International Council for the
Exploration of the Sea

C. M. 1984/F:35
Mariculture Committee

REPORT OF THE WORKING GROUP ON INTRODUCTIONS AND TRANSFERS OF MARINE ORGANISMS

Halifax, Canada, 17 - 19 May 1984

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WORKING GROUP ON INTRODUCTIONS AND TRANSFERS OF MARINE ORGANISMS

Report of a meeting, held May 17-19, 1984 at Halifax, Canada

The 1984 meeting of the ICES Working Group on Introductions and Transfers of Marine Organisms was held at tje Fisheries Laboratory, Fisheries and Oçeans Canada, in Halifax, Nova Scotia, Canada, from May 17 to 19, 1984. Fourteen participants representing 11 member countries were present:

C. J. Sindermann	USA (Chairman)
J. T. Carlton	USA (Rapporteur)
D. DeClerck	Belgium
R. A. Eisner	Canada
R. Drinnan	Canada
G. Turner	Canada
G. Bylund	Finland
H. Grizel	France
H. Rosenthal	Federal Republic of Germany
J. McArdle	Ireland
P. van Banning	Netherlands
E. Egidius	Norway
B. I. Dybern	Sweden
A. S. Munro	UK

In addition, a report from Denmark (V. H. Jacobsen) had been received and was presented by the Chairman. The members of the Working Group were welcomed by Dr. James Stewart, Director of the Fisheries Research Branch, Scotia-Fundy Region, Fisheries and Oceans Canada. The Chairman thanked Dr. Stewart for his remarks, and then reviewed the purposes and goals of the Working Group and of

this year's meeting. The Agenda for the meeting was considered and, after adjustments and additions, approved (Appendix I).

STATUS OF WORKING GROUP RECOMMENDATIONS OF 1983

The Chairman reviewed the status of recommendations formulated at the last meeting of the Working Group in Bergen, Norway in May 1983 (see 1983 Report, pages 55-57) and submitted for consideration at the 71st Statutory Meeting in Copenhagen in October 1983:

Recommendations 1 - 4

No resolutions passed. However, the Procès-Verbal de la Réunion for 1983 (ICES, 1984) states (p. 128) that "the report and recommendations, as amended", of the Mariculture Committee, "were adopted", although these recommendations are not enumerated in the Procès-Verbal. The Chairman and E. Egidius (Norway) will inquire if any of the Mariculture Committee recommendations so noted and adopted include any of those formulated by the Working Group and, if so, what their status is.

Recommendation 5

C. Res. 1983/2:37 passed, that the WG meet in Halifax, Canada, with terms of reference as detailed (see Appendix II).

The Rapporteur presented a "Checklist and Synopsis of Council Resolutions Pertaining to the Introductions and Transfers of Marine Organisms, 1969 - 1983," which is here included as Appendix II.

STATUS OF WORKING GROUP RESPONSES TO RESOLUTIONS APPROVED AT THE 1982 AND 1983 STATUTORY MEETINGS

Council Resolutions 1982/2:12 and 1983/2:37 call for the Working Group to complete or continue work on the following matters; the status of each is discussed below:

(A) Guidelines for Implementing the ICES Code of Practice Concerning Introductions and Transfers of Marine Species

As an augmentation and explanation of the Revised Code of Practice, the Working Group prepared and submitted to the Mariculture Committee proposed guidelines for implementing the Revised Code (CM 1982/F:33). A goal of the present Working Group meeting was to finalise and complete this document (C. Res. 1983/2: 37), whose publication in the Cooperative Research Report series was proposed (as Recommendation 1) at the Working Group meeting in 1983 in Bergen (this recommendation is again made herein under Recommendations arising from this meeting (q.v.)). The Working Group examined and discussed the Guidelines and a number of modifications, rewordings, and corrections were proposed to bring the Guidelines into a final state ready for publication. A.L.S.Munro (UK) prepared and submitted a partially revised protocol to obtain an F_1 disease-free generation for salmonid species whose introduction or transfer are contemplated. The Working Group then prepared a final draft of the Guidelines, which are now considered ready for publication.

(B) Protocols for Inspection of Marine Species Prior to Importation

A goal of the present Working Group meeting was to vigorously pursue the development and future of the "Protocols" document which has been discussed and worked on at several past meetings. It was felt that the scope and purpose of the Protocols should be more carefully defined, contents elaborated, authorship of sections assigned, and preliminary deadlines set. These goals were all achieved, and are discussed in more detail below.

(C) Expansion and Update on National Laws and Regulations Relative to Introductions and Transfers.

Representatives of each member country present at the meeting presented material relative to a proposed revision of the "National Laws and Regulations of ICES Member Countries Concerning Introductions and Transfers of Marine Organisms", dated 1981, and existing in two identical bound volumes (one deposited with the ICES Secretariat in Copenhagen, and one deposted with H. Rosenthal at the Biologische Anstalt Helgoland, Hamburg). Details are presented below.

(D) Continue the Oversight of Proposed and Ongoing Introductions and Transfers of Salmonid Fish in ICES Member Countries

(E) Prepare and Expand Case Studies of Introductions and Transfers

These are discussed in the appropriate sections within this Report.

(F) Consider the Genetic and Ecological Implications of Introductions and Transfers

This is discussed under the "Protocols" section, in part, below.

ICES REVISED CODE OF PRACTICE AND EIFAC ACTIVITIES

During discussions on the "Guidelines for Implementing the ICES Code of Practice" (above), and throughout the meeting, it was recognized that a number of changes in the concept and wording of the Revised Code have been proposed at Working Group meetings during and since 1980. These include two proposed minor title alterations, one to include the words "and Transfer" and another to delete the word "Revised" (for example, Recommendation 10.8 of the 1980 Nantes Working Group meeting (C.M.1980/E:60: page 24) (no Council action). These proposed changes which have accumulated over the past five years will be assembled and, along with other suggestions for incorporating new material into the Code, be brought together for consideration at the next Working Group meeting. Increasing interest in the Revised Code of Practice (for example, in Germany (Neudecker, 1981), in Chile (Augsburger and Gallardo, 1983), and by FAO/EIFAC) appears to make this particularly timely.

The recent and continuing interest by FAO's European Inland Fisheries Advisory Commission (EIFAC) in the ICES Code of Practice and the Guidelines document was discussed. Based upon the ICES Code of Practice developed by this Working Group, EIFAC has proposed a similar Code of Practice, modified in part for inland waters, but also containing a number of changes of a general nature in wording and in concept (EIFAC Report of the Working Party on Stock Enhancement, Hamburg, 16-19 May 1983). The EIFAC Working Party has noted in its Report the activities of the ICES Working Group in developing the Code of Practice and the complementary Guidelines for Implementation of the Code, as well as the activities of the Exotic Fish Section of the American

Fisheries Society (AFS) along similar lines. The EIFAC Working Party concluded "that the three organizations harmonize their Codes and Protocols so that they are essentially similar", that the EIFAC Working Party and the ICES Working Group "maintain close communication with each other, through exchange of working documents, correspondence between Chairman and periodic joint meetings as feasible," and that liasion by both working committees with AFS should be maintained.

The ICES Working Group felt that greater contact with the EIFAC Working Party on matters concerning introductions and transfers, especially relative to the development of codes of practice, protocols, and guidelines, is critical and timely, and noted that interaction with FAO was early encouraged by the ICES Council in Council Resolution 1970/2:12 (see Appendix II herein). H. Rosenthal (FRG) stated that he would be attending the upcoming meeting of EIFAC at its Thirteenth Session in Aarhus, 23-30 May 1984, and would take up the matter of greater interaction between the Working Groups, and the possibility of a joint meeting pending Council approval (see Recommendations arising from this meeting).

The Working Group then discussed methods by which greater dissemination of the Revised Code of Practice could be achieved. Members felt that representatives of each ICES member country could be encouraged to undertake any feasible steps to publicize the Code through appropriate agencies and channels (such as fishery laboratories, fishery agencies, aquaculture-mariculture facilities, marine research laboratories, national trade journals, and so on), by publishing both the Revised Code of Practice and an accompanying prefatory statement explaining the Code (this has been done, for example, by E. Egidius in Norway). Underscoring this was the consensus that widespread availability and widespread knowledge of the existence of the Code continued

to be relatively limited (recent publications appear to be limited to the Cooperative Research Report 116 (ICES, 1982), the European Mariculture Society Quarterly Newsletter 26 (Rosenthal, 1982), and Sindermann (1984)). Further discussion centered on the desirability of having the Code available in the languages of ICES member countries to ensure the greatest access, and that translation of the Code into these languages (which would include Danish, Dutch, English, Finnish, French, German, Icelandic, Norwegian, Polish, Portuguese, Russian, Spanish, and Swedish) should be encouraged. A Recommendation to these effects was formulated.

A STATEMENT OF PURPOSE AND OPERATING PRINCIPLES OF THE WORKING GROUP

At the 1982 Working Group meeting in La Coruna a statement of operational philosophy for the Working Group was developed into a working draft for the 1983 meeting in Bergen and a final draft was produced then for the 1984 meeting in Halifax.

The Statement of Purpose was the subject of several discussion sessions during the present meeting. As now developed, it is a synthesis of concepts developed since 1979 and of several documents and working papers prepared during and since 1982. It was decided to preface the Operating Principles with the Terms of Reference for the WG as specified in various Council Resolutions. Several minor changes of wording and concept were proposed which have been incorporated into the final document, which is here included as Appendix III. The Statement of Purpose is expected to undergo changes in the future, as new situations and new considerations arise, and as the Guidelines and Protocols documents evolve.

RELEVANT PUBLICATIONS

The literature on introductions continues to increase, and two lengthy lists of recent citations were submitted by J. Carlton (USA) and H. Rosenthal (FRG), in addition to references submitted with each National Report (below). An important general reference to appear soon is the edited volume of Courtenay and Stauffer (1984) on the "Distribution, biology, and management of exotic fishes."

All references and other literature materials submitted are assembled in the Appendix on Bibliography and Relevant Publications.

NATIONAL SUMMARIES

Reviewed below are recent data and information submitted by member countries on laws and regulations, exports, and introductions (deliberate, accidental, hatchery, and planned). Subject divisions are those of Cooperative Research Report 116, with the addition of category 3.1.5 (as outlined in Appendix II of CM 1983/F:27, WG Bergen Meeting), and with the new addition here of 3.1.6, Research Purposes (excluding use in hatcheries). References cited are found in the relevant appendix.

1.0 Relevant laws and regulations in ICES member countries

National laws and regulations relative to introductions and transfers of marine organisms were assembled in 1981 in response to ICES Council Resolution 1979/4:11 and brought together in a bound volume in 1982. These laws and regulations were outlined and presented by title in Appendix II of the Working Group's 1983 Bergen meeting report (CM 1983/F:27, pp. 62-66). The WG has since 1982 made an effort to update and expand this compilation, and the results are presented here in Table 1 (pp. 9-10 herein). The WG agreed that further attempts must be made to learn of the recent status of pertinent laws and regulations in those

Table 1.

1984 STATUS OF NATIONAL LAWS AND REGULATIONS OF ICES MEMBER COUNTRIES CONCERNING INTRODUCTIONS AND TRANSFERS OF MARINE ORGANISMS

Country	Date of most recent laws or regulations submitted to ICES	NOTES
Belgium	1976	Laws concern animal and public health control; there appear to be no laws on the control of introductions
Canada	1984	"Fish Inspection Regulations" amendments of October 1982 and January 1984 submitted
Denmark	1971	Order of 7 September 1971 on import of live oysters revised and effective 15 April 1984 (no copy submitted); concerns human health aspects (hygienics)
Finland	--	Laws prohibit introduction of any live fish (no copies submitted)
France	1984	Order #3297 (19 November 1981, replacing #2354) submitted; also a shellfish import regulation list amended 9 March 1984
FRG	1978	C.M.1981/F:46: p.2 (WG Sete meeting) refers to "a new regulation covering resources in coastal waters which also includes introductions" (no copy submitted)
GDR	--	--
Iceland	1970	"Law on salmon and trout fisheries"
Ireland	1959	Laws prohibit importation of all live fish and shellfish except under license. (1972 regulations?). The following was omitted from Appendix II(b) of C.M. 1983/F:27 (Bergen WG meeting): Ireland:"Fisheries (Consolidation) Act, No. 14, 1959".
Netherlands	1963 (1977 footnotes)	--
Norway	1978	New laws expected by 1985

Table 1
(continued)

Country	Date of most recent laws or regulations submitted to ICES	NOTES
Poland	---	---
Portugal	---	Laws concern animal and public health health control, not introductions
Spain	1970	New legislation (mariculture) in preparation.
Sweden	1983	Importation and transplantation of fish and shellfish without permission prohibited
UK	1980	(a) Schedules (Sections) 9, 14, 16, of Wildlife and Conservation Act of 1981 is in effect and pertains to introductions (no full copy submitted; parts of 14 and 16 appear on p. 13 of CM 1982/F:37 (La Coruna WG meeting)) (b) Diseases of Fish Act 1983 effective July 1983, fresh and saltwater fish imports may be subject to health regulations (no copy submitted)
USA	1981	---
USSR	pre-1980	---

countries which have either never submitted material or have not submitted legislation recently.

In addition to the material presented in Table 1, the following information is noted:

Canada

The discussion under "Canada" in the Bergen meeting WG report (CM 1983/F:27) should read as follows:

> "Revisions to the British Columbia Fishery (General) Regulations, Nova Scotia Fishery Regulations, Quebec Fishery Regulations, and Pacific Shellfish Regulations (see Appendix II(b), CANADA) were submitted, consisting of 1981 and 1982 amendments."

France

The "shellfish import regulation" document referred to in Table 1 is a list of "Especes et pays pour lesquels peuvent etre deposees des demandes de derogation a l'interdiction d'immersion des coquillages etrangers (application de l'article 2 de l'arrete du 21 novembre 1969)", modified 9 March 1984, (the order referred to is no. 4160 P.3), and consists of a list of 11 countries and the pertinent shellfish (mussels, clams, oysters).

UK

The Diseases of Fish Act 1983 became operational in July 1983. The principal powers of interest are that all fresh and saltwater fish imports may be made subject to health regulations. The absolute ban on live salmonid fish has been reversed, and such fish may be allowed entry subject to health protocols which are currently being drafted.

2.0 Other procedures concerning introduced species

Canada

The federal Department of Fisheries and Oceans is revising the "Fish Health Protection Regulation Manual of Compliance" (Miscellaneous Special Publication No. 31). It should be available by the end of summer 1984. This Manual explains the application of the Fish Health Protection Regulations under the Fisheries Act of Canada, and outlines the administrative and inspection procedures for handling fish to test for pathogens. (The title page, abstract, and contents of the current Manual are presented in Appendix IV herein. The Manual (old and new) may be purchased from: Printing and Publishing, Supply and Services Canada, Ottawa, Canada K1A 0S9).

France

France submitted a copy of a technical in-house ISTPM note, "...relative aux equipements des establissements agrees pour l'immersion de coquillages etrangers", which is reproduced here (Appendix IV) as a detailed example of regulatory procedures relative to introduction of exotic shellfish.

Ireland

Following the outbreak of Bonamia disease in England the importation of all molluscan shellfish into Ireland from England was prohibited. More recently Department of Fisheries officials went to England to visit one commercial hatchery and to discuss the situation with MAFF officials. As a result of these the matter is at present under review.

Ireland submitted copies of their technical requirements for the

regulation of imports of Atlantic salmon (Salmo salar) smolts and of Tilapia and red drum (Sciaenops ocellatus). As these are of general interest relative to the establishment of general procedures for such regulation, they are reproduced here in Appendix IV.

3.1.1. Deliberately introduced fish: fishery enhancement

See: Current Status of Proposed or Actual Introductions: Salmonid Fishes (this report).

USA

Turner and Snelson (1984) provide recent data on the population structure and biology of the brackish- and fresh-water pike killifish Belonesox belizanus, native to Mexico and Central America, in Florida.

