North American Commission

NAC(02)8

Report of Activities – 2001/2002

NAC Scientific Working Group on Salmonid Introductions and Transfers

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Members:

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The Scientific Working Group (SWG) did not formally meet during this reporting period, but rather conducted its business through correspondence.

1. Update of the databases for the inventory of introductions and transfers of salmonids within the NAC area

Information for the inventory of introductions and transfers of salmonids was solicited from federal, state and provincial agencies, but has not been received from all agencies. Therefore, the database has not been updated. The 2001 and 2002 information will be presented at the 2003 Annual meeting of the NAC.

2. Update of the databases for fish disease occurrences within the NAC area

The database of the historic occurrences of fish pathogens in the NAC area has not been updated since the information for 2001 has not been received from all agencies.

Infectious Salmon Anemia (ISA) disease has been confirmed at pen sites within the Cobscook Bay area of eastern Maine. The first case of ISA in the US was confirmed in Maine on February 15, 2001. The US Department of Agriculture Animal and Plant Health Inspection Service entered into a cooperative ISA control program with the State of Maine to monitor and manage the disease. Indemnification was provided for depopulated aquaculture fish. The sites in one half of Cobscook Bay were permitted to restock in 2002 and the balance will restock in 2003.

3. Update database of numbers Atlantic salmon aquaculture escapees and observations of rainbow trout in Atlantic salmon rivers

The SWG compiled the most recent information available to the Group on occurrences of Atlantic salmon aquaculture escapees and rainbow trout in rivers within Maine, New Brunswick, Nova Scotia, and Newfoundland. It is recognized that the information is incomplete; however an attempt will be made to get a more complete record of historical and current information over the coming year.

In 2001, Atlantic salmon aquaculture escapees were reported in seven (7) rivers in New Brunswick and Maine (Table 1). The greatest numbers were reported in the Magaguadavic

River (132), Dennys River (62) and St. Croix River (58), with the escapees representing 75% to 94% of the salmon entering these rivers. ICES (CNL(02)20) reported that four (4) farmed-escaped salmon (two (2) smolts, one (1) post-smolt and one 1 SW adult) captured in the Magaguadavic River were either North American X European hybrids or wholly European in origin. The 1SW and the post-smolt farmed escapees of North American X European hybrid may have originated from the Maine salmon farming industry. However, the smolt escapee of European origin must have originated from one of the commercial hatcheries on the Magaguadavic River. The SWG reiterates its concern that the introduction of European origin strains or European X North American hybrids into wild Atlantic salmon rivers could adversely affect the productivity of wild Atlantic salmon populations.

Rainbow trout, believed to be of aquaculture origin or progeny of aquaculture escapees, were reported from 12 rivers on the west and south coast of Newfoundland in 2001 (Table 2). These fish were either caught by anglers, or captured or observed during scientific surveys. Both male and female rainbow trout were confirmed. A research project conducted on Trout River, western Newfoundland, confirmed that successful reproduction has occurred and at least three year-classes were present. The Scientific Working Group reiterates its concern that if rainbow trout become established, it could negatively impact on the Atlantic salmon resource.

Some information, albeit incomplete, was available on observations of rainbow trout in rivers of New Brunswick and Nova Scotia (Table 3). No information was available as to the origin of these fish. In 2001, rainbow trout were reported to have been observed in three (3) rivers in New Brunswick and three (3) rivers in Nova Scotia. The Scientific Working Group will attempt to get a more complete inventory of observations of rainbow trout for the 2003 annual meeting.

4. Canadian National Code on Introductions and Transfers of Aquatic Organisms

Canada adopted a National Code on Introductions and Transfers of Aquatic Organisms in January 2002. The Code applies to all aquatic organisms in freshwater and marine habitats. The purpose of the Code is to establish an objective decision-making framework regarding intentional introductions and transfers that is designed to protect aquatic ecosystems while encouraging responsible use of the aquatic resources for the benefit of Canadians. The National Code was developed to minimize the negative impacts of introductions and transfers and, at the same time, permit environmentally sound fisheries resource enhancement and development of aquaculture. The Code ensures that a consistent single standard set of risk assessment and approval procedures is applied across the country. The risk analysis process evaluates the level of risk of adverse ecological, genetic and fish health effects from a proposed introduction and transfer. The Precautionary Approach has been adopted in the Code.

