

STUDY PERFORMANCE REPORT

State: Michigan

Project No: F-53-R-15

Study No: 475

Title: Development and implementation of conservation genetic initiatives for Michigan inland and Great Lakes fisheries

Period Covered: April 1, 1998 to September 30, 1999

Study Objectives: (1) to develop genetic guidelines and policies governing broodstock, and hatchery production and release for the Fisheries Broodstock Committee of the Michigan Department of Natural Resources, (2) to assess levels of genetic diversity in Lake Sturgeon and other threatened species in Michigan Great Lakes and inland waters, and assist in implementation of genetics guidelines to aid in species restoration efforts, (3) to collect, analyze, and interpret demographic and genetic data bases for Great Lakes sport fisheries to assist in efforts to establish the extent of interaction of hatchery supplemented fisheries with natural reproduction, (4) to collect, analyze, and interpret demographic and genetic data bases for Great Lakes sport fisheries to assist in efforts to identify areas of endemism and of high genetic diversity which could serve as species conservation areas or management zones.

Summary: Significant deficiencies in Michigan Department of Natural Resources, Fisheries Division hatchery and stocking policies were found based on extensive travels to 6 hatcheries throughout the state and interactions with Division hatchery and management personnel. All fish production figures involving broodstock origin, development, and maintenance were compiled together with species, strain, and hatchery-specific records of methods of crossing, gamete takes, brood rearing, and stocking.

Recommendations were offered in the form of 2 draft documents (Scribner, draft 1; Scribner, draft 2) prepared for Division hatchery and management personnel and for Division Broodstock and Stocking committees. Sources of many salmonid strains were of unknown or suspect origin. Greater attention is needed to develop rotational lines for all species and strains as there is strong potential for inbreeding and loss of genetic variation. Sources of natural recruitment into each strain and species should be identified or developed to episodically infuse greater diversity into broodstocks. Greater attention to methods of crossing eggs and milt are needed to maximize retention of genetic diversity in progeny. Stocking guidelines should be developed to minimize impacts to native or naturalized populations.

Job 1. Title: Review background information concerning historical broodstock and hatchery operations for all species and strains currently in production in the state of Michigan. Review existing Michigan DNR broodstock management plan which presently covers the underlying principals and practices of hatchery operations and releases.

Findings: Information pertaining to historical hatchery practices, and origins of all strains and species currently used in the State of Michigan hatchery system have been gathered from Michigan DNR sources around the state. I interviewed hatchery managers and technical personnel regarding past and current operations. I participated in all MDNR Broodstock Committee and Stocking Committee meetings, and made presentations to both groups.

Background information gathered during interviews was used to draft documents presented in Scribner, Draft 1 and Draft 2.

Job 2. Title: Write general guidelines and policy governing genetic broodstock and hatchery management for the Broodstock Committee of the Michigan Department of Natural Resources.

Findings: The draft report outlining general concepts and principles governing gamete takes, broodstock management, and stocking is provided in Scribner, Draft 1.

Job 4. Title: Write genetic guidelines for the Lake Sturgeon Recovery Team pertaining to aspects of egg and milt take for hatchery production and release.

Findings: I have interacted with MDNR personnel of the Lake Sturgeon Recovery Team and individuals responsible for gamete takes from the Sturgeon River. Correspondence has included responses to requests for information regarding the manners in which individuals were spawned and juveniles were released. A portion of this dialog is provided in Scriber, Draft 2. In general the methods used by the state are fundamentally flawed and if continued in the current format will result in inbreeding. The way in which sturgeon are spawned and juveniles released will not, in my judgement, lead to a viable populations. Discussions regarding how best to achieve management goals given logistical constraints are ongoing.

Job 5. Title: Work with hatchery biologists and support staff working with salmonid production (coho, chinook, and steelhead) to identify aspects of hatchery operations which could be improved to enhance the genetic diversity of supplemental fisheries.

Findings: I have identified several sources of scale samples which will be used to examine the changes in genetic characteristics over time which can be related to state spawning practices. I have participated in weir activities and a graduate student has utilized these spawning activities to conduct experimental crosses to examine the efficacy of various spawning practices as related to retention of levels of genetic variability. In general, the large returning populations, the large numbers of individuals spawning, use of 1:1 male to female sex ratio for spawning, and the protracted nature of egg takes suggest that levels of genetic variability are being maintained. Specific empirical data addressing this issue are being collected.

Job 6: Conduct surveys of naturalized and supplemental salmonid fisheries to identify the extent of spatial variation in genetic diversity, how the diversity is partitioned (i.e., by lake basin, and drainages within basin), and of the impact of hatchery supplementation to overall genetic diversity.

Findings: Work is currently underway for steelhead which will address the effects of hatchery supplementation on homogenization of genetic characteristics across drainages. Sampling for this effort is described in Federal Aid Project F-35-R-24, Study Performance Report, Study 688, "Evaluation of alternative mechanisms underlying spatial genetic diversity of lake Michigan steelhead: an assessment using genetic markers". In addition, collections are being made for the 2 strains of coho salmon to determine whether stocking practices have resulted in homogenization of these 2 strains which originated from different historical ranges of the species distribution in Western North America.

Literature Cited:

Scribner, K. T. Draft 1. Genetic-based management of Michigan DNR broodstocks. Michigan Department of Natural Resources, Unpublished Fisheries report, Ann Arbor.

Scribner, K. T. Draft 2. Recommendations for egg and milt take from a genetics perspective. Michigan Department of Natural Resources, Unpublished Fisheries report, Ann Arbor.

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