3.1.2. Deliberately introduced fish: mariculture

See: Current Status of Proposed or Actual Introductions: Salmonid Fishes (this report)

Canada

Rainbow trout (Salmo gairdneri) are raised in several commercial operations under permit, as part of on-going commercial operations. Rainbow trout are used extensively in operations in New Brunswick, Prince Edward Island, and Nova Scotia as well as Quebec, and have begun turning up in west coast Newfoundland rivers. Initially (1980) numbers did not appear to be great, but in 1983 considerable numbers showed up in some west coast rivers (Dr. J. Pippy, Head, Freshwater and Anadramous Group, St.John's, Newfoundland). Local people

were out in considerable numbers to fish for these trout. Their origin is not confirmed.

Denmark

As a pilot experiment for ocean ranching, 1000 tagged Salmo gairdneri (as smolts) were released at Arhus Bay (15 May 1982) and as of 31 December 1983 reports on recapture were received from locations as far away as near the Sognefjord in Norway. Likewise in 1983 (7 May) 1000 smolts were released in Arhus Bay and 1000 from Isefjord. As per 31 December 1983 reports on recapture have been received from Strømstad (near the border of Norway and Sweden) in Skagerrak and from internal Danish waters.

FRG

Returns from rainbow trout releases in Neustädter Binnenwasser and Neustädter Bight (reported in last year's WG report, pp.9-10) continue to come in.

Ireland

One license was granted in 1983 for the importation of 60,000 live Atlantic salmon smolts into Ireland from Norway. The conditions applied to this importation are documented in Appendix IV (herein).

3.1.5. Captures of fish introductions originally made in neighboring countries

Belgium

In August and September 1983 four coho salmon (Oncorhynchus kisutch) were caught in Belgium waters by sport anglers near sluices of Nieuwpoort. These captures are probably related to releases by a private party in the Somme Estuary in Picardy (100 km distant) in 1981 and 1982.

Canada

Martin and Dadswell (1983) report the following situation relative to records of coho salmon (Oncorhynchus kisutch) in the Bay of Fundy and its tributary drainage: "Since 1976 there have been 14 confirmed occurrences of coho salmon, involving 1-22 individuals, in the Bay of Fundy and its tributary drainage. Most of these fish were thought to originate from the stocking program for coho initiated in the early 1970's in New Hampshire and Massachusetts, USA. Successful spawning of coho in Bay of Fundy tributaries has occurred on at least three occasions, once in the Digdeguash River, New Brunswick, and twice in the Cornwallis River, Nova Scotia. Electrofishing surveys during 1982 failed to capture any coho parr in 28 New Brunswick coastal Bay of Fundy streams. Nine coho parr were captured in the Cornwallis River in the fall of 1982 and five more the following spring" (1983).

Denmark

Recaptures of Salmo gairdneri released into the Baltic Sea (400,000) in 1983 by Poland have been made in Denmark, but no compilations are available.

Finland

A few sturgeon (Acipenser) are captured each year from USSR releases.

Netherlands

On 6 January 1984 a third specimen of coho salmon was caught in Dutch waters (see WG 1982 Report for prior captures). The fish was caught by a sports angler near the sluices (sea front) of IJmuiden (Buiten spuikanaal). It was a female with non-ripe eggs (TL = 33.1 cm; gutted weight = 305 g).

Two specimens of Atlantic salmon which were caught in Dutch inland waters in 1970 and 1972 were recently reported on by Larsson (1984). These were released in the river Lagan in Sweden at smolt length (TL = 15 cm and 25 cm), and captured a year later with length of 65 cm (3 kg) and 85 cm (6.8 kg).

Sweden

Captures of sturgeon are made from USSR released in the Baltic.

3.1.6. Deliberately introduced fish: research purposes

Canada

Canada reports the following relative to the introduction of Atlantic salmon sperm from Almond Bank Hatchery of the Freshwater Fisheries Laboratory, Scotland, to cross with Atlantic salmon eggs from New Brunswick streams:

> The purpose of the introduction, according to the proponent, Dr. C. B. Schom, Associate Professor at the University of New Brunswick, was (1) to determine if there are any signs of genetic incompatability (i.e., genetic isolation) between North American and European salmon, (2) to determine if there are any detectable differences in growth patterns of embryos and fry associated with origin of the sperm, and (3) to examine the nature of the genetic control of smoltification at 9 cm in the Scottish parr versus smoltification at 13 cm in North American parr. Permission was granted by the Non-Indigenous Introductions Committee of Scotia-Fundy Region to import the sperm for crossing to the quarantine facility on the Saint John campus of the University of New Brunswick. The quarantine facility was approved by the region's fish health officer prior to the importation. The permit recommended by the Non-Indigenous Committee allowed for importation to the quarantine facility but no movement of offspring of the cross out of the facility. This request for movement to the wild or into cages would have to be deliberated independently with no guarantee of a favourable response. Unfortunately for Dr. Schom, the hatch resulting from the cross died as a result of equipment malfunction at the laboratory, after what would appear to have been a promising hatching success rate. No plans have been received from Dr. Schom for a new permit to try again in 1984.

3.1. Deliberately introduced fish: miscellanea

Netherlands submitted rarely accessible data on historical introductions of certain finfish into the Netherlands and Germany, in part based upon very rare publications. These data are presented here as reference materials in Appendix V.

3.2.1 Deliberately introduced invertebrates: fishery enhancement

(See also: 3.2.2. Mariculture, below)

France

Recent studies on the oyster Crassostrea gigas are those of Deslous-Paoli et al. (1981a, 1981b, 1982).

3.2.2. Deliberately introduced invertebrates: mariculture

Canada

The European oyster Ostrea edulis which were imported initially in 1977 and raised through a number of generations (first at Dalhousie University, then the Northwest Arm, Halifax Harbour, and finally Sambro Head, just outside of Halifax Harbor) have satisfied the Non-Indigenous Committee requirements related to freedom from disease. Dr. Newkirk from Dalhousie University, who has managed this project from its inception, has received a permit to cross these Ostrea edulis with O. edulis already in Nova Scotia from transplants prior to 1977. The Nova Scotia Department of Fisheries staff and Dr. Newkirk hope that the cross will provide for "hybrid" vigor which will translate into better growth rates than are now realized by the older stock of Ostrea edulis in the Nova Scotia hatchery. The oysters resulting from the cross will be supplied to growers in Nova Scotia. The permit allowing for the crossing of the two stocks also states that there is no longer a requirement for the Non-Indigenous Introductions Committee of Scotia-Fundy to be involved with this 1977 O. edulis import. A report by the Committee will be prepared, with input from Dr. Newkirk, which will summarize the involvement of various groups in the implementation of this

1977 import from the beginning to the end of the Committee's direct involvement. (See: Haley and Newkirk, 1982).

As indicated in the 1983 national summary for Canada, the bay scallop (Argopecten irradians irradians) was stocked out in selected locations on Prince Edward Island in 1982 and a successful spawn was being readied for planting out in 1983 (approximately 1,000,000). The stock outs in 1983 were once again successful in terms of growth to market size, reaching approximately 55 mm in 5 1/2 months. An attempt was made to overwinter the 1983 bay scallop stock but preliminary indications are that a heavy mortality occurred during the past winter. Samples sent in for disease analysis did not reveal anything that could have been responsible for the die-off in the widely separated areas. There is the possibility of mortality due to super-cool water temperatures under the ice last winter. However, the Gulf Region staff (Department of Fisheries and Oceans) is only now surveying the extent of the mortalities and trying to determine the cause. Plans have been made to stock more bay scallops into selected waters on Prince Edward Island in 1984, but the numbers which will be available are not known at this time.

Denmark

Crassostrea gigas (14,700 specimens) and Ostrea edulis (9,100 specimens) were imported from England (Colchester), The Netherlands; and France (Bretagne).

France

No further data are available on the release of post-larvae of the

the Japanese shrimp Penaeus japonicus into ponds on the Mediterranean coast.

A recent paper on the planting of Tapes philippinarum in the Etang de Thau is that of Maitre-Alain (1983).

USA

On 30 June 1983 one living specimen of the Japanese clam Tapes philippinarum (= Tapes japonica) was collected by a private clam digger on an intertidal mud-sand flat on the south side of Cape Cod, Massachusetts, in Buzzards Bay. The specimen measured 7.0 cm in length, 4.7 cm in height, and 3.5 cm in width and was in excellent condition; it was examined by J.T.Carlton and R. Mann at the Woods Hole Oceanographic Institution. The origin of this specimen is problematic. Extensive clam collections are made on a regular basis in the same region by both private and scientific interests, but no further specimens have come to light. Various private mariculture interests on Cape Cod may have made unauthorized transplants of the Japanese clam, from the Pacific coast of the USA, in the past, but no current activity along these lines is known.

3.2.3 Deliberately introduced invertebrates: live storage prior to sale

Denmark

Crassostrea gigas (13, 710 kg) and Ostrea edulis (2,670 kg) were imported from England (Colchester), The Netherlands, and France (Bretagne), and 50-100 oysters (no species mentioned) were imported from Yugoslavia (Istria).

France

Table 2 on the following page summarizes importations into France of

Table 2.

Quantity and origin of shellfish of different species imported in France for market

Species:	Flat oyster *Ostrea edulis*	Cupped oyster *Crassostrea*	Mussels *Mytilus edulis*	Other Shellfish
ORIGIN:	England (Solent), Ireland	Italy, England (hatchery)	Netherlands, England, Spain, Ireland, Italy, Denmark, FRG	Ireland, Engla Tunisia, Canad Italy, Portuga
Passage through storage (tons)	266.7	0.05 (young)	8932.35	1235.2
Direct sale (tons)	324.54	60.02	33542.47	1890.0

shellfish essentially intended for market in 1983. The shellfish pass through a storage facility (with treated effluent) and are then conditioned for market. Only the young are relaid in beds after histological certification.

3.2.5 Deliberately introduced invertebrates: research purposes

Belgium

Flat oysters, *Ostrea edulis*, were imported from the Netherlands for research purposes.

Denmark

For research purposes, 700 kg of "baby oysters" (no species indicated) were imported from Ireland, while another 60 kg (no species indicated) came from Norway.

Canada

One hundred specimens of the venerid clam Protothaca staminea were imported from Vancouver, British Columbia in April 1984 for biological research purposes (mechanical testing of static shell strength and fatigue life). They were held in a laboratory at Dalhousie Aquarium and none were released.

3.3. Deliberately introduced plants

France

See: "Comments: The Cultivation of the Brown Alga Undaria on the Atlantic coast of France" (herein).

Netherlands

Pistia stratiotes is an aquatic plant used in aquaria; it was dumped into ditches in the Province of Zuid-Holland, Westland, during the summer and overgrew large areas. This plant is a native of Asia and needs a water temperature above 20° C; the plants died during the next winter (Tomey, 1983).

4.0 Species introduced accidentally with deliberate introductions

UK

No change in the distribution of Bonamia infection has been reported (see WG 1983 Report, pp. 18-19).

Two non-indigenous species of hydroids (hydrozoan coelenterates), Coryne pintneri and Thecodium brieni, are newly reported from Scotland, having been previously known only from northwest France and the Mediterranean. It is believed that they were introduced on oysters from Brittany, France (Edwards and Harvey, 1983).

Status of IHHN Shrimp Virus

Recent information on the current geographic distribution and hosts of the newly recognized infectious hypodermal and hematopoietic necrosis (IHHN) virus was presented. The virus is now known in three species pf penaeid shrimps: Penaeus vannamei, P. stylirostis, and P. monodon (see Bell and Lightner (1983), Brock et al. (1983), Lightner et al. (1983a, 1983b, 1983c) and other references in the Appendix, provided by C. Sindermann (USA) and H. Rosenthal (FRG)). An up-dated map of the known geographic range of the IHHN virus in cultured populations of penaeid shrimp has been provided to H. Rosenthal by J. A. Brock, Aquaculture Disease Specialist, Department of Land and Natural Resources, State of Hawaii (January 1984) and is presented here (Figure 1).

5.0 Completely accidental introductions

FRG

Recent work on the introduced salt marsh plant Spartina townsendi in the FRG is that of Meixner (1982, 1983) (Ref: 1983 Bergen WG Report, page 21).

Netherlands

Two specimens of the blue crab Callinectes sapidus were caught on 11 and 22 October 1983 in the Eemhaven, Port of Rotterdam (carapace widths of 15 and 13 cm). Another specimen (carapace width 18.4 cm) was caught in the Noordzeekanaal (shipping canal from IJmuiden to the Port of Amsterdam) on 17 October 1983. Striking in these observations is that they are linked with shipping traffic.

UK

Phycological investigations on the biology, distribution, and ecology

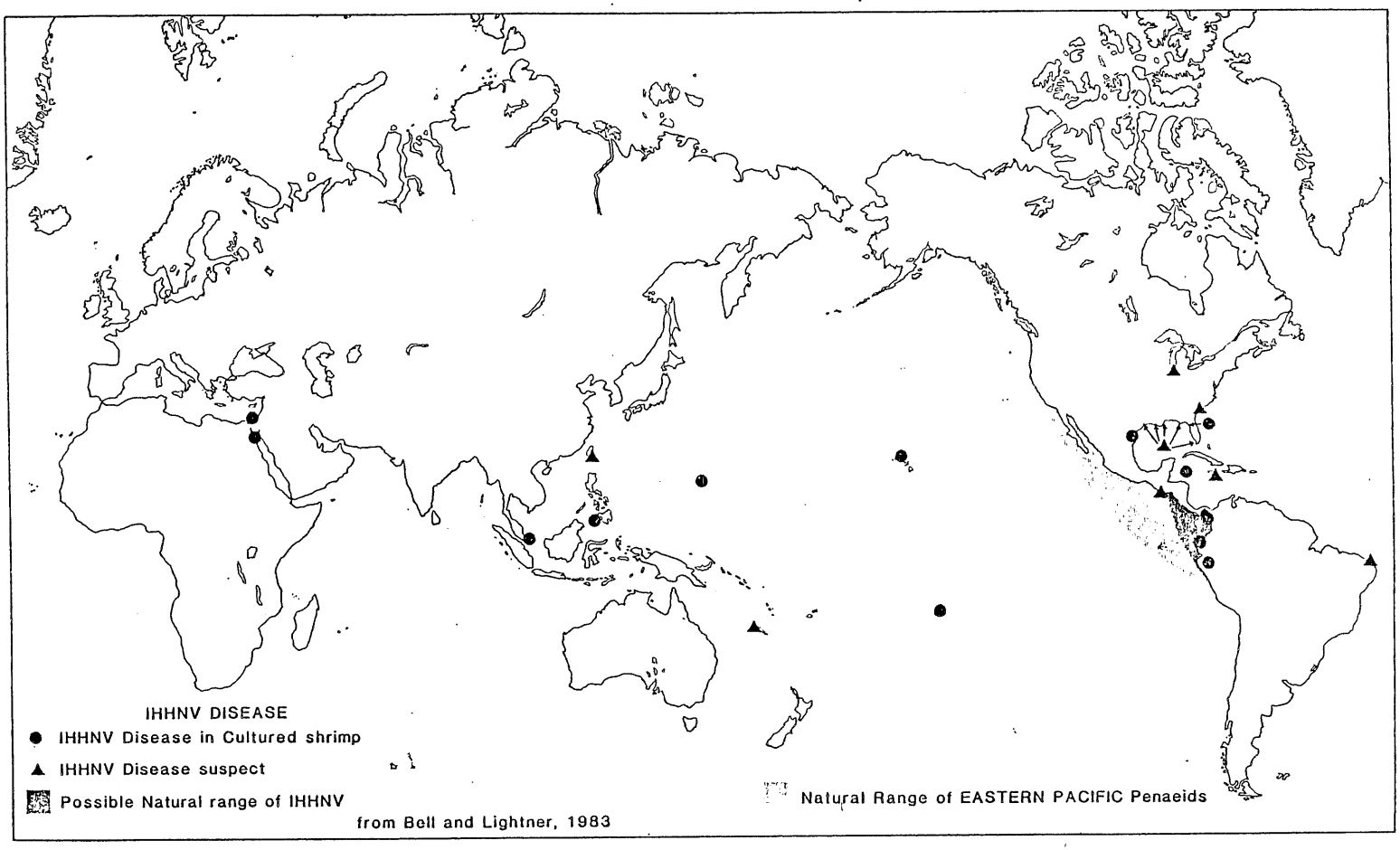

Figure 1.