The Canadian National Code states that consultations should take place between neighboring jurisdictions if a proposed introduction, transfer or range extension might impact stocks within a watershed but outside the receiving province.

5. Activities within the US to Improve Conditions for Environmentally Sustainable Aquaculture

In August 2000, representatives from the aquaculture industry and the environmental community began discussions on potential areas of collaboration. A Framework for a Salmon Aquaculture Containment Policy in the State of Maine, May 1, 2001, was developed as a result of these collaborative discussions. The Framework has the goal of developing a mandatory, enforceable Containment Management System (CMS) and endorses a policy of requiring compliance and includes a set of mechanisms to monitor, identify and respond to problems as they appear. There are three main parts to the policy: (1) development of a standard CMS that will serve as a basis for the subsequent development of company-specific CMS plans; (2) the development, testing and implementation of a marking system for all farmed fish; and (3) the development of an escape response plan in the event of an actual escape. Following adoption of this Framework the industry and the environmental community invited the state and federal resource agencies to work with them in implementing the Framework. It was recognized that the participation of the regulatory agencies was essential if the product was to be ultimately used in permitting processes. The work to develop the CMS and also to investigate marking techniques is being conducted under a grant provided to the Maine aquaculture Industry in 2001 by the National Fish and Wildlife Foundation.

The CMS system is based on a Hazard Analysis Critical Control Point (HACCP) system, which contains a company specific HACCP plan, a paper trail that documents operational performance, and an auditing system. The standard CMS that is currently being developed for the Maine salmon farming industry is based on the following seven principles:

1) Assessment of the hazards and risks
2) Determination of critical control points
3) Establishment of critical limits and tolerances
4) Establishment of limit monitoring procedures and schedules
5) Establishment of predetermined corrective actions
6) Establishment of record-keeping systems and procedures
7) Establishment of a verification system

Following the completion of the standard CMS, each company will develop an individual specific HACCP plan for one of their sites. This trial HACCP will be completed and audited by the fall of 2002. The lessons learned through this trial will be utilized in developing site-specific plans for the remaining sites, which will be completed by the end of 2002. Company specific CMS's will be audited at least once annually for compliance. The reporting of known escapes would be required. The report of a known escape of a predetermined level will trigger additional audits of the facility. Reported losses and other logged events, required under the standard CMS, will be entered into a database. All sites will be required to implement an inventory control system that maintains records related to numbers of fish at key production points, known or suspected escapes, dead fish removed from pens and known loss of inventories.

The second part of the policy is the development, testing and implementation of a marking system for all farmed fish. In July 2002 a scale-reading workshop is being held and laboratory trials are now ongoing to examine the interaction between different tagging techniques and innoculations. Field trials are in the planning stages.

Discussions to finalize these components are ongoing and on an accelerated timeframe. There are a number of reasons why it is essential that resolution on these issues be reached in the immediate future. The Maine Department of Environmental Protection is in the process

of drafting a permit regulating the discharge from all existing facilities, the National Marine Fisheries Service and U.S. Fish and Wildlife Service are conducting a consultation on all existing facilities under the Endangered Species Act (ESA), and there is ongoing litigation related to the operation of some existing facilities. The NMFS and USFWS continue to recommend to the US Army Corps of Engineers that the use of non-North American strain Atlantic salmon in marine cages should be prohibited. Through the ESA consultation process this recommendation can become a binding permit condition. At this time, the NMFS and USFWS are discussing possible compliance schedules with various representatives from the regulatory agencies and aquaculture industry.

