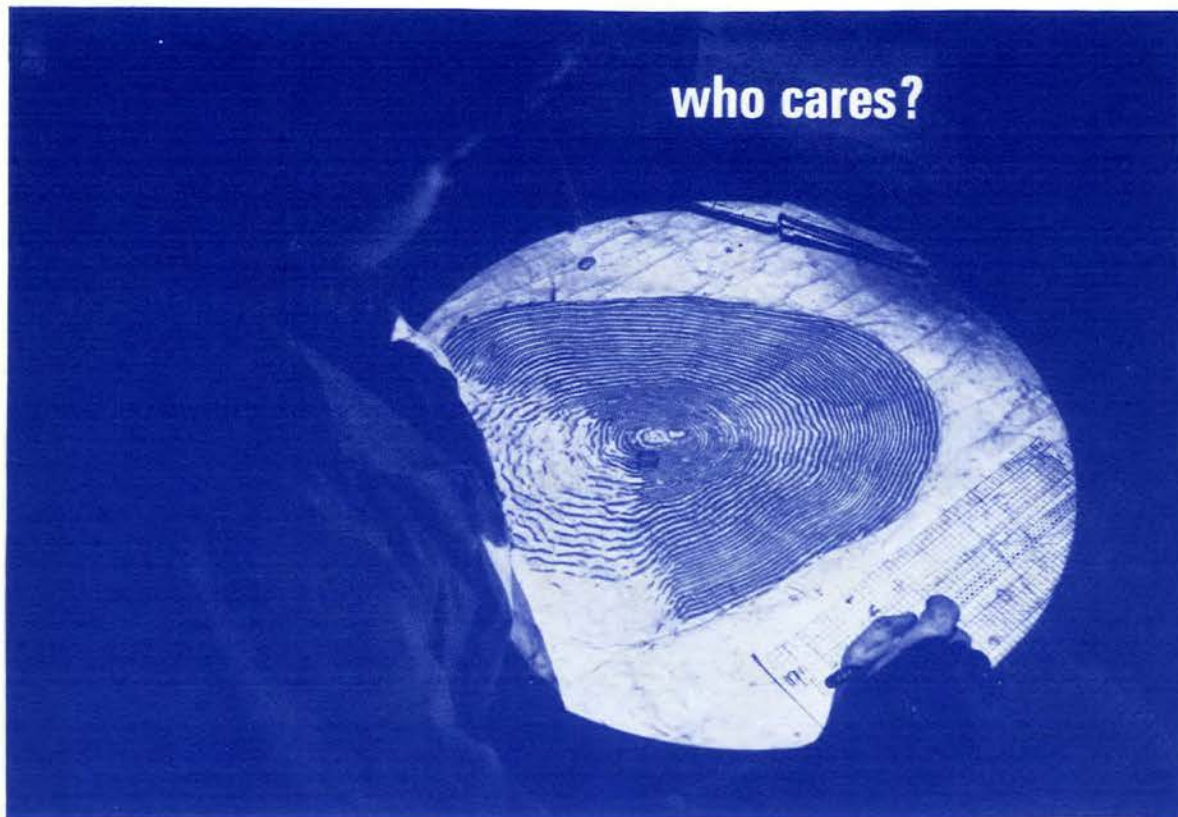
It is to the credit of the Montreal publishing firm of Harvest House, therefore, that they have been able to distill into 264 pocket-book-size pages the quintessence of the pollution problem in Canada and the measures for its control, as reflected in the work of the "Pollution and Our Environment" conference.

The difficult job of condensing and editing the original proceedings to produce the Reader was ably handled by four planners and scientists on the faculty of the University of Waterloo, who were also prominent contributors to the conference.

It is to be hoped that this "Reader" technique can be used to advantage on future occasions to bring the message of other important conferences closer to the general public.

how many rings on a fish scale?

who cares?



THE FISHERIES RESEARCH BOARD OF CANADA CARES



FRB scientists "read" a scale to determine the age and sometimes the origin of a fish. They add this information to other facts and come up with an amazingly accurate picture of fish populations, their movements, abundance and catch potential. This knowledge is vital to a wise administration of the fisheries.

The Fisheries Research Board is in the business of providing answers to the mysteries of our oceans and lakes. That's what fisheries research is all about!

But more: to maintain Canada's position in world fisheries and to maintain her prestige in the market places, science is being applied to

age-old problems of fish-handling and processing. FRB scientists pioneered refrigeration techniques and the use of antibiotics in fish preservation and they have developed new and improved fish products.

FRB oceanographers add yet another dimension to fisheries research in Canada. Their studies of waters as an environment for fishes are opening exciting avenues of knowledge that may yet make harvesting the seas as predictable and sure as harvesting land crops.

The Fisheries Research Board of Canada, established in 1898, assures the nation that Canada will continue to be a world leader in fisheries science!

DEPARTMENT OF FISHERIES

Hon. Jack Davis, M.P., Minister

Dr. A. W. H. Needler, Deputy Minister



Ottawa, Canada