IHHN Virus in Penaeids

of the nonindigenous brown alga Sargassum muticum continue (see references in bibliography in Appendix, under subheading Sargassum).

USA

The blackchin tilapia, Tilapia melanotheron, is now established on the U.S. Atlantic coast (Dial and Wainwright 1983). Previously established on the Gulf coast of Florida, it has been discovered on the Florida west coast, in the Banana and Indian Rivers from Cocoa Beach south to Indian Harbor Beach; schools of blackchin tilapia were observed in seagrass beds at several localities. The introduction dates from about 1980. The Mozambique tilapia, Tilapia mossambica, is further reported to be moving slowly south along the Atlantic coast of Florida (Dial and Wainwright 1983).

Studies on established exotic marine and estuarine fishes continue at the National Fishery Research Laboratory in Gainesville, Florida by J. Boccardy, J. Clugston, and staff, and at the Florida Atlantic University of W. Courtenay. An FAO-backed symposium on exotic fishes in developing nations is still planned, but neither date nor place have been set. A symposium on reducing the risks of introductions of exotic fish is planned at the August 1984 meeting of the American Fisheries Society at Cornell University, chaired by C. Koehler of Southern Illinois University.

The ecological effects and community modifications by the introduced snail (periwinkle) Littorina littorea on the USA Atlantic coast continue to be the focus of several investigations (Brenchley and Carlton, 1983; Bertness, 1984). The subtropical shipworm Teredo bartschi, previously reported from Barnegat Bay, New Jersey, is now established in Long Island Sound, at Waterford, Connecticut, where it is restricted to the thermal

effluent of a nuclear power station (M. Keser, Millstone Nuclear Power Station, personal communication, 1984).

The aggressive green alga Codium fragile tomentosoides, introduced about 1956 from western Europe to Long Island, New York, continues to spread south. Its current status on the US Atlantic coast is detailed by Carlton and Scanlon (1984). Codium has now been discovered in Topsail Inlet, North Carolina, and occurs in several inlets between Cape Fear and Cape Lookout, south of Cape Hatteras (Searles et al. 1984). It is thus, for the first time, now moving into the range of native species of Codium.

6.0 Species introduced for hatchery rearing

Belgium

Claus et al. (1983) report on the onshore nursery rearing of Ostrea edulis, Crassostrea gigas, and Tapes philippinarum (= Venerupis semidecussata) at the Sluice Dock at Ostend.

France

Two million eggs of coho salmon have been imported from the state of Washington (USA) in December 1983 for commercial use. Importation of a limited quantity of chinook salmon (20,000 eggs) and of chum salmon (20,000 eggs) was also made for an aquaculture enterprise. The exchange of eggs and larvae of turbot have continued between France and England. Penaeus vanamei has been introduced in France from Tahiti for experimental purposes.

Norway

Seed of Crassostrea gigas were imported from Scotland into a hatchery.

Sweden

Ostrea edulis spat were imported from Norway to enhance oyster production.

UK

Approximately 30 to 40 million rainbow trout ova were imported from Denmark, USA and Tasmania, and 1.5 million Atlantic salmon ova from Norway.

6.1. Species introduced for hatchery rearing: stock not subsequently planted outside hatchery

UK

The stock of coho salmon which was held in containment throughout two generations was destroyed in January 1984.

6.3. Species introduced for hatchery rearing: stock supplied in larger quantities to the industry or to some other organization

Canada (see also: 3.2.2, page 17, on Ostrea edulis)

The shellfish hatchery at Pleasant Point, Nova Scotia, run by the Nova Scotia Department of Fisheries, is spawning Mercenaria mercenaria (quahog) and Crassostrea virginica beginning in July 1984 for distribution to provinicial growers. These are not new imports but result from stocks maintained in the hatchery now for a number of years.

7.0 Planned introductions

See also: Current Status of Proposed or Actual Introductions: Salmonid Fishes (herein)

UK

No decision about proposals to introduce a brood stock of pink salmon (Oncorhynchus gorbuscha) has been taken and the proposals to ranch the species remain in abeyance.

8.0 Live exports for consumption

9.0 Live exports for purposes other than direct consumption

Most national reports do not list live exports *per se* and, indeed, in many countries it appears that such data are difficult to obtain with accuracy. Certain data sets can be reconstructed by tabulating data on live imports from specified origins. Those reports that do present export data do not always distinguish between exports intended for direct consumption and exports intended for other purposes (such as grow out). The two categories are thus here combined:

	SPECIES AND IMPORTING COUNTRY:			
EXPORTING COUNTRY	*Ostrea edulis*	*Crassostrea*	*Mytilus edulis*	Other (include unident.oysters)
CANADA				France
DENMARK			France	
FRANCE	Denmark	Denmark		
FRG			France	
IRELAND			France	Denmark
NETHERLANDS	Belgium Denmark	Denmark	France	
NORWAY	Sweden			Denmark
PORTUGAL				France
SPAIN			France	
TUNISIA				France
UK	Denmark France	Denmark France Norway		France
YUGOSLAVIA				Denmark

EXPORTING COUNTRY	SPECIES AND IMPORTING COUNTRY: Coho Salmon	Turbot	Atlantic Salmon	Rainbow Trout	Sole
Denmark				UK	
Norway			UK, Ireland		
Sweden			Norway Germany (FRG) rance	Norway	
Tasmania				UK	
UK		France Spain			France Spain
USA	France (eggs)			UK	

In addition, live lobsters are exported from Canada to twenty countries for human consumption.

CURRENT STATUS OF PROPOSED OR ACTUAL INTRODUCTIONS: SALMONID FISHES

In the following reports, common and scientific names of salmonids are as follows:

Oncorhynchus gorbuscha	Pink Salmon	(Humpback Salmon)
Oncorhynchus keta	Chum Salmon	(Dog Salmon)
Oncorhynchus kisutch	Coho Salmon	(Silver Salmon)
Salmo salar	Atlantic Salmon	

Belgium

It is known that 6,000 coho salmon smolts from France were privately released by a promotor in June 1983 in the Yser estuary at Nieuwpoort, with a planned recapture in September 1984. However, it is believed that almost all of these died within the first 24 hours due to various environmental problems in the estuary. No permits are required for such releases under current legislation.

Captures of coho salmon near Nieuwpoort in the late summer and fall of 1983 are believed to be fish from the Somme Estuary (see 3.1.5, page 14, herein).

Canada

A published report in a St. John, New Brunswick, newspaper (March 1984) referring to a "plan" to transplant "Pacific species of salmon into Atlantic waters" of Canada was brought to the attention of the Canadian representative G. Turner, who noted that the report was erroneous and that no such government plans existed. Indeed, there appears to be little interest in any aspect of ocean ranching of Pacific salmonids in Canadian Atlantic waters, due in part to concerns about possible ecological and pathological effects (see Martin and Dadswell 1983) of such introductions.

Recent collections of coho salmon in Canadian Atlantic waters are believed to results from releases in the USA (see 3.1.5, page 15, herein).

France

H. Grizel (ISTPM) provided the following report on the continuing studies of the ecology of Atlantic and coho salmon, specifically focusing upon a recent study of competition between the two species in fresh water:

After a first experimental approach focusing on the interspecific relationships between fry of the same age of the two species in semi-natural streams or in the laboratory (cf. contract INRA/CNEXO 65 1940), interactions between juveniles of different ages were begun with the object of investigating the hypothesis of a possible intercohort predation (contract INRA/CNEXO 65 1956). In 1983, a first experiment was conducted in six successive raceways of 30 m^2 of a large outdoor experimental stream fed by diversion from a natural stream, the Lapitxuri, a tributary of the Nivelle. The survivorship, the sedentary behavior, and the downstream migration of fry of Atlantic salmon ("salars") (3,000 eggs/raceway) were observed with and without one-year old juveniles of Atlantic salmon and of coho salmon ("cohos"). In addition, a sample of specimens of one-year olds were obtained in the course of the experiment to study their stomach contents. In preliminary analysis, if survivorship and growth appear to be little different according to the raceways, the sedentary behavior is significantly more important in the control raceways than in the raceway containing the juveniles of "coho" and particularly of "salar". The downstream migration is most important and takes less time in the presence of one-year old subjects. In 1984, a comparison of the same type was carried out in six raceways of the experimental stream of the Lapitxuri. In a first experiment, fry of "coho" were introduced into a hatchery alone or in the presence of juveniles of "salar"; in a second experiment (in progress) the fry of later "salars" were introduced into

the hatchery either alone or in the presence of fry of older "coho" from the first experiment. According to results at hand now, particularly relative to analysis of stomach contents, predation by juveniles of "salar" on fry of "coho" is important, and manifests itself at the moment of emergence. It may be the same in the inverse sense, with the juveniles of "coho" preying on the fry (to the resorption of the bladder) of "salar", but it is necessary to wait to the end of the experiment to make a conclusion.

Parallel to this experiment in a semi-natural environment, a precise analysis of the micro-distribution and of the activities (including diurnal rhythms) among the fry of "coho" with and without juveniles of "salar" has been undertaken in a controlled environment in six identical and parallel aquariums of 600 liters with running water. This experiment, conducted initially with fry of coho at emergence, has been taken up again with older fry; the analysis of the results remains to be done.

UK

As noted previously, the coho salmon stock which was held in containment throughout two generations was destroyed in January 1984. Proposals to introduce a brood stock of pink salmon and to ranch the species remain on hold.

USA

Martin and Dadswell (1983) provide data on coho stocking and releases for the states of Massachusetts and New Hampshire from 1971 through 1982, and return data for the period from 1977 to 1980 for New Hampshire (less than one percent) and for Massachusetts (less than one-and-a-half percent).

See also: "Comments: Ocean Ranching of Pacific Salmon in the State of Maine" (herein).

CURRENT STATUS OF PROPOSED OR ACTUAL INTRODUCTIONS: JAPANESE COCKLE Tapes

The WG briefly discussed the matter of the status and intent of introductions of the Japanese cockle Tapes philippinarum in European waters. The clam is currently being released into open waters in the UK, Ireland, the Atlantic and Mediterranean coasts of France, and in perhaps other countries as well (WG 1983 Bergen report (CM 1983/F:27, pp. 16, 17, 18; also Maitre-Alain 1983). The Rapporteur further noted that reports of Tapes plantings (usually derived from hatchery seed) in the national summaries did not normally clarify whether the intent of such plantings was for fishery enhancement (3.1.1, and thus the establishment of breeding populations) or for mariculture (3.1.2, growth and fattening). In Dr. H. Quiroga's (Spain) absence, a proposed presentation on movements around the world of this species prepared by Dr. Quiroga could not be made. The matter will be re-examined when further data are available.

Taxonomic Note:

Bernard (1983) has determined that the proper name of the Japanese "cockle" is Tapes philippinarum (Adams & Reeve, 1850). The following names are junior synonyms: Tapes japonica Deshayes in Gray, 1853; Tapes semidecussata Reeve, 1864, and Paphia bifurcata Quayle, 1938 (thus, T. philippinarum is the oldest and proper name of this group of names). Bernard (1983: 56) regards Ruditapes as a subgenus of the genus Tapes. The genus Venerupis is a distinct taxon, to which philippinarum is not, apparently, properly assigned.

COMMENTS: THE CULTIVATION OF THE BROWN ALGA UNDARIA ON THE ATLANTIC COAST OF FRANCE

Background

A request was received by the WG from the ICES delegate for England and Wales for clarification of cultivation experiments, being conducted on the Atlantic coast of France, with the exotic brown alga, Undaria pinnatifida. This algae was introduced from Japan to France with seed oysters in 1971 into the l'Etang de Thau on the Mediterranean coast, where it is now well established (Perez, Lee, and Juge 1981). Movement of this species to the Atlantic coast would constitute transport outside of its present range, and is thus an introduction under WG definitions. It is noted that several European countries, including Norway, Scotland, Ireland, and France, have interests at various levels in algal culture and harvesting.

Current Status

The following information was provided by H. Grizel relative to Undaria on the French Atlantic coast:

There is a great interest in France in cultivating and marketing algae for human consumption, and it is along these lines that Undaria is now being grown experimentally on the Brittany coast at Ouessant. Small plants (plantules) are raised in hatcheries, and these plantules are then placed in the water on lines (ropes) for growth. Growth is considerably better here than on the Mediterranean coast: whereas in the l'Etang de Thau Undaria reaches a maximum size of 0.8 - 0.9 m, Undaria in Brittany will grow to 2.0 or more meters in length between

September and February. The French believe that there is no danger that Undaria will become established on the Atlantic coast, because experiments in their laboratory and in the natural environment have shown that the female gametophyte stage must be subjected to a temperature of 20° C in order to become mature. Temperatures in the cultivation area in Brittany do not exceed 16 to 17° C. Moreover, the Undaria are harvested in winter, when water temperatures are 5 to 6° C, before the plants are reproductive. Undaria is an annual species, developing primarily during winter months, but dying back in the summer. Finally, it is not yet established whether there is sufficient industry interest to expand these experiments to commercial production levels. If there is not, the experiments will cease.

Cultivation and Life History of Undaria in Asia (China - Japan)

Dr. J. S. Craigie, of the National Research Council of Canada, Halifax, presented at the request of the Working Group a detailed statement on the cultivation, life history, and reproductive biology of Undaria pinnatifida in Asia.

Undaria is widely distributed in Japan, where it grows on hard rock bottoms to depths of 15 meters. It is a sublittoral alga, avoiding both very cold upwelling waters and warm tropical waters. Undaria supports a vast culture industry in Japan and China. It and the kelp Laminaria japonica were introduced to China, where both species are grown together in mixed cultures; however, Undaria is harvested primarily in the spring (March to May), except in Hokkaido where they are harvested from May to July, while the plants are not fully grown -- thus, they are largely removed before Laminaria (which does not do well below about 6 to 7° C) begins to grow.

The complex life cycle of Undaria (Figure 2) includes several critical stages. The first is the requirement that the sporophyte be subjected to temperatures of greater than 14° C for at least 10 days in order to produce zoospores. The zoospores will adhere and germinate best at temperatures under 20° C. Gametophytes of both sexes develop from zoospores; these survive at temperatures of -1° to +30° C, but grow best at 17 to 24° C. The gametophytes mature well at temperatures of less than 20° (for example, at 17° C) and produce zygotes which in turn develop into the asexual sporophyte stage. Further details of the reproductive biology of Undaria are presented in the attached diagram and are available in Saito (1975).

Response of Working Group

The Working Group:

(1) discussed at length the presentations of Dr. Grizel and Dr. Craigie, and noted the difficulties in resolving the discrepancies between the reported temperature requirements for reproduction of Undaria in France and in Japan. The WG also discussed the possibility that Undaria placed in the natural environment in Brittany could be lost to storms or other activities, and requested a further assessment of this possibility. The WG felt that more details are necessary to further clarify the status of this experiment. Dr. Grizel will advise the appropriate authorities of the WG's request that details of the experiment and plans for the future, and answers to the questions raised, be provided as soon as possible. The WG further suggested that the UK and other interested countries, through their delegates, request of France details of the Undaria experiments.