Cooperative Funds for the US Aquaculture Industry
The US Department of Commerce has announced the availability of $5 million to promote the continued development of the Atlantic salmon aquaculture industry, by minimizing the potential for negative impacts on wild Atlantic salmon listed under the ESA. A request for proposals for use of these funds was issued in May 2002 and states that acceptable activities include the development and testing of:
(1) More secure cages to reduce farmed fish escapement;
(2) Broodstock strains that grow more quickly, better resist disease, or pose less genetic threat to North American wild salmon stocks;
(3) Improved marks or tags to trace potential escapes of farmed fish;
(4) Vaccines or other methods to prevent the spread of disease between farmed fish and wild fish; and
(5) Improved methods to monitor sea cage integrity and farmed fish disease.

6. Transgenics

The US Food and Drug Administration (US FDA) and Aqua Bounty Farms have approached the National Marine Fisheries Service, U.S. Fish and Wildlife Service and Canadian regulatory agencies to share information preparatory to designing an environmental risk assessment of transgenic salmon. Topics of relevance include the regulatory context, risk management in the regulation of transgenic plants, risks presented by salmon cultivation, changes induced by genetic modification, and risk mitigation and management.

The US FDA has determined that it will regulate transgenic fish as a new animal drug. A drug is defined as any articles intended to affect the structure and function of an animal. The approval process for a new animal drug is rigorous and includes a review of the environmental safety of the drug, its mechanisms of use and its disposal. The US FDA has further determined that an Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) is required. The EA will include an assessment of the potential risks to wild populations of Atlantic salmon, related species, other non-target animals and the habitat and resources on which the species depend. The EA process is currently at the problem formulation stage where all of the issues and concerns that need to be addressed within the EA are identified. Conducting the risk analysis for the EA is expected to take at least one year.

Aqua Bounty Farms' hypothesis is that sterile, all-female stocks of transgenic, growth enhanced Atlantic salmon produced under quality assured manufacturing practices can be successfully integrated into existing commercial salmon production facilities resulting in less environmental impact than current aquaculture practices. The risk analysis and EA will identify and assess all available information and either confirm or refute this hypothesis. The

Harvard Center for Risk Assessment will be conducting the environmental risk assessment. The following four groups of potential hazards have been identified: ecosystem disruptions, pathogen transfer, genetic disturbance, and competition for environmental resources.

The National Marine Fisheries Service and US Fish and Wildlife Service will remain involved in this process with the US FDA and the applicant to ensure that concerns for wild populations are adequately identified and addressed, including conducting the appropriate section 7 consultation under the ESA. The US has made the FDA aware of the action NASCO has taken on transgenic salmon and the US FDA was also notified separately by the NASCO Secretariat.

Table 1. Known occurrences of Atlantic salmon aquaculture escapees in salmon rivers within the NAC area.

	Number of escapees (escapees as percent of total sample)							Life Stage
River (St/Prov)	Prior to 1990	1990 - 1996	1997	1998	1999	2000	2001	
CANADA								
Annapolis (NS)		1			R******	15		MSW
Baddeck (NS)		23 (6)***		5 (3)				1SW & MSW
Bear (NS)	Many angled in early 1990's							1SW & MSW
Big Salmon (NB)	1							1SW & MSW
Conne (NF)		3	10(2)	2(1)	1(>1)	5(2.3)	0	1SW & MSW
Conne (NF)		71						smolt
Dennis (NB)	R*****							1SW & MSW
Digdeguash (NB)	below hatchery					0		juveniles
Gaspereau (NS)		5		1 (4)		1(2)		MSW
Indian Brook (NS)						1		1SW & MSW
LaHave (NS)	1 (<1)	0	0	0				1SW & MSW
Magaguadavic (NB)		2,301	82 (58)	223 (8)	79(77)	30(68)	132(94)	1SW & MSW
Magaguadavic (NB)							35	smolt
Mersey (NS)						1		1SW & MSW
Meteghan (NS)						1		1SW & MSW
Middle (NS)				9 (4)				1SW & MSW
North (NS)		14 (8)***		55 (11)				1SW & MSW
Saint John (NB)		several in 1990, Belle Isle Bay			R******	R******	14	1SW & MSW
Salmon Digby (NS)					2	0		1SW & MSW
St. Croix (NB/ME) *		231	27 (39)	25 (38)	23(64)	30(60)	58(75)	1SW & MSW
Tusket (NS)				2 (<1)				MSW
Waewig (NB)	juveniles below hatchery 1 adult							Juveniles and adults
Stewiacke (NS)		7 (33)	0					MSW
UNITED STATES								
Penobscot River							1(0.1)	
Dennys (ME)**		67	2 (100)	1(100)		29(94)	65(79)	Sexually mature & immature
Narraguagus (ME)		9****	0	0	3 (9)	0	0	
Union (ME)					63(90)*****	6(75)	2(100)	
Other Maine Rivers	Unofficial reports of escapes in various eastern coastal rivers, especially Cobscott Bay area							

