

Northeast Consortium Cooperative Research Annual Progress Report, June 2007

Project Title: Genetic Identification of Atlantic Cod Spawning Stocks in U.S. Waters using Microsatellite and SNP DNA Markers

Project Leader :
David Berlinsky

Lead Institution:

Participant:

David Berlinsky
Associate Professor
Department of Zoology
University of New Hampshire
38 College Road
Durham, NH 03824
Phone: (603) 862-0007
Fax: (603) 862-3784
E-Mail: david.berlinsky@unh.edu
mail: wirgin@env.med.nyu.edu

Additional Key Project

Isaac Wirgin,
Associate Professor
Dept. of Environmental Medicine
NY University School of Medicine
57 Old Forge Road
Tuxedo, NY 10987
Phone: (845) 731-3548
Fax: (845) 351-5472
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Project Objectives: Our research objectives are to identify the spatial and temporal stock structure of Atlantic Cod (*Gadus morhua*) in US waters, using genetic analyses. Specifically, our aim is to identify and sample major spawning aggregations throughout the Gulf of Maine (GOM), Georges Bank, and areas south of Georges Bank, and to determine if these aggregates are genetically unique stocks.

Major Accomplishments: The results from our NEC development grant were published as:

- I. Wirgin, A. Kovach, L. Maceda, N.K. Roy, J. Waldman and D.L. Berlinsky. Stock identification of Atlantic cod in U.S. waters using microsatellite and single nucleotide polymorphism (SNP) DNA analysis. 2007. Transactions of the American Fisheries Society 136:375-391.

Since the start of this year, samples were collected from the following locations:

<u>Samples:</u>	<u>Date Sampled</u>	<u>Sample Size</u>	<u>Reproductive Condition</u>
CCZ Massachusetts Bay (MBW7)	Dec 06 - Jan 07	44	Spawning condition adults
Coxes Ledge (CLW7)	Jan 07	73	Spawning condition adults
Block Island (BIW7)	Jan - Feb 07	140	Spawning condition adults
MA coast (IBSS7)	Feb 07	56	Spawning condition females
NJ Coast	Jan-April 07	49	Unknown adults
Stellwagen Bank (SWS7)	March 07	86	Spawning and spent adults
NE Peak Georges Bank	Jan-Feb 07	142	Spawning and spent adults
Long Island (LIS7)	April 07	96	Unknown adults
Block Island (BIS7)	April 07	118	Unknown and spawning adults
Ipswich Bay (IPS7)	June 07	78	Mostly spent females
Casco Bay (CBS7)	April 07	96	Juveniles
MA Coast (STS7)	May 07	1410	Juveniles
ME Coast	July 07	70	Non spawning females

To date, DNA has been isolated from most of the collected samples and genotyping is underway. In addition to the 6 SNPS and 7 microsatellite loci used for our initial analyses, we have added 5 additional microsatellite loci for recently collected samples. Participating fishermen include Captains David Goethel, Proctor Wells, Chris Odlin, Robert Bogan, Bill Amarou and Jeff Carver.

Unexpected difficulties: The key to the success of our project is identifying the spawning aggregates. The major difficulty we face is that, for some previously identified (historic) populations, spawning aggregates might no longer exist, e.g. coastal Maine and downeast Maine. Although we sampled adult fish from offshore Maine in August

2006 and July 2007, they were not actively spawning. Furthermore, in the last few winters cod have not been aggregating in Ipswich Bay, as they did back in 2003. It is possible that the structure of cod populations is more fluid and complex than previously anticipated. If so, this too will be a very interesting finding.

Tasks for the next 6 months: We will continue genotyping the samples collected in 2007 with the 6 SNPS and 12 microsatellite loci. We will also continue our collaboration with fisherman to identify and sample cod from spawning aggregations. Some of the populations sampled in 2007 were not sampled previously (e.g. NJ coast, Block Island) and should be sampled again to demonstrate temporal stability.

Impacts: Our research involves collaboration between scientific researchers, managers and commercial fisherman. We have been working closely with our steering committee members in sample collection and have made every effort to communicate our preliminary findings through scientific publications seminars and meetings. Our project is generating much interest and we anticipate that our findings will be incorporated into the scientific information used to develop fisheries management plans.