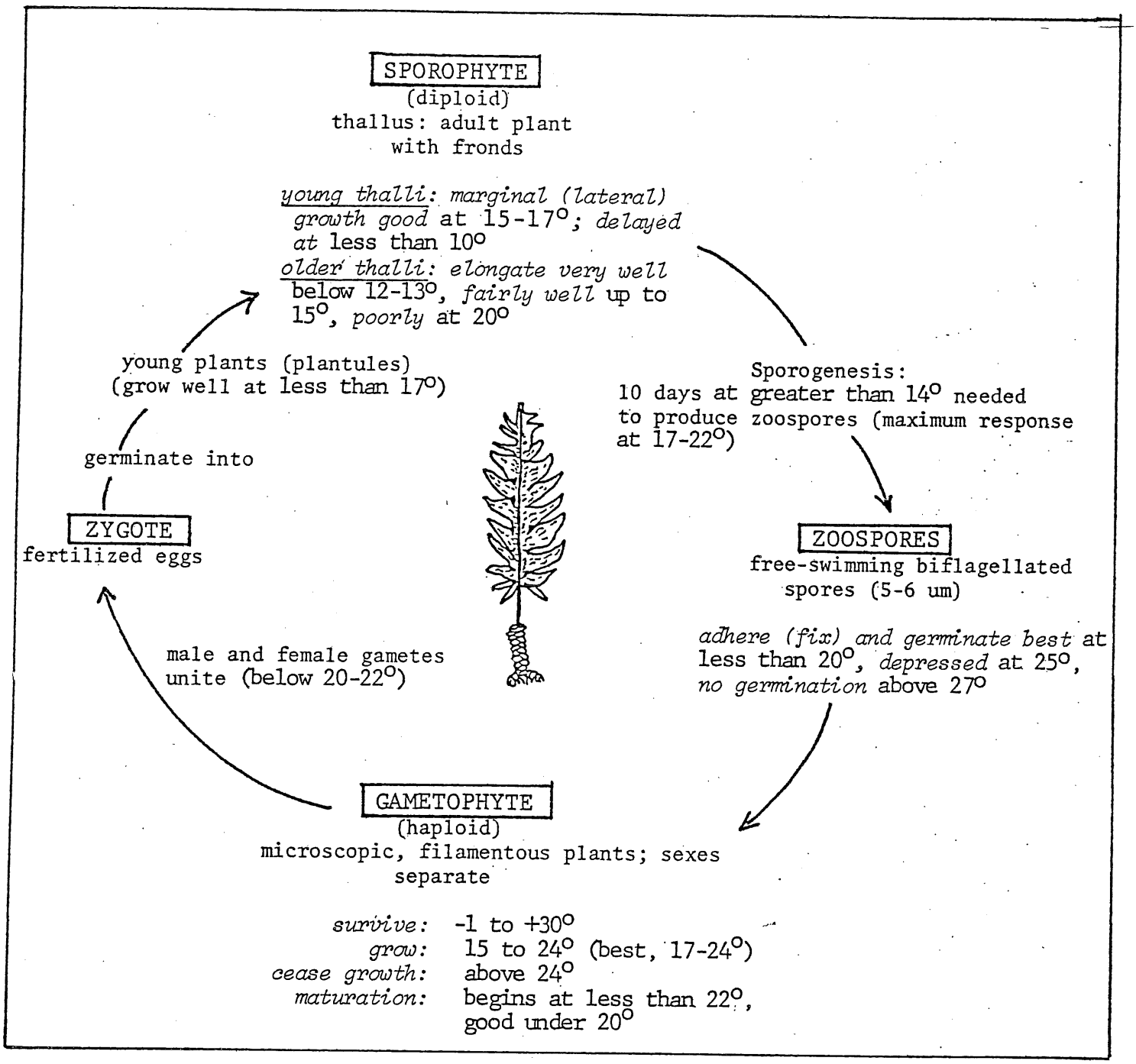

Figure 2.

LIFE CYCLE OF UNDARIA PINNATIFIDA

LE CYCLE DE REPRODUCTION D'UNDARIA PINNATIFIDA (LAMINARIALES)

(after Saito (1975), Pérez et al. (1981), J.S.Craigie (herein))

(2) expressed regret that ICES was not informed earlier of these experiments, so that the Council could study the matter and consult with experts in their countries. It was emphasized that the ICES Code of Practice calls for providing such information "at an early stage" in such cases.

COMMENTS: OCEAN RANCHING OF PACIFIC SALMON IN THE STATE OF MAINE

Background

In 1983 the Working Group received a request from the Chairman, Technical Advisory Committee of the Department of Marine Resources, State of Maine, for an advisory opinion on a pilot program in that state which involves the importation and release of pink salmon (Oncorhynchus gorbuscha) eggs from Alaska and of chum salmon (Oncorhynchus keta) eggs from Hokkaido, Japan. No formal detailed proposal was received at that time. Based upon the ICES "Revised Code of Practice to Reduce the Risks of Adverse Effects Arising from Introductions of Marine Species", the WG noted that none of the recommended procedures of the Code appear to have been followed. The WG strongly urged that an extensive study of the effects and implications of such introductions should be made, that, "in company with such a study, detailed information on biological, ecological, and geographic aspects of all planned introductions be presented to the Council at an early stage," and "that no further imports of eggs be made except for purposes of establishing an all-captive brood line." The WG did not recommend continued release of Pacific salmon, but

noted five directions that the pilot program might take (see 1983 Working Group report, CM 1983/F:27, pages 33-36).

The comments made by the WG were included in the WG Report for 1983, and were subsequently indicated by the Secretary General to be the official advise of ICES.

The WG's comments and details of the ICES Code of Practice were also transmitted to the National Science Foundation (NSF), which is funding the pilot program.

Current Status of Pilot Program

Sea Run, Inc. of Kennebunkport, Maine, has provided the following information on the current status of their program. A final report of Phase I of the project was submitted to NSF in May 1983, summarizing the results of the first three years, and the program has embarked on Phase II, for a second three year period. A copy of this Report has been provided to the WG Chairman.

From the 1982 releases, about 400 pink salmon are reported to have returned, but most of these avoided net traps. A few were captured and examined for diseases.

The intent of this program is to establish their own brood stocks from returning fish when this is possible.

Response of Pilot Program Operator

In responding to the ICES recommendations and advisory opinions, Sea Run, Inc., noted that the Revised Code of Practice was not known to them at the program's inception, and that it was not then and is not now generally available. Sea Run, Inc., pointed out how important introductions and transfers are to aquaculture, but also stated that they

"understand the need for international guidelines to minimize the risk of disease transfer". Sea Run, Inc., expressed the concern that the Code of Practice and Code Guidelines, "might serve as a serious obstacle to finfish aquaculture," specifically noting that the "application of (sections) 2(a) and (b) (of the Code) (= the life-long quarantine provision) to the introduction or transport of finfish as eggs is unrealistic with regard to (1) cost, (2) reproductive biology of certain finfish, and (3) degree of risk involved." Sea Run, Inc., regards this risk as "very low", noting the long history of movements of fish eggs, before disease inspections, "without record of harm across oceans and continents," the "remarkably clean" record for egg shipments since disease inspections have been implemented, and that imported fish are generally subject to a greater risk of disease, because of the stress of culture in a new environment, than are native wild stocks with which the cultured stock may come in contact.

Sea Run, Inc., thus suggested that the quarantine provisions of sections 2(a) and 2(b) of the Code not apply to the introduction or transfer of fertilized finfish eggs, and that this exception be placed directly into the Revised Code of Practice.

Response of Working Group

After lengthy discussion, the WG found that:

(1) the suggested cessation of salmon releases as recommended by ICES has not been done, and the WG expresses some concern at the continuing and unabated levels of the project. The WG particularly regrets that Sea Run, Inc., did not know of the existence of the Revised Code of Practice. The WG wishes to re-emphasize its recommendation that there be an

establishment of a captive brood stock from which to derive first generation progeny. The WG re-emphasized its desire to be kept fully informed of the direction of the program, including exact numbers of fish released and of fish returning. The WG urged that a marking program be established so that released fish can be recognized. The WG further emphasizes that the essence of the Revised Code of Practice as discussed in the 1983 Report relative to this program is still supported,

(2) the study and plans called for by the WG as parts 1(a) and (b) of its comments have not been provided to ICES,

(3) Canadian representatives expressed particular concern about the reality of straying of pink salmon to other rivers, as exemplified by recent experiences in Newfoundland, and in other areas,

(4) these experiments should also be monitored and reported upon by an authorized independent party,

(5) the current program is of special importance because it is one of the few active ongoing programs to release Pacific salmon in the North Atlantic Ocean,

and,

(6) the Chairman of the WG volunteered to discuss these matters with the USA delegates who, in turn, may discuss these matters with the National Science Foundation and that the Chairman further volunteered to discuss these matters with the Parent Committee, all with a goal to obtain suggestions as to how to proceed.

COMMENTS: MOVEMENT OF TEMPORARY INSTALLATIONS AND VESSELS AND CONCOMITANT TRANSPORT OF NON-INDIGENOUS MARINE ORGANISMS

E. Egidius (Norway) raised the matter of the role of the increasing number of exploratory oil drilling rigs, fouled with marine organisms of many kinds, in accidentally transporting non-indigenous species to new regions. She noted that such rigs were very common and are towed or move across oceans (such as North Sea rigs moving to North America), and asked the WG's advice and opinion on the current importance of this phenomenon.

A moderate amount of discussion followed. G. Turner (Canada) noted that fouled rigs are brought into Halifax Harbor for cleaning. A. S. Munro (Scotland) advised that Dr. R. Ralph and colleagues, of the Offshore Marine Studies Unit, Zoology Department, University of Aberdeen, Scotland, were studying marine growth patterns on North Sea oil platforms. P. van Banning (Netherlands) urged that the appropriate literature be assembled for an assessment of the situation.

J. Carlton (USA) noted that Benech (1978) had recorded the movement of living marine organisms on an exploratory drilling vessel from Japan to California, and that Foster and Willan (1979) had recorded the transport of a barnacle community and other organisms on an oil platform from Japan to New Zealand. Studies on the composition of the fouling community on such platforms appear to be available from California, the Gulf of Mexico, and the North Sea.

The WG suggested that a preliminary document be prepared for the next meeting, in the form of informational advice to member countries on the possibilities of introduction of exotic species concomitant with oil and gas exploration. J. Carlton volunteered to assemble the literature and

will contact experts at the University of Aberdeen and elsewhere for advise.

CASE HISTORIES OF INTRODUCTIONS AND TRANSFERS

The Working Group on Introductions and Transfers of Marine Organisms has for several years encouraged the development of detailed reviews and analyses, in the form of "case histories", of the available data on the ecological, genetic, behavioral, and/or pathological impacts of introductions of marine invertebrates, fish, and plants, focusing in each case upon a specific species or group of related species. Such case histories, it is felt, would (1) form the foundation for a rigorous understanding of the patterns and processes that lead to successful and/or unsuccessful introductions of non-indigenous organisms, and (2) provide a reference data base on the known impacts and effects of transfers and introductions, by and against which proposed introductions could be compared and considered.

A number of such case histories, in preliminary stages of development and revision, have been presented to the Working Group: Pacific salmon in the North Atlantic Ocean (including northwest Russia) (Solomon), the oyster Crassostrea gigas in France (Grizel), bay scallops in Canada (Turner), and Penaeus japonicus ranching in Japan (Rosenthal, below). Numerous other case histories are in preparation or have been proposed by WG members, including reviews of Ostrea edulis in North America, Tapes philippinarum around the world, Atlantic salmon in Ireland, the slipper shell Crepidula in Western Europe, Sargassum muticum in Europe and elsewhere, red bream introductions, the introduction of the IHHN virus in penaeid shrimps through mariculture operations, the striped bass introductions

of the North American Pacific coast, and others.

The WG considered that, (1) because of the greatly increased interest throughout ICES member countries on the effects of introductions and transfers, (2) because of the body of knowledge now existing, particularly that which has become available since the WG was reconvened in 1979, (3) because the WG has been considering problems associated with these matters for a period of five years and a review and assessment seem particularly appropriate, and (4) because of the importance of developing case histories to achieve the two goals noted on the previous page, the presentation of scientific papers on significant case histories of transfers and introductions be suggested, in the form of a special minisymposium two years hence, such a session focusing upon "The Effects of Introductions and Transfers on Living Marine and Aquatic Resources and Ecosystems." A similar minisymposium was earlier proposed at Sete (CM 1981/F:46, p. 23, no. 7) and at La Coruna (CM 1982/F:37, pp. 45-46, no. 4). Possible coordination with EIFAC, which has similar interests along these lines, were also discussed by the WG. This suggestion is presented as a Recommendation herein.

The following case history was presented by H. Rosenthal (FRG) as an important example of coastal shrimp ranching management and as a model for consideration of certain principles governing the release of a species in natural waters. An abstract of Dr. Rosenthal's presentation is given here:

Ranching of Penaeus japonicus in Japanese coastal waters: A case history

During the 1960s commercial catches of the "Kuruma shrimp" Penaeus japonicus in the Seto Inland Sea (19,000 km^2) declined drastically, due in part to increased land reclamation and coastal pollution (both of which reduced the extent of spawning and nursery grounds) and in part to overfishing. Interest turned toward the development of commercial shrimp hatcheries to

restock the Sea, and the first such hatchery was established in Takamatsu in 1960. Although several million larvae were produced in the first three years of the hatchery, it was not until the early 1970s that large-scale experimental releases of hatchery-reared shrimp started. Numerous studies were concomitantly undertaken to understand the physical, chemical, biological, behavioral, and ecological parameters that mediated the success or failure of such releases (Kurata and Shigueno, 1979; Kurata, 1981; Hirata, 1984).

Initial releasing programmes, which suffered extensive mortalities, were followed by improvements in rearing technology, such that between 1965 and 1974 production increased from 305 to almost 900 tons. Important developments in rearing techniques included improved feed quality and the development of moving aeration systems which allowed the juvenile penaeids to grow to larger size (3 cm) without damage to walking legs (pereopods) and swimmerets (pleopods). Amelioration of such damage seems to increase survival potential.

Studies on the causes of mortality to newly-released hatchery-reared fry (7 to 10 mm) revealed that, while background physical-chemical parameters may play a role, the most important cause is predation by goby fish (Tridentiger obscurus) and young plaice (Paralichthys olivaceus, 5 to 15 cm TL). Most of the released post-larval stages of Penaeus japonicus appeared in the stomach of plaice from between 30 minutes and 3 hours after release; about 60 percent of the total initial mortality may be attributed to goby predation within a few hours after release.

The behavior of young, post-planktonic shrimp has dictated the nature of the releasing and grow-out programme. The shrimp do not migrate very far as post-planktonic stages; rather, they settle in shallow water and tend

to disperse gradually offshore as they grow. They are nocturnal, remaining buried at daytime but becoming active at night. Overall, migration is limited as long as they are under 14 cm in total length (thereafter, they tend to move further offshore, and are thus out of reach of the local fishery). Useful releasing strategies would appear to take advantage of liberating shrimp over a relati-ely hard bottom with a sand substrate cover of a few cm depth, which would permit shrimp burrowing but prevent the burrowing of most predatory flatfish. Alternatively, a rough bottom with built-in terraces permitting tidepool formation would minimize predation and allow step-by-step dispersal of the growing shrimp from the releasing points to the nursery grounds. Natural habitats of these types are relatively rare in Japan, however, and thus manmade lagoons or fenced enclosures are frequently used to provide acceptable release sites. These latter are, however, often expensive to operate and maintain and difficult to control. The most advanced and successful method that takes Kuruma shrimp as well as the behavior of potential predators into account utilizes artificial tidelands that contain releasing flats and nursery grounds at various elevation levels. The purpose of these tidelands is to control dispersal and prevent the access of predators at times when juvenile shrimp are actively moving. An example of such an artificial tideland is Ohmi Bay, the releasing zone of which occupies an area of 1 ha (50 x 200 m) and is designed to accomodate 1 million juveniles at each stocking period.

Economic considerations are approximately as follows: based upon data from a pilot farm operation in 1971, it cost less than 0.3 yen/individual to raise a shrimp from the egg to a 10-13 mm TL individual, when a survival rate to leberation was about 50 percent. Taking the 1975 data for the

Ohmi Bay artificial tideland release, total expenditures (cost of fishing operation, cost of shrimp fry production, operation and maintenance of artificial tidelands, depreciation, and interest) cost (figures are yen x 1000) 21,970; gross income was 39,500, yielding a net profit of 17,530. The net income/recapture is estimated to be 2.74 yen.