* 1994-96 aquaculture fish were estimated to be 13-54% of the run.

** Partial counts in Dennys

Table 2. Known occurrences of rainbow trout observed in Newfoundland rivers, believed to be aquaculture escapees or progeny of aquaculture escapees.

River (St/Prov)	Number of rainbow trout							Life Stage
	Prior to 1990	1990 - 1996	1997	1998	1999	2000	2001	
Watts Bight Bk (NF)	3							Adult
Western Arm Brook							1	
River of Ponds (NF)	1+	4+*			24	2****	6	Adult
Portland Creek (NF)					1			Adult
Parsons Pond (NF)		1						Adult
Deer Arm Brook							1	Adult
Lomond River							1	
Trout River (NF)	4		1+	1+	1+**	2***	97+	adult+juv
Humber River (NF)					3	1**	1	Adult
Serpentine (NF)	2							Adult
Flat Bay Brook (NF)		1*			2			Adult
Robinsons River (NF)					2			Adult
Crabbes R (NF)						2		immature
La Poila River (NF)					3			Adult
Garia Brook (NF)					3			Adult
Grandys River (NF)					2	3*****	3	Adult
Unnamed Bk (Bay de Vieux)							1	
White Bear River							1+	
White Bear R Estuary							1+	
Grey River (NF)						1		immature
Northwest Bk						3		Adult
Jeddore lake						3		juvenile
Conne River (NF)		157	61	27	21	45	18+	Adult
Little River (NF)		5			1			Adult
Garnish River (NF)				2+				
Long Harbour R (NF)				1+			2	Adult
Grand Bank Bk (NF)				1+				Adult
Lawn Bk (NF)						1		Adult
Holyrood Pond						3		Adult
Biscay Bay Bk (NF)				2				adult

* 1 Male (internally sexed)
** 1 Female (internally sexed)
*** 2 females, immature
**** 1 was a spent female, and 1 was a male
***** 1 was a ripe male

Table 3. Reports of rainbow trout observed in New Brunswick and Nova Scotia rivers. Rainbow trout in some Nova Scotia rivers maybe from directed stocking programs. Table is incomplete

River (St/Prov)	Number of Rainbow trout							Life Stage
	1995	1996	1997	1998	1999	2000	2001	
Saint John R (NB)	10	2	1			1	2	
Nashwaak R (NB)		1						
Big Salmon R (NB)						18	8	
Shepody R* (NB)						1		Juvenile
Upper Salmon R (NB)							1	Juvenile
Sutherlands R (NS)			1					
Salmon R (NS)					2 - 4			immature
Mersey R (NS)					2			
Tusket R (NS)					5+			
Middle R (NS)					2		11	adult
North R (NS)					1+			Juveniles
St. Mary's R (NS)					1			Juvenile
River Tillard						1+		
Baddeck R (NS)						8		1adult+Juv
Musquodoboit (NS)							2+	adult
River Philip (NS)							12	~30 cm

* Shepody River has a self-sustaining population of rainbow trout. Rainbow trout angled annually.