The ranching programmes dealing with the release of Kuruma shrimp fry have reached a large-scale activity. Besides 7 stations of the Japanese Seto Inland Sea Farming Fisheries Association, almost each Prefecture operates its own hatchery for releasing purposes. A total of about 340 million juveniles are now released annually. The number of hatcheries is not likely to increase during the next few years, but considerable effort is made to increase production per unit investment, with a long-term aim of achieving year-round production of stocking materials.

Conclusions

Artificial tidelands appear to be the most promising releasing sites for hatchery-reared shrimp, provided that the stocking is undertaken at the right size and time, important predators are eliminated regularly, and other operational procedures are harmonized with the habitat requirements of the species. Nakaji (1983) has recently described one operation in a well-protected bay (Kurita Cove, Wakasa Bay), where released fry support a small scale fishery with a present yield twice as high as the one recorded prior to the start of the releasing programme. While the overall recovery of the Kuruma shrimp fishery in the Seto Inland Sea appears to be related to the increased stocking activity, the role of

long-term natural fluctuations in regulating shrimp populations here is not well known, and it is hoped that the next few years of data will provide a basis for a reliable evaluation of the overall effects of ocean ranching of Penaeus japonicus.

"PROTOCOLS": A MANUAL OF PROCEDURES

Working Group members have worked for several lengthy sessions over the past several meetings on the development and drafting of protocols for the inspection of marine species prior to importation. The development of these protocols was initially considered as a procedural guide to the certification and inspection of shellfish and finfish stocks being considered for introduction and, as such, was a detailed expansion of suggestions outlined in the Revised Code of Practice and the Guidelines for Implementing the Revised Code of Practice. The manuscript material at hand, to date, thus consists of draft statements detailing a broad spectrum of quarantine, inspection, and certification procedures.

At the present meeting, the WG decided to expand these draft protocols into an extensive manual of procedures, tentatively titled, "A Manual of Procedures to Reduce the Risks of Adverse Effects Arising from the Introduction and Transfer of Marine Species", appoint a coordinating editor, develop an outline for the Manual, assign, identify, or suggest appropriate authors for each section of the Manual, and set a deadline for section drafts.

After discussion of general procedures, standard subhead series, and overall content, the following tentative outline was developed:

Outline for "A Manual of Procedures..."

I. INTRODUCTION
   Purpose, intention, and focus of Manual
   History of development of Manual

II. (Reprinted) ICES Code of Practice
   (Reprinted) Guidelines for Implementing the Code of Practice

III. PROTOCOLS

   A. 1. Principles of Quarantine, Inspection, and Certification Procedures
      2. Principles of Pathological (Disease and Parasite) Considerations
      3. Principles of Ecological Considerations
      4. Principles of Genetic Considerations
      5. Principles of Behavioral Considerations

   B. 1. Specific Procedures: Fish
         1a. Salmonids
         1b. Eels
         1c. Other species

      2. Specific Procedures: Mollusks
      3. Specific Procedures: Crustaceans
      4. Specific Procedures: Marine Plants

IV. PROTOCOLS FOR SPECIES OF CURRENT COMMERCIAL PRACTICE
   (Reference: Section III, with modificatons as detailed)

V. PROTOCOLS FOR SPECIES IMPORTED SOLELY FOR SCIENTIFIC STUDIES IN RESEARCH INSTITUTIONS

VI. METHODOLOGY FOR PRESENTATION TO ICES OF PROPOSALS FOR INTRODUCING OR TRANSFERRING MARINE ORGANISMS

The WG designated G. Turner (Canada) as editor and coordinator of this document. Various WG members present were assigned the development of drafts for certain sections, and the Editor requested that the names of prospective authors be submitted to him. A first deadline of 31 December 1984 was set for most section drafts. The outline above, and the overall contents of the Manual, are expected to be modified and elaborated as the document develops. Strong support for the development of the Manual as a major WG goal was voiced by all members present.

FUTURE INITIATIVES OF THE WORKING GROUP

During the course of the meeting, the WG defined the following initiatives for development, deliberation, and completion:

(1) To prepare to completion "A Manual of Procedures to Reduce the Risks of Adverse Effects Arising from the Introduction and Transfer of Marine Species," a document detailing protocols of quarantine, inspection and certification procedures, and pathological, ecological, genetic, and behavioral considerations, along with specific procedures for certain groups. This document will also cover procedures for species within current commercial practice, for species imported solely for laboratory study, and the methodology of presentation to ICES of proposals for the introduction and transfer of marine organisms.

(2) To consider those revisions, modifications, and elaborations that have been proposed over the past five years to the Revised Code of Practice, and to consider harmonization of the Revised Code of Practice with a similar Code under development by FAO/EIFAC.

(3) To consider and detail plans for a suggested minisymposium in 1986 on "The Effects of Introductions and Transfers on Living Marine and Aquatic Resources and Ecosystems," including the deliberation and selection of appropriate and critical case histories for such a minisymposium.

(4) To continue to explore methods for the increased dissemination and widest possible availability of the ICES Code of Practice on introductions and transfers.

(5) To make an expanded effort to learn of the status of pertinent laws and regulations relative to the introduction and transfer of marine organisms in ICES member countries, focusing upon those countries which have not submitted copies of such legislation in recent years. Related to this effort would be the development of a registry of laws and regulations from non-ICES countries by which means important concepts developed elsewhere could be studied (Bergen meeting, 1983, CM 1983/F:27, p. 3).

(6) To continue to carefully monitor the status of transfers and introductions throughout ICES member countries, in particular those concerning salmonid fishes (including the straying of releases into adjoining countries), algal introductions, and shellfish introductions, all of which are of active and growing concern among member countries.

RECOMMENDATIONS

During the course of the meeting, recommendations to the parent committee were formulated by the Working Group on Introductions and Transfers of Marine Organisms. They are:

(1) That the "Guidelines for Implementing the ICES Code of Practice Concerning Introductions and Transfers of Marine Species" be published in the COOPERATIVE RESEARCH REPORT series, and by this means be widely and publicly available.

(2) That ICES ensures the widest possible dissemination of its "Revised Code of Practice to Reduce the Risks of Adverse Effects Arising

from Introduction of Marine Species," by encouraging each representative of each member country to do whatever is feasible to publicize the Code, and that ICES concomitantly encourage member countries to translate the Code into their official languages.

(3) That member countries contemplating introductions and transfers of marine organisms be reminded that the ICES Revised Code of Practice calls for providing to the Council "at an early stage" such information as would provide adequate time for full appraisal of the implications of each proposed introduction or transfer.

(4) That, because of the greatly increased interest throughout ICES member countries on the effects of introductions and transfers, because of the body of data now existing and the considerable attention given to these matters by the Working Group for a period of five years, and because the development of case histories on such effects would both form the foundation for a rigorous understanding of the patterns and processes that lead to successful and/or unsuccessful introductions and provide a reference data base on known effects by and against which proposed introductions could be compared and considered, and noting that similar proposals were made in 1981 and 1982, a minisymposium be convened, entitled "The Effects of Introductions and Transfers on Living Marine and Aquatic Resources and Ecosystems", to preceed the 1986 Statutory Meeting, wherein invited scientific papers on significant case histories of the effects of introductions and transfers would be presented,

and wherein participation by members of the FAO/EIFAC Working Party on Stock Enhancement, which has parallel interests, could be invited in the form of a joint session.

(5) That, because of the need to prepare to completion the "Manual of Procedures to Reduce the Risks of Adverse Effects Arising from the Introduction and Transfer of Marine Species," to consider revisions and modifications developed over the past five years to the Revised Code of Practice, to consider and detail plans for a proposed minisymposium on the effects of introductions and transfers in the form of presentations of critical case histories, to continue to explore methods for the increased dissemination and understanding of the Revised Code of Practice, to continue the synthesis and compilation of national laws and regulations, to prepare a document on the possibilities of introduction of non-indigenous species concomitant with the movement of exploratory drilling vessels on continental shelves, to continue to monitor the situation with the proposed introduction of the alga Undaria into Atlantic waters, and to continue its oversight of the status of salmonid fish, algal, shellfish, and other introductions in and between ICES member countries, the Working Group on Introductions and Transfers of Marine Organisms (in possible conjunction with a joint meeting with the FAO/EIFAC Working Party on Stock Enhancement for a portion of the designated time, and if agreeable to concerned parties) meet in Göteborg, Sweden, May 28 - 31 1985.

Appendix I

Agenda of Meeting, Halifax May 1984

ICES WORKING GROUP ON INTRODUCTIONS AND TRANSFERS
OF MARINE ORGANISMS

Halifax, Nova Scotia

May 17-19, 1984

May 17, 1984 (Thursday)

9:00 am — Convene opening session

- Welcome and remarks by officials of host country
- Introduction of participants
- Introductory comments by chairman
- Consideration of modifications to agenda
- Status of Working Group responses to resolutions approved at 1981 and 1982 Statutory Meetings
  - (a) Expansion of Code of Practice (Guidelines)
  - (b) Protocol documents
- Status of recommendations submitted to Mariculture Committee in 1983
- Reviews of FAO and EIFAC activities
- Review of relevant publications
- Summaries of new national laws and regulations concerning introductions and transfers
- National summaries of current activities concerning introduced species

12:00 noon to 1:30pm — Lunch

1:30 pm — Reconvene

- Continue and complete national summaries
- Review final draft statement of purpose
- Discuss proposed modifications of Guidelines to Code of Practice (ex. shipping eyed larvae, and acceptance of salmonid eggs from certified hatcheries)

May 17, 1984 (Thursday) (continued)

° Consider request by UK for information on plan s to introduce Undaria on the Atlantic coast of France

5:00 pm Adjourn

5:00 pm Field excursion to oyster farm, Halifax

May 18, 1984 (Friday)

9:00 am Reconvene

° Review of status of proposed or actual introductions:

(1) Pacific salmon on the east coast of the United States (C. Sindermann)

(2) Pacific salmon on the east coast of Canada (G. Turner)

(3) Coho salmon releases in European waters (D. DeClerck, H. Grizel)

(4) Status of introductions of the Japanese cockle (little neck clam) Tapes (Ruditapes) philippinarum (japonica, semidecussata) (J. Carlton)

(5) IHHN Virus dissemination (H. Rosenthal, C. Sindermann)

(6) Penaeus japonicus in France

12:00 noon to 1:30 pm Lunch

1:30 pm Reconvene

° Continue review of proposed or actual introductions

° Case histories of introductions and transfers:

(1) Ranching of Penaeus japonicus in Inland Sea of Japan (H. Rosenthal)

Discussion of case histories
Discussion of Special Session for 1986

° Review status of "Protocols for inspection, certification, and quarantine of marine species prior to importation"

6:00 pm Adjourn

May 19, 1984 (Saturday)

9:00 am	Reconvene
	Discussion
	° Develop outline for Protocols (continued)
	° Problems related to temporary installations (oil rigs, etc.) and their movements (E. Egidius)
	° Methods of dissemination of information about introductions and the Code of Practice
	° Recommendations
12:00 noon to 1:30 pm	Lunch
1:30 pm	Reconvene
	° Recommendations (continued)
	° Review draft Working Group Report
	° Discussion of the future of the Working Group
5:00 pm	Adjourn

Appendix II

Checklist and Synopsis of Council Resolutions Pertaining to the Introductions and Transfers of Marine Organisms, 1969 - 1983

INTERNATIONAL COUNCIL FOR
THE EXPLORATION OF THE SEA
(ICES)

CONSEIL INTERNATIONAL POUR
L'EXPLORATION DE LA MER
(CIEM)

WORKING GROUP ON
INTRODUCTIONS AND TRANSFERS
OF MARINE ORGANISMS

GROUP DE TRAVAIL SUR
L'INTRODUCTION ET LES TRANSFERTS
DES ORGANISMES MARINS

Checklist and Synopsis of Council Resolutions Pertaining to Introductions and Transfers of Marine Organisms

1969 - 1983

May 1984
Revised July 1984

INTRODUCTION
(Revised, July 1984)

The International Council for the Exploration of the Sea has been concerned with problems associated with the intentional or accidental movement of marine organisms since 1968 (Procès-Verbal de la Réunion, 1969: 69). The "Working Group on the Introduction of Non-Indigenous Marine Organisms" (name changed in 1980 to, "Working Group on Introductions and Transfers of Marine Organisms") first met in London in 1970. The Group met again in 1971, 1973, and 1974, all under the chairmanship of Dr H A Cole. The Group was reconvened in 1979 under the chairmanship of Dr C J Sindermann (Proces-Verbal de la Reunion, C.Res. 1978/2:28).

Following are a Synopsis of Resolutions, and transcripts of Resolutions passed by the Council from 1969 to 1983, relevant to the introduction and transfer of marine organisms.

SYNOPSIS OF RESOLUTIONS

	Council Resolution
* WORKING GROUP	
Establishment and Function	1969/2:10; 1971/2:7
Name Change	1980/2:15
Meetings:	
London 1970	1969/2:10
London 1971	1970/2:12
London 1973	1972/2:14
London 1974	1973/2:18
Conwy 1979	1978/2:28
Nantes 1980	1979/2:20
Sete 1981	1980/2:18
La Coruna 1982	1981/2:18
Bergen 1983	1982/2:12
Halifax 1984	1983/2:37
* DOCUMENTS	
Code of Practice	1973/4:4; 1977/4:13
Revised Code of Practice	1979/4:5
Compilation of Legislation on Introductions	1979/4:11
Questionnaire	1979/4:10
Publication of CRR 32	1971/1:8
Publication of CRR 116	1981/1:6
Member Countries to Provide Annual Reports of National Activities on Introductions	1971/4:5; 1972/4:7
Countries Not Represented on WG Should Provide Written Summaries of National Activities on Introductions	1980/2:16
* RECOMMENDATIONS	
Development of Quarantine and Inspection Facilities	1979/4:8
Regulations for Control and Inspection of Introductions	1979/4:7
Establishment of Pathogen-Free Brood Stocks	1979/4:9

SYNOPSIS OF RESOLUTIONS
Page 2

* RECOMMENDATIONS

Genetic Considerations of Introductions, Genetic Diversity, and Impact of Hybridization	1979/4:12
Co-operation with FAO	1970/2:12
Matters Related to:	
Macrocystis	1973/2:18; 1974/2:16
Sargassum	1973/4:5
Oncorhynchus	1979/4:6

1

Council Resolutions (C. Res.)

1969

C. Res. 1969/2:10
"taking into consideration the document C.M. 1968/E:10, 'The benefits and dangers in the introduction of fish and shellfish in the ICES area from other parts of the world' by A. C. Simpson, a Working Group be set up, at national expense, consisting of representatives from each member country, with Dr. H. A. Cole as Convener, to consider the principles which might govern the introduction and acclimatisation of non-indigenous marine organisms, especially shellfish and anadromous and catadromous fish species, and to report to the 1970 Statutory Meeting."

1970

C. Res. 1970/2:12
"a) since the final report of the Working Group to Consider the Benefits and Dangers in the Introduction of Fish and Shellfish in the ICES Area from Other Parts of the World must be based on comprehensive factual data on introductions of non-indigenous species made by member countries, the Working Group should continue its work until the next Statutory Meeting;

b) since the area covered by the Working Group includes part of the east coast of the U.S.A., the Council should seek co-operation with U.S.A.;

c) since a FAO Working Party is concerned with similar problems on a global scale and co-operation with that Working Party must be most useful, FAO be approached with the request that an Observer from the Council be invited to the next meeting of the FAO Working Party which will be held in February 1971."

1971

C. Res. 1971/1:8
"the Report of the Working Group on the Introduction of Non-Indigenous Marine Organisms be published as a 'Cooperative Research Report', together with the recommendations approved by the Council

1971 (continued)

C. Res. 1971/2:7
"a Working Group shall be set up, with Dr H A Cole as Convener, to:-

(a) collate and disseminate information received regarding existing and proposed introduction of non-indigenous marine organisms, and

(b) take responsibility for advising the Council on all questions relating to the introduction of new species and for suggesting and modifying agreed procedures covering them, with the aim of establishing an accepted International Code of Practice.

The Working Group should include in their consideration the movement of species between member countries as well as new introductions from outside the ICES area.

C. Res. 1971/4:5
"member countries are requested to provide on an annual basis to the Statutory Meetings of ICES information about introduction of non-indigenous marine organisms into and within the ICES area, supplementing and bringing up to date previous submissions and providing progress reports on introductions already made."

1972

C. Res. 1972/2:14
"the Working Group on the Introduction of Non-Indigenous Marine Organisms will meet under the chairmanship of Dr H A Cole for 3 days in London, in June 1973, to:

(a) review and update information on the introduction of non-indigenous marine organisms,

(b) develop further the provisional International Code of Practice which might govern such introductions,

(c) examine technical questions related to the control of such introductions.

C. Res. 1972/4:7
"since at the present meeting only one member country reported on transplantation of species, the member countries are reminded of their obligations to provide annual reports on this important subject."

1973

C. Res. 1973/2:18

"a) the Working Group on the Introduction of Non-Indigenous Marine Organisms should meet as soon as practicable to consider further the proposed introduction of Macrocystis to France in the light of the detailed assessment prepared by Peres et al., taking into account the discussion of this question at the 61st Statutory Meeting of ICES.

b) in view of the importance of the matter, all potentially affected member countries be requested to appoint members to the Working Group."

1973 (continued)

C. Res. 1973/4:4
"the Council endorse the Code of Practice developed by the Working Group on the Introduction of Non-Indigenous Marine Organisms and recommend its adoption by all member countries."

C. Res. 1973/4:5
"ICES should call the attention of all member countries to the potential danger of Sargassum muticum becoming established and recommend that in any country where it is discovered steps should be taken to effect its eradication by any method considered appropriate; and that ICES should be kept informed of actions taken in this respect."

1974

C. Res. 1974/2:16
"noting the Report of the Working Group on the Introduction of Non-Indigenous Marine Organisms on the proposed experimental introduction of Macrocystis pyrifera to France and the Resolution of the VIIIth International Sea Weed Symposium, as well as the discussion on this item in the Joint Meeting of the Fisheries Improvement and Shellfish and Benthos Committee,

a) if a new experiment is proposed, the Working Group on the Introduction of Non-Indigenous Marine Organisms should meet in France to consider the question further; and

b) that interested countries should be strongly urged to include algologists in their representation to the meeting."

1977

C. Res. 1977/4:13
"It was decided that the code of practice to reduce the risks of adverse effects arising from the introduction of non-indigenous marine organisms should again be circulated to Delegates."

1978

C. Res. 1978/2:28

"It was decided that the Working Group for the Introduction of Non-Indigenous Marine Organisms should be reconvened with Dr C. J. Sindermann as the Convenor. The recent plans on intended introductions should be assessed. The Group should also comment on the proposals made by the Working Group on Pathology of Marine Organisms to amend the present Code of Practice to reduce the risks of adverse effects arising from the introduction of non-indigenous marine species, adopted by the Council on 10 October 1973. The Group should meet at Conwy, 1-3 April 1979, immediately prior to the Working Group on Pathology so that one joint session of the Groups is possible."

1979

C. Res. 1979/2:20

(it was recommended that the next meeting of the Working Group be held from 22 - 25 April 1980 in Nantes, France)

C. Res. 1979/4:5

"It was decided that the revised Code of Practice to Reduce the Risks of Adverse Effects arising from Introduction of Marine Species is adopted as recommended by the joint meeting of the Working Group on the Introduction of Non-Indigenous Marine Organisms and the Working Group on Pathology and Diseases of Marine Organisms, held at Conwy, Wales, 4 April 1979."

C. Res. 1979/4:6

"It was decided that the Council should encourage member countries to conduct feasibility and environmental impact studies for all species of Oncorhynchus prior to any further introductions into North Atlantic waters and adjacent seas."

C. Res. 1979/4:7

"It was decided that because at present little standardisation exists and some nations exert little or no control, member nations and appropriate international organisations should be encouraged to consider regulations providing control and inspection of marine species considered for introduction."

C. Res. 1979/4:8

"It was decided that member countries should be encouraged to develop national or regional quarantine and inspection facilities for introduced marine species."

1979 (continued)

C. Res. 1979/4:9
"It was decided that member countries should be requested to encourage the establishment of brood stocks certified free of specified pathogens, for those species that are part of current commercial practice."

C. Res. 1979/4:10
"It was decided that member countries should be requested to complete the questionnaire on 'Statement of the present situation in relation to the introduction of non-indigenous marine organisms', as described and reproduced in Cooperative Research Report, No. 32. Completed questionnaires should be sent to Dr C Sindermann, Chairman of the Working Group, by 1 February 1980."

C. Res. 1979/4:11
"It was decided that Delegates should be encouraged to send to the ICES Secretariat by October 1980 copies of legislation and regulations in their countries regarding introductions, including considerations of the following: inspection and quarantine procedures, certification, training of inspectors, and intranational transfers. This material will be compiled into a summary report by the Working Group on the Introduction of Non-Indigenous Marine Organisms."

C. Res. 1979/4:12
"It was decided that attention should be given by ICES member countries to the genetic implications of the introduction of non-indigenous species, particularly the maintenance of genetic diversity during the establishment and proliferation of the stock and possible impacts of hybridization between natural and introduced stocks. Results of investigations should be reported at future meetings of the Council."

1980

C. Res. 1980/2:15
"It was decided that the name of the Working Group on Introduction of Non-Indigenous Marine Organisms should be modified to read: 'Working Group on Introductions and Transfers of Marine Organisms' in order to avoid difficulties in interpretation of terms."

1980 (continued)

C. Res. 1980/2:16
"It was decided that because of the great international importance of the matters considered by the Working Group on Introductions and Transfers of Marine Organisms, those countries not represented on it should at least provide written summaries of national activities to the meetings of the Working Group."

C. Res. 1980/2:18
"It was decided that the Working Group on Introductions and Transfers of Marine Organisms should meet in Sete, France, 5-8 May 1981 in order to consider the urgent problems concerned with the transfers and introductions of non-indigenous species such as oysters and salmon, and in order to complete a status report on introduced species, and a collation of all national legislation concerning introductions."

1981

C. Res. 1981/1:6
"It was decided that the report of the Working Group on Introductions and Transfers of Marine Organisms, edited by Dr C J Sindermann, should be published in the Cooperative Research Report series."

C. Res. 1981/2:18
"It was decided that the Working Group on Introductions and Transfers of Marine Organisms (Chairman: Dr C J Sindermann) should meet in La Coruna, Spain, 4-7 May 1982, to continue its oversight on salmon, oysters and seaweed introductions and its preparation of protocols and advisory documents."

1982

C. Res. 1982/2:12
"It was decided that the Working Group on Introductions and Transfers of Marine Organisms should meet in Bergen, Norway, 10 to 12 May 1983, with Dr C Sindermann as Chairman, to continue work on the 'Proposed Guidelines for Implementing the ICES Code of Practice concerning Introductions and Transfers of Marine Species'; on 'Protocols for Inspection of Marine Species prior to Importation'; and on the 'Revised Code of Practice to Reduce Risks for Adverse Effects arising from the Introduction of Marine Species'. Also to focus on ecological and genetic implications of introductions and transfers, and to continue oversight on introductions in ICES member countries."

1983

C. Res. 1983/2:37

"It was decided that the Working Group on the Introductions and and Transfers of Marine Organisms should meet in Halifax, Nova Scotia (Canada), from 17-19 May 1984, with Dr C J Sindermann as Chairman, to:

(i) expand and update information on national laws and regulations regarding introductions and transfers,

(ii) prepare and expand case studies of introductions and transfers,

(iii) continue the oversight of proposed and ongoing introductions and transfers of salmonid fish in ICES member countries,

(iv) consider the genetic and ecological implications of introductions and transfers,

(v) finalise the protocols for inspection of marine species prior to their importation,

(vi) finalise and complete the 'Revised Code of Practice to Reduce the Risks of Adverse Effects Arising from Introductions of Marine Species' and the 'Guidelines for Implementing the ICES Code of Practice concerning Introductions and Transfers of Marine Species' for consideration at the 1984 Statutory Meeting.

Appendix III

A Statement of Purpose:

Terms of Reference and Operating Principles

INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA
(ICES)

CONSEIL INTERNATIONAL POUR L'EXPLORATION DE LA MER
(CIEM)

WORKING GROUP ON INTRODUCTIONS AND TRANSFERS OF MARINE ORGANISMS

GROUP DE TRAVAIL SUR L'INTRODUCTION ET LES TRANSFERTS DES ORGANISMES MARINS

A STATEMENT OF PURPOSE:

TERMS OF REFERENCE AND OPERATING PRINCIPLES

MAY 1984

INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA (ICES)

CONSEIL INTERNATIONAL POUR L'EXPLORATION DE LA MER (CIEM)

WORKING GROUP ON INTRODUCTIONS AND TRANSFERS OF MARINE ORGANISMS

GROUP DE TRAVAIL SUR L'INTRODUCTION ET LES TRANSFERTS DES ORGANISMES MARINS

A STATEMENT OF PURPOSE AND OPERATING PRINCIPLES

Terms of Reference

The establishment and function of the Working Group on Introductions and Transfers of Marine Organisms are given in C. Res. 1969/2:10 and C. Res. 1971/2:7. These define the terms of reference of the Working Group as follows:

(1) "to consider the principles which might govern the introduction and acclimatisation of non-indigenous marine organisms, especially shellfish and anadromous and catadromous fish species" including "the movement of species between member countries as well as new introductions from outside the ICES area",

(2) "collate and disseminate information regarding existing and proposed introduction of non-indigenous marine organisms",

(3) "take responsibility for advising the Council on all questions relating to the introduction of new species and for suggesting and modifying agreed procedures covering them, with the aim of establishing an accepted International Code of Practice"

Additional activities of the Working Group, as defined in C. Res. 1982/2:12 and C. Res. 1983/2:37, are as follows:

(4) to develop "A Manual of Procedures to Reduce the Risks of Adverse Effects Arising from the Introductions and Transfers of Marine Species", which includes protocols on quarantine, inspection, and certification procedures, and pathological, ecological, genetic, and behavioral considerations of introductions

(5) to call national attention to problems which may result from, or which have resulted from, proposed or actual introductions or transfers (the "Case Histories of Introductions and Transfers")

STATEMENT OF PURPOSE/2

(6) to maintain a current record of all national laws, regulations, and codes concerning introductions and transfers within the ICES area of interest ("Summaries of National Laws")

The regions of consideration of the Working Group are defined as follows: "The area covered by the Group should be the North Atlantic, north of a line between Gibraltar and Cape Hatteras, U.S.A." (Procès-Verbal de la Réunion, 1970: 65).

These responsibilities and activities are carried out by the receipt of proposals and of requests for advice, and by continued revisions, updating, and dissemination of materials, pertinent to the attainment of the goals stated above.

Operating Principles and Policies

The Working Group (hereafter, WG) has developed a set of operating principles during and since its meeting in Conwy, Wales, in 1979. These serve as a general framework for its discussions and deliberations. These operating principles are as follows (wherein the word "importation" is understood to include both "introductions" and "transfers"):

(1) The role of the WG should be an objective one, of examining all scientific aspects of proposed or of existing introductions and transfers, but should not be one of serving as an immovable barrier to all importations. In turn, the WG should avoid actively recommending or endorsing an importation, but rather should examine and study all available data, drawing conclusions therefrom, and offering advice based upon those considerations.

STATEMENT OF PURPOSE/3

(2) The WG should be aware of, or be made aware of, and should be sensitive to, the pragmatic (practical) economic and/or social aspects of introductions, but should evaluate proposals on the basis of the available scientific data.

(3) Proposed deliberate introductions should have clearly stated and demonstrated rational bases. Proposals which are, in the view of the WG, without adequate rationale, poorly planned, or are unnecessarily risky, should be clearly identified as such by the Group.

(4) Relative to (1), (2), and (3), the WG refers to the "ICES Revised Code of Practice to Reduce the Risks of Adverse Effects Arising from the Introduction and Transfer of Marine Species" as a basic document for considering any introductions or transfers. By doing so, the WG encourages those contemplating introductions or transfers to do the same.

(5) Relative to (4), the WG examines proposals for introductions based upon relevant major scientific implications and viewpoints, which include but which are not limited to the following:

(a) ecological considerations: population-level and community-level processes, including competition, predation, habitat and microhabitat utilization, diversity, and other phenomena

(b) genetic considerations: including the potential for hybridization, change in gene frequency, change in gene diversity, and changes and/or modifications of disease and/or parasite resistance

STATEMENT OF PURPOSE/4

(c) behavioral considerations: including interactions between native and exotic species,

(d) pathological considerations: including the potential for unintentional introduction of diseases and parasites.

(6) Relative to (4), the WG strongly encourages the development of native species or of species stocks, through scientific management and mariculture (aquaculture) practices, and encourages such development to be considered whenever and wherever feasible as an alternative to introducing new species.

(7) Relative to (4), the WG encourages the consideration of non-migratory species as opposed to migratory species, because of the potential of the latter for uncontrolled straying and subsequent colonization.

(8) The WG, by undertaking deliberations, thereby encourages that all importations should be made under adequate national control and surveillance supported by an adequate legal framework of laws and regulations, including those focused upon mandatory and standardized inspection, quarantine, and certification procedures.

(9) The WG notes, relative to all of its deliberations, that the outcome of an introduction or transfer cannot be fully predicted, so that any importation is an exercise in risk-assessment and risk-taking.

(10) The WG notes, relative to all of its deliberations, that it understands and assumes that all proposed introductions are accompanied by full and adequate procedures and provisions for post-importation (follow-up) monitoring.

STATEMENT OF PURPOSE/5

(11) The WG encourages strong policies for guarding against accidental introductions, by whatever means.

(12) The WG will not initiate proposals, but will study proposals submitted to the Council, and offer scientific opinions based upon the best available data.

(13) The WG may, as perceived necessary, initiate special studies of topical problems concerned with introductions and transfers of marine organisms.

(14) The WG encourages public dissemination of the results of its discussions and of the documents so produced.

APPENDIX IV.

Other Procedures Concerning Introduced Species: Canada, France, and Ireland

CANADA

MISCELLANEOUS SPECIAL PUBLICATION NO. 31

Fish Health Protection Regulations Manual of Compliance

DEPARTMENT OF FISHERIES AND THE ENVIRONMENT
FISHERIES AND MARINE SERVICE
OTTAWA
DECEMBER 1976

Printed in Canada 1977
Reprinted in 1977

ABSTRACT

Department of Fisheries and the Environment, Fisheries and Marine Service. Fish Health Protection Regulations: manual of compliance. Fish. Mar. Serv. Misc. Spec. Publ. 31: 36 p.

This manual explains the application of the Fish Health Protection Regulations under the Fisheries Act of Canada. It outlines the administrative and inspection procedures to be followed and provides step-by-step procedures for handling fish samples to test for the major bacterial, viral, and myxosporidian pathogens of salmonids.

All movements of fish into Canada or between provinces require a permit. This permit will be issued only to producers whose facilities have been inspected and certified free of designated diseases.

The sampling procedures are based on the probability of detecting a disease agent carrier, assuming a certain prevalence of carriers in the population. Composition, transportation, and laboratory handling of the samples are described in detail.

The methods provide for the detection of the following pathogens: the kidney disease bacterium; the redmouth bacterium (Enterobacteriaceae); Aeromonas salmonicida; the protozoans Myxosoma cerebralis and Ceratomyxa shasta; the viruses causing viral hemorrhagic septicemia, infectious hematopoietic necrosis, and infectious pancreatic necrosis; myxobacteria; the motile aeromonads; the pseudomonads; and the vibrios. Identification to the species level is not required for the last four organisms.

CONTENTS

FRANCE

INSTITUT SCIENTIFIQUE ET TECHNIQUE
DES PECHES MARITIMES

Service des contrôles sanitaires
et techniques

Département "Cultures marines"

NOTE TECHNIQUE

relative aux équipements des établissements agréés pour l'immersion de coquillages étrangers

Novembre 1981

CHAPITRE I

PRESCRIPTIONS RELATIVES A L'AGREMENT DES ETABLISSEMENTS AUTORISES A PRATIQUER LE RETREMPAGE DE COQUILLAGES ETRANGERS DE TAILLE MARCHANDE

INTRODUCTION

Les règles générales d'application de l'arrêté n° 4160 P.3 du 21 novembre 1969 telles que récemment redéfinies imposent qu'à l'avenir les immersions de coquillages étrangers de taille marchande soient strictement interdites en milieu ouvert ou dans un établissement en contact direct avec le milieu ouvert.

Seuls des établissements spécialement équipés et agréés spécifiquement pourront bénéficier des dérogations prévues à l'article 2 de l'arrêté précité. Leur agrément sera conditionné par la réalisation d'équipements de désinfection de leurs rejets d'eau de mer vers le milieu ouvert.

La présente note précise les conditions générales qui seront mises à l'agrément ainsi que les types de traitement des eaux de rejet prescrits.

1 - Dispositions générales

1.a) Les établissements autorisés à immerger des coquillages étrangers de taille marchande (ie. pouvant bénéficier de dérogations) importés en vue de leur livraison à court terme à la consommation, devront obligatoirement être inscrits au casier sanitaire.

Cette autorisation sera matérialisée par un agrément spécifique de l'I.S.T.P.M.. Cet agrément sera conditionné par la réalisation et le respect permanent des conditions ci-après (articles 7 et 17 du décret du 20 août 1939).

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1.b) Les établissements agréés devront disposer de bassins d'entreposage isolés (pas de rejet direct des eaux dans le milieu ouvert). Une capacité maximale d'accueil sera déterminée au moment de l'agrément en fonction des dimensions des bassins isolés sans possibilité de vidange directe au milieu.

Ces bassins devront pouvoir être remplis et surtout vidangés à la demande. Il est en effet nécessaire qu'en cas d'accidents tels que pollutions, mortalités abondantes, pontes massives... les bassins puissent être vidés rapidement. Dans tous les cas, *le délai maximum de vidange des bassins ne devra pas excéder deux heures.*

1.c) Les établissements agréés devront disposer de locaux de conditionnement en rapport avec la capacité d'accueil des bassins.

Les coquillages étrangers immergés dans l'établissement ne pourront quitter celui-ci que pour la consommation immédiate. Ils seront donc obligatoirement conditionnés et étiquetés sur place (étiquette sanitaire de l'établissement). *Tout conditionnement, reconditionnement ou entreposage dans un autre établissement conchylicole sera formellement prohibé.*

Les colis porteront obligatoirement sur une étiquette fixée de façon apparente à l'extérieur de l'emballage la mention :

"... (dénomination de vente du coquillage) importé de... (pays d'origine)".

1.d) Les détenteurs d'établissements agréés auront l'obligation de tenir à la disposition des services de contrôle un registre "importations" sur lequel devront être obligatoirement répertoriées toutes les opérations réalisées.

Sur ce registre devra notamment figurer la liste complète et précise des différents acheteurs des lots entreposés dans l'établissement.

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1.e) Les eaux dans lesquelles les coquillages étrangers auront été immergés ou plus généralement toutes les eaux ayant été au contact desdits coquillages (eaux de lavage) ne devront en aucun cas retourner directement au milieu marin.

Pour ce faire, deux solutions techniques sont admissibles :

. si l'environnement spécifique de l'établissement le permet, un épandage ou un lagunage à terre sans aucun retour des eaux à la mer ,

. dans le cas contraire, l'application d'un traitement de désinfection des eaux avant leur rejet au milieu ouvert. Les traitements de désinfection prescrits sont décrits au paragraphe 2 ci-après.

Pour permettre à l'établissement de faire face sans inconvénients majeurs à une défaillance de 24 h du dispositif de désinfection, il devra obligatoirement disposer d'un bassin de rétention des eaux d'un volume égal à la somme des volumes utiles des bassins d'entreposage.

1.f) Le non respect des dispositions décrites ci-dessus ou de celles permettant l'exécution des contrôles entraînera la suspension temporaire ou définitive de l'agrément.

2 - Traitements de désinfection recommandés

En l'absence de données expérimentales obtenues spécifiquement sur les germes pathogènes pour les coquillages, les méthodes et équipements de désinfection retenus ici sont ceux qui, déjà utilisés aussi bien en France qu'à l'étranger dans des domaines similaires (désinfection des eaux de piscines...), présentent un maximum de garanties quant à leur efficacité dans la lutte contre les maladies hydriques humaines (champignons, bactéries, virus...). De plus, pour garantir encore davantage l'efficacité de ces méthodes à l'égard des maladies des coquillages, il a été pris la précaution d'augmenter les doses d'application des agents désinfectants.

Ceci étant, d'autres procédés de désinfection pourraient être envisagés. Néanmoins, faute de données expérimentales suffisantes, il a été jugé préférable de ne

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pas les retenir pour l'instant. Tout procédé nouveau devra en conséquence faire l'objet d'un avis de principe favorable de l'I.S.T.P.M.. Cet avis sera fondé sur les résultats d'expérimentations spécifiques programmées par l'Institut des Pêches. Deux méthodes de désinfection peuvent d'ores et déjà être écartées : ultrafiltration et le rayonnement U.V.

2.a) *Traitements retenus*

Ce sont les traitements de désinfection faisant appel à l'ozone, au chlore et au brome.

Les spectres d'action de ces trois oxydants sont sensiblement les mêmes puisque, dans les trois cas, l'activité biocide est celle du brome et de ses dérivés (contenus à l'état naturel dans l'eau de mer, vers lesquels se déplacent les équilibres chimiques).

Le tableau joint en annexe n° 1 synthétise un certain nombre de données relatives à ces trois traitements.

2.b) *Conditions d'application, intensité du traitement, installations*

Le schéma joint en annexe n° 2 illustre les conditions dans lesquelles ces traitements devront être mis en oeuvre et les installations qu'elles nécessitent.

Ce schéma appelle les commentaires et précisions suivantes :

. dans tous les cas, le passage des eaux dans un filtre à sable est fortement recommandé, ce traitement préalable contribuera à une meilleure efficacité du traitement désinfectant proprement dit. Ce filtre devra néanmoins être régulièrement nettoyé (inversion du flux d'eau) et les eaux de lavage seront soit épandues en milieu terrestre (si possible) soit soumises à un traitement désinfectant (chlore ou brome) de forte intensité,

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. les doses d'utilisation recommandées sont les suivantes en regard des doses habituellement usitées dans le cadre de la lutte contre les maladies hydriques humaines "classiques" :

			OZONE	CHLORE	BROME
Doses d'utilisation "classiques"			0,5 à 1,5 mg/l	3 mg chlore libre/litre	1 à 4 mg/l
Doses préconisées	Eau des bassins	Avec filtration	1,5 à 2,5 mg/l	5 mg/l	5 mg/l
		Sans filtration		10 mg/l	10 mg/l
	Eau des filtres			20 mg/l	20 mg/l et dilution avant rejet au milieu

Ces doses d'utilisation seront éventuellement réajustées en fonction des résultats d'expérimentations spécifiques conduites sur les agents pathogènes et divers parasites des coquillages d'une part, sur l'incidence des résidus de désinfectant vis-à-vis du milieu marin d'autre part. Sur ce dernier point, il importe de souligner qu'une étude particulière à chaque établissement agréé devra être faite pour déterminer les conditions de rejet des eaux traitées en fonction de l'environnement local ;

. un temps de contact suffisant entre eaux soumises au traitement et agent désinfectant devra être assuré. Dans le cas du traitement à l'ozone, cette condition sera réalisée (en fonction de la puissance de l'appareil installé) dans la tour de contact fournie par le fabricant du matériel. Par contre, en ce qui concerne les traitements au chlore et au brome, un bassin de contact devra être mis en place. Il sera de dimensions suffisantes pour assurer une durée de contact minimale d'une heure.

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c) *Coût des installations prescrites*

Le coût des installations à mettre en place en vue de l'agrément sera fonction de la méthode de traitement retenue et de la capacité d'accueil de l'établissement.

Néanmoins, pour permettre d'approcher l'ordre de grandeur des investissements nécessaires dans chaque cas, ont été réunies dans l'annexe 3 ci-jointe un certain nombre de données chiffrées.

Ces données reposent sur des informations fournies par les principaux constructeurs et installateurs de matériels d'une part, sur des devis actualisés de construction d'autre part.

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CHAPITRE II

PRESCRIPTIONS RELATIVES A L'AGREMENT DES STATIONS DE QUARANTAINE

olissements où seront consignés les coquillages destinés à être immergés en milieu ouvert)

Les stations de quarantaine sont destinées à accueillir des coquillages importés en vue de l'élevage ou d'un complément d'élevage, mais pour lesquels l'autorisation définitive d'immersion ne pourra être donnée qu'au vu des résultats d'un examen pathologique systématique pratiqué par l'I.S.T.P.M.

La station de quarantaine doit donc être un établissement spécialement aménagé pour l'immersion temporaire des lots de coquillages en attente d'une décision définitive et de telle sorte que lesdits coquillages ne puissent contaminer le milieu ouvert.

Elle devra en conséquence présenter, pour pouvoir être agréée, des garanties d'innocuité de ses rejets analogues à celles qui ont été prescrites pour les établissements d'entreposage de coquillages étrangers de taille marchande. Les méthodes de traitement des eaux et équipements nécessaires seront donc identiques à ceux décrits au chapitre II.

On remarquera néanmoins que, s'agissant de coquillages destinés à une immersion ultérieure en milieu ouvert, la station de quarantaine n'est pas soumise à la condition d'inscription au casier sanitaire et à ce qu'elle implique sur le plan des équipements (installations de conditionnement...).

Le responsable de la station sera chargé de tenir à jour un registre particulier sur lequel seront répertoriées toutes les opérations réalisées. Tout lot

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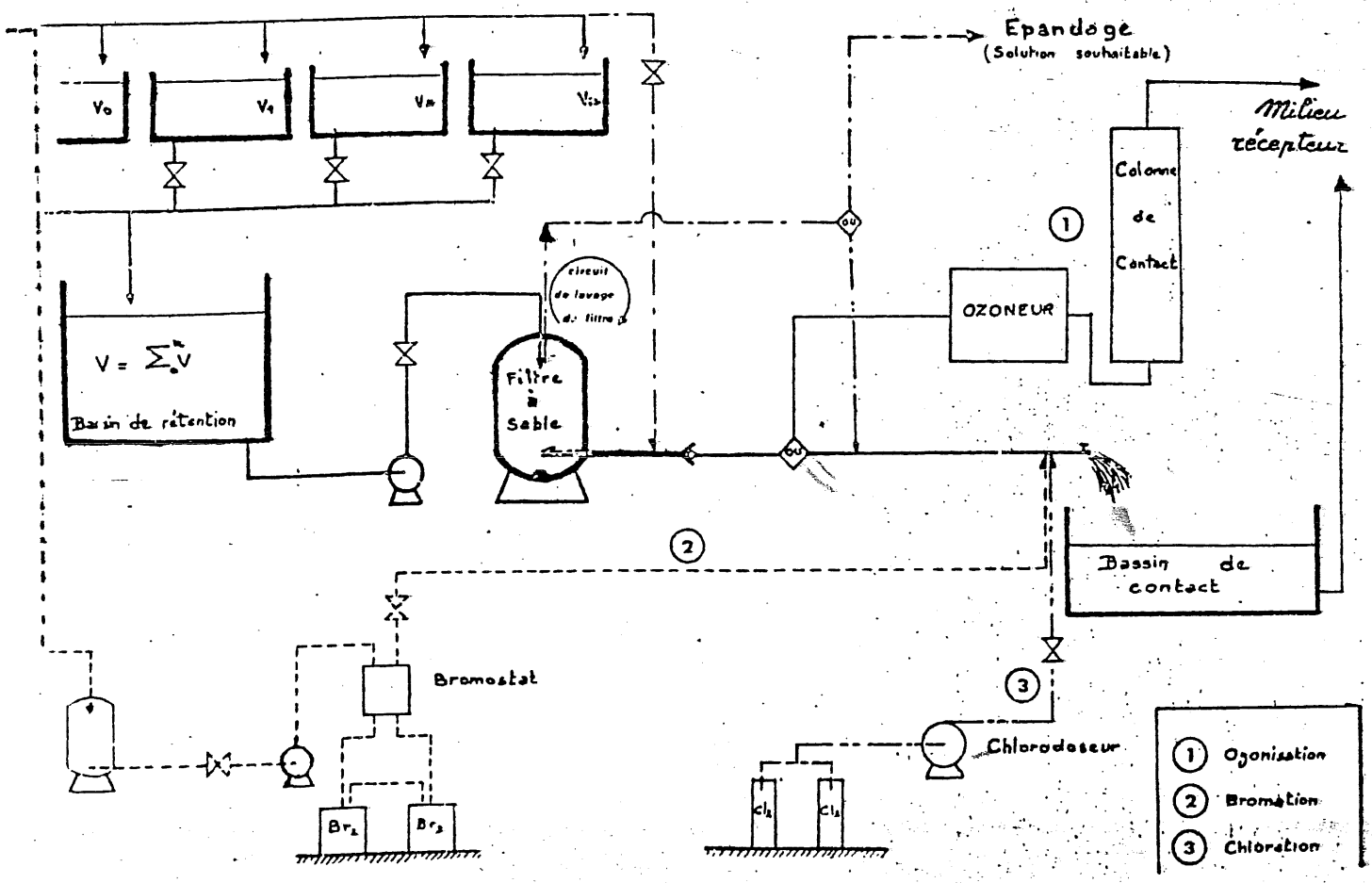
immergé dans la station étant considéré comme consigné, il ne pourra quitter celle-ci que sur avis favorable du Service de contrôle, notifié par écrit sur ledit registre. Les lots déconsignés seront transférés vers les lieux d'immersion sous couvert d'une autorisation de transport délivrée par l'I.S.T.P.M.

ANNEXE 1

EXAMEN COMPARATIF DES PROCEDES DE DESINFECTION PRECONISES

	OZONE	CHLORE	BROME
onnées sitives	. Oxygénation de l'eau. . Disparition du résiduel d'ozone en 3 mn. . Absence de manipulation . Faible toxicité pour l'homme. . Fiabilité du système entièrement automatisé.	. Coût peut élevé. (# 7 F HT/Kg) . Seul le chlore gazeux nécessite un asservissement.	. Formation de bromamines instables. (T 1/2 = 5 mn pour NBr_3 et 30 mn pour $NH\ Br_2$) Monobromamine active. . Possibilité de production du brome à partir de pastilles se décomposant au contact de l'eau. . Fiabilité d'un système obligatoirement automatisé.
Pouvoir germicide dû au brome et ses dérivés			
onnées gatives	. Formation d'ions bromure ($Br\ O_3^-$) . Consommation 25 w/h pour produire 1 g d'ozone.	. Formation de chloramines en présence de teneurs élevées en NH_4^+. . Composés stables (T 1/2 = 10 - 15 h).	. Coût supérieur à celui du chlore. (# 10 F HT/Kg) . Nécessité d'un asservissement total compte tenu danger manipulation brome liquide.
		Vapeurs corrosives et dangereuses à respirer	


Épandage
(Solution souhaitable)
Milieu récepteur
Colonne de Contact
OZONEUR
circuit de lavage d.. filtre
Filtre à Sable
Bassin de rétention
Bassin de contact
Bromostat
Chlorodoseur
1 Ozonisation
2 Bromation
3 Chloration

ANNEXE 3

NNEES CHIFFREES PERMETTANT D'ESTIMER LE COUT DES EQUIPEMENTS NECESSAIRES
(au 1.10.1981)

. Bassin cimenté (parois et fond) y compris travaux de terrassement.... # 1 000 F/m3

. Bassin de rétention en terre avec bâche agricole en polyéthylène..... # 30 à 50 F/m2

. Pompe 175 m3/h. (permettant la vidange de 350 m3 en 2 h., soit 500 m2 de bassin)..... # 20 000 F

. Dispositif de chloration ou de bromation pour le traitement de 375 m3/jour..... # 100 000 F

. Bassin de contact pour 50 m3 (ouvrage cimenté)..... # 70 000 F

. Injecteur de chlore (chlorodoseur)..... # 30 000 F

. Injecteur de brome (bromostat)..... # 40 000 F

. Filtre à sable pour filtration de 500 m3/jour, y compris pompe..... 20 à 25 000 F

. Ozoneur pour 15 m3/h. (375 m3/j.)..... # 140 000 F

. Local technique..... # 50 000 F

IRELAND

Importation regulations and health certification for Atlantic salmon smolts, Tilapia, and red drum:

Salmon

One licence was granted in 1983 for the importation of 60,000 live smolts into Ireland from Norway. The conditions applied to the importation were as follows:

1. Any proposed importation must comply strictly with the health requirements laid down in the Certificate of Health accompanying this Import Licence. The Certificate of Health must be signed by Dr. Tore Hastein of the National Veterinary Institute, Oslo, Norway and must be submitted to the Department of Fisheries and Forestry, for scrutiny prior to importation. A copy of the certificate must also accompany the consignment of fish. The fish must also be free from undesirable pests and parasites.

2. The destination of the imported smolts will have been inspected before importation under this licence by an officer of the Department of Fisheries and Forestry, Dublin, and will have been deemed to be adequately isolated from other fish farms and pose not known disease risk to other fish farms or wild fish stocks.

3. All equipment and packing used in transporting the fish shall be new and unused or cleaned and disinfected before and after use in accordance with the instructions laid down in the Appendix attached to this import licence. Any disposable material must be buried or burned after use.

4. No water from the compartment in which the fish being imported under this licence are transported shall be discharged from the transporting vessel into Irish territorial waters unless it passes through an acceptable sterilising procedure.

5. Movement of the fish imported under this licence to any other farm is prohibited.

6. All imported fish dying in transit or immediately afterwards must be burned or buried, a sample having first been dispatched to the Department of Fisheries and Forestry, Fisheries Research Centre, Fish Pathology Unit, Abbotstown, Castleknock, Co. Dublin.

7. Any mortalities occurring in the imported fish during the on-growing period must be immediately reported to the Department of Fisheries and Forestry, Fisheries Research Centre, Fish Pathololgy Unit, Abbotstown, Castleknock, Co. Dublin.

8. In the event of any serious disease outbreak occurring in the fish following importation, any measures (including slaughter without compensation) deemed necessary by the Department of Fisheries and Forestry to control or eradicate such disease must be immediately carried out.

9. Prior to importation, the farm of production must have been examined by an officer of the Department of Fisheries and Forestry, Dublin, and certified by him to be in a satisfactory condition.

10. The date and place of importation must be notified to the Secretary, Department of Fisheries and Forstry, Agriculture House (Floor 6E), Kildare Street, Dublin 2 at least seven days before importation takes place.

11. Samples of the live fish imported under this licence must be sent for examination to the Department of Fisheries and Forestry, Fisheries Research Centre, Fish Pathology Unit, Abbotstown, Castleknock, Co. Dublin. by the licensee once a week aned thereafter as frequently as requested by the Department.

12. The farm of destination and all premises used in connection with operations carried on at the said fish farm shall be open to inspection at any time by any authorised officer within the meaning of the Fisheries Acts 1959 to 1980.

The Health Certificate contained the following conditions:-

1. The fish, including brookstock, on the farm of origin described at 1 above are free of the diseases listed at (a) to (h) below, this status having been ascertained by means of the tests and sampling procedures as described by the Department of Fisheries and Forestry, Dublin in the Appendix to this certificate, such tests having been carried out by Dr. Tore Hastein or by an officer of the National Veterinary Institute, Oslo, Norway under his supervision.

   (a) Infectious Pancreatic Necrosis (IPN)
   (b) Viral Haemorrhagic Septicaemia (VHS)
   (c) Infectious Haematopoietic Necrosis (IHN)
   (d) Corynebacterial Kidney Disease (BKD)
   (e) Furunculosis
   (f) Vibriosis
   (g) Whirling Disease (Myxosomiasis)
   (h) Proliferative Kidney Disease (PKD)

2. The farm of origin has been inspected regularly by Dr. Tore Hastein or by an officer of the National Veterinary Institute, Oslo, Norway, under his supervision at not less than six monthly intervals over the preceding two years.

3. Samples of fish from the farm of origin have been examined by Dr. Tore Hastein or by an officer of the National Veterinary Institute, Oslo, Norway under his supervision at intervals of not less than six months over a periopd of two years prior to the issue of this certificate and were found to be free of the diseases listed (a) to (h) at 1 above using the tests, sample size and procedures as laid down by the Department of Fisheries and Forestry, Dublin in the Appendix attached to this certificate.

4. A representative sample of the fish to be dispatched has been examined by Dr. Tore Hastein or by an officer of the National Veterinary Institue, Oslo, Norway, under his supervision within 28 days of dispatch and was found to be free of the diseases listed at (a) to (h) at 1 above using the tests, sample size and procedures laid down by the Department of Fisheries and Forestry, Dublin, in the Appendix attached to this certificate.

5. A representative sample of the fish to be dispatched has been examined by Dr. Tore Hastein or by an officer of the National Veterinary Institute, Oslo, Norway, under this supervision within 28 days of dispatch and was found to be free of diseases listed at (a) to (h) at 1 above using the tests, sample size and procedures laid down by the Department of Fisheries and Forestry, Dublin, in the Appendix attached to this certificate.

6. The fish in the consignment are free of all undesirable pests and parasites.

7. All the fish in the consignment are from the same farm of origin between the last date of examination as referred to at 5 and the date of dispatch of the consignment.

TILAPIA & RED DRUM

A proposal to import Tilapia and Red Drum* fish (palagic egg layer) from Florida into Ireland was received in 1983. A small number of Tilapia would be imported initially to serve as a brookstock. In the case of the Red Drum fish it was proposed to import several thousand small fry for several years from which the majority would be ongrown and a smaller number retained to from a brookstock. As these are warm water tropical fish the proposal envisaged using the warm water effluent from one of the power stations to cultivate these fish. The conditions applied to importation were as follows:

1. Any proposed importation of Tilapia sp. must comply strictly with the health requirements laid down in the Certificate of Health accompanying this import licence. The Certificate of Health must be signed by the Superintending Veterinary Office for Fish Diseases for the State of Florida, U.S.A., and must be submitted to the Secretary, Department of Fisheries and Forestry (Fisheries Division), Leeson Lane, Dublin 2, Ireland, for scrutiny prior to importation. A copy of the said certificate must also accompany the consignment of Tilapia sp.

2. The farm of destination will have been inspected before importation takes place under this licence by an officer of the Department of Fisheries and Forestry, Dublin, and will have been deemed to be adequately isolated from and pose no disease risk to other fish farm or to wild fish stocks.

3. All equipment and packaging used in transporting the Tilapia sp. shall be new and unused or cleaned and disinfected before and after use in accordance with the instructions laid down in the Appendix attached to this import licence. Any disposable material must be buried or burned after use.

*Sciaenops ocellatus

4. Water used in transporting the Tilapia sp. must be thoroughly sterilized before disposal in accordance with the instructions laid down in the Appendix attached to this import licence.

5. At the farm of destination any measures, such as treatment of outflow water, deemed necessary by the Department of Fisheries and Forestry, Dublin 2, must be carried out.

6. Movement of the live Tilapia sp. imported under this licence to any farm or elsewhere other than to the farm of destination is prohibited.

7. All imported Tilapia sp. dying in transit or immediately afterwards must be burned or buried, a sample having first been dispatched to the Department of Fisheries and Forestry, Fisheries Research Centre, Fish Pathology Unit, Abbotstown, Castleknock, Co. Dublin.

8. Any mortalities occurring in the imported Tilapia sp. during the on-growing period must be immediately reported to the Department of Fisheries and Forestry, Fisheries Research Centre, Fish Pathology Unit, Abbotstown, Castleknock, Co. Dublin.

9. In the event of any disease outbreak occurring in the Tilapia sp. following importation, any measures as directed by the Department of Fisheries and Forestry, Dublin, to control or eradicate such disease must be immediately carried out by the licensee.

10. Prior to importation, the installation or origin of the Tilapia sp. to be imported under this licence will have been examined by an officer of the Department of Fisheries and Forestry, Dublin, and certified by him to be in a

satisfactory condition.

11. The date and place of importation of the Tilapia sp. must be notified to the Secretary, Department of Fisheries and Forestry, Leeson Lane, Dublin 2, at least seven days before importation takes place.

12. The live Tilapia sp. imported under this licence must be sent for examination to the Department of Fisheries and Forestry, Fisheries Research Centre, Fish Pathology Unit, Abbotstown, Castleknock, Co. Dublin, by the licensee, as frequently as required by the Department of Fisheries and Forestry, Dublin.

14. The farm of destination and all premises used in connection with operations carried on at the said Tilapia sp. farm shall be open to inspection at any time by any authorised officer within the meaning of the Fisheries Acts, 1959 to 1983.

Health certificate conditions:

1. The Tilapia sp. referred to at 3 and 4 above, including their broodstock, on the installation or origin described at 1 above are free of all diseases, pests and parasites, this disease, pest and parasite free status having been ascertained by tests and sampling procedures as prescribed by the Deparment of Fisheries and Forestry, Leeson Lane, Dublin 2, Ireland, in the Appendix attached to this certificate, such tests and sampling having been done by the Superintending Veterinary Officer for Fish Diseases, for the State of Florida, U.S.A., or, under his supervision, by a veterinarian or fish pathologist in the United States of America who is recognised by and acceptable to the said Superintending Veterinary Officer.

2. The installation of origin has been inspected regularly by the Superintending Veterinary Officer for Fish Diseases, for the State of Florida, USA, or, under this supervision, by a veterinarian or fish pathologist recognised by and acceptable to the said Superintending Veterinary Officer.

3. Samples of Tilapia sp. from the installation of origin have been examined by the said Superintending Veterinary Officer for Fish Diseases, or under his supervision, by a Veterinary Officer for Fish Diseases or, under this supervision, by a veterinarian or a fish pathologist recognised by and acceptable to him, at regular intervals over a period of two years prior to the issue of this certificate and were found to be free of all diseases, pests and parasites, using the tests, sample size and procedures as laid down by the Department of the Fisheries and Forestry, Dublin, in the Appendix attached to this certificate.

4. A representative sample of 10% of the number of Tilapia sp. to be dispatched to Ireland has been examined by the Superintending Veterinary Office for Fish Diseases, for the

State of Florida, USA, or, under his supervision, by a veterinarian or fish pathologist recognised by and acceptable to him, within 28 days of their dispatch to Ireland and was found to be free of all diseases, pests and parasites using the test, sample size and procedures laid down by the Department of Fisheries and Forestry, Dublin, Ireland, in the Appendix attached to this certificate.

5. All of the Tilapia sp. contained in the consignment to bne dispatched to Ireland have been supplied solely from the installation of origin designated at 1 above in this certificate and none of them was taken from elsewhere outside the said installation.

6. No additional Tilapia sp. from any other installation or place have been brought to the installation of origin designated at 1 above and added to the consignment to be dispatched to Ireland under this import licence between the last date of examination as referred to at 4 above and the date of dispatch of the consignment.

7. Prior to dispatch of the consignment of Tilapia sp. to Ireland the fish have been treated as prescribed in the Appendix attached to this certificate.

Appendix V

Historical Data on Early Finfish Introductions into the Netherlands and Germany

Historical data on early finfish introductions into the Netherlands and Germany

(Submitted by S. J. de Groot, 1984)

Old information was retrieved re the introduction in the end of the last century of American fresh water species into Germany.
As the data of these introductions is lacking in the more recent publications, the publications very rare some attention is given here.
It is more than likely that at least 3 species, Large-mouth bass, Horned pout (and with it unnoticed Black Bullhead) and Sunfish were introduced into The Netherlands from Germany. In The Netherlands on the border with Belgium there still exists a large population of *Umbra pygmaea*, the Striped Mud Minnow, likely introduced around the turn of the century from America.

The German publications are all by M. VON DEM BORNE, father and son were very active in this field (VON DEM BORNE, 1888, 1890-a,b,c, 1892-a,b). The Latin species names are given unaltered.

1. *Grystes nigricans* - Small mouthed Black bass - 7 specimen from Prof. S.F. Baird (Washington) caught in Greewoodlake by New York by Mr. F. Mather - February 1883 dispatched to Germany, arrived alive, however, in due time 4 died, successfull propagation.
2. *Grystes salmoides* - Big mouthed Black bass - 45 specimen, same source, send with the previous species, 10 stayed alive, successfull propagation (Large-mouthed bass - *Micropterus salmonides)*.
3. *Amiurus nebulosus* - Small Catfish - 50 specimen from Prof. S.F. Baird to Germany (Deutschen Fischerei Vereins) very successfull propagation.

   (It proved that in fact two species were introduced, *Ictalurus nebulosus* and *Ictalurus melas* - NIJSSEN & DE GROOT, 1974).
4. *Centrarchus hexacanthus* - Calico bass, introduced in Germany via France. Introduced from America by Mr. Am. Berthoule, 23 specimen, handed over to Mr. E. Bertrand 01-04-1887 and stored into a pond near Versailles. They produced 500 young fish in 1887 and several thousands in 1888.
5. *Centrarchus aeneus* - Rock bass, 20 specimen send to Germany on instruction of the Commissioner of Fisheries Prof. S.F. Baird, via Mr. F. Mather on 26 February 1887. Arrived on the 12th of March 1887 in Berneuchen. In 1889 they spawned for the first time, still 12 alive from the first batch.
6. *Pomotis vulgaris* - Sunfish - first introduced around 1885 in France and exported from there to Germany. In 1891 directly imported by M. von dem Borne junior from America, 500 specimen to Berneuchen.
7. *Pomotis auritus* - Moon fish - 18 specimen imported from America in 1891 by M. von dem Borne junior.
8. *Amia calva* - Dogfish - 2 specimen imported from America by M. von dem Borne in 1891.

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Appendix VI

Seafarm Ventures, Halifax County, Canada, and

Quarantine Facility, Fisheries Laboratory,

Fisheries and Oceans Canada, Halifax, N.S.

SEAFARM VENTURES, HALIFAX COUNTY, NOVA SCOTIA

On 17 May 1984 the Working Group visited and examined the field and laboratory facilities of Seafarm Ventures, Inc., at Sambro Head, Halifax County, Nova Scotia. Ms. Catherine Enright, of the Department of Biology, Dalhousie University, Halifax, gave the Group a detailed tour of the facility, which focuses on the commercial production of the European flat oyster, Ostrea edulis, by grow-out in a marine, shallow-water embayment on the coast east of Halifax, of hatchery-produced seed. (Oyster production here relies upon hatchery-produced seed; only rarely is there a small natural set in the grow-out region) Seafarm Ventures, and other enterprises which produce the "Nova Scotia Belon Oyster" (Ostrea edulis) are part of an "Ostrea edulis Cooperative Limited."

The visit was arranged through the efforts of Dr. John Castell and Mr. Gary Turner, of Fisheries and Oceans Canada, to whom and to Ms. Enright the Working Group extended its thanks and appreciation.

QUARANTINE FACILITY, FISHERIES LABORATORY, HALIFAX

On 18 May 1984 the Working Group toured and examined the laboratories of the Quarantine Facility of the Fisheries Laboratory of Fisheries and Oceans Canada, Halifax. The facility includes chlorine gas injection of all treatment water. Current studies focus upon the rainbow trout (Salmo gairdneri), brook trout (Salvelinus fontinalis), Atlantic salmon (Salmo salar), and American lobsters (Homarus americanus).

Appendix VII

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