Alaska Department of Fish & Game Mark, Tag, and Age Laboratory Support; Year 2

by

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EXECUTIVE SUMMARY

Support from the Northern Fund was used to help the Alaska Department of Fish and Game's Mark, Tag, and Age Laboratory meet one of its primary obligations: to provide fisheries managers with the data needed to effectively manage southeast Alaska sockeye salmon fisheries, assess the efficacy of enhancement programs, and meet US/Canada Pacific Salmon Treaty obligations. To accomplish this task, sockeye salmon otoliths were recovered from Transboundary River (TBR)-related fisheries in southeast Alaska and examined for unique thermal mark patterns that served to identify an individual's hatchery of origin, brood year, and age. The first 100 sockeye salmon otolith samples collected from all commercial TBR fishery locations each week were examined for thermal marks within 24 hours of recovery. These recovery data were posted to the internet as they were generated so that fishery biologists could manage TBR-related fisheries in real-time. A total of 20,064 pairs of sockeye salmon otoliths were sampled from commercial fisheries in southeast Alaska between July 1st, 2015 and June 30th, 2016; 18,505 (92%) were collected from fisheries associated with the US/Canada Enhancement Program.

Key words: Pacific salmon, thermal mark, hatchery, otolith.

INTRODUCTION

The ability to thermally mark otoliths in hatchery-raised salmon and subsequently identify those marks recovered from individuals caught in a fishery is critical to monitoring and evaluating enhancement projects and fisheries conducted as part of the Pacific Salmon Treaty [Annex IV, Chapter 1, Transboundary Rivers (TBR)] in southeast Alaska. Each unique mark pattern not only allows biologists to distinguish between wild and hatchery fish, but it also provides information regarding hatchery of origin, brood-year, and age. Hatcheries in Alaska and Canada produce, mark, and release approximately 2.5 billion salmon per year. The Mark, Tag, and Age (MTA) Laboratory in Juneau is responsible for coordinating these marking activities, validating the marks produced, and identifying marked otoliths recovered from salmon caught in select fisheries throughout Alaska. These mark recovery data are used to manage fisheries in southeastern Alaska in real-time, with an emphasis on fisheries targeting TBR stocks. The recovery and identification of these marked otoliths allow managers in Alaska and Canada to assess the efficiency of enhancement programs, estimate the contribution that each hatchery makes to a fishery, and determine the proportion of Canadian and Alaskan salmon caught in TBR fisheries.

The objective of this project was to ensure that the MTA Lab continued to provide the data needed to fulfill its obligation to deliver thermal mark recovery data to the Alaska Department of Fish and Game (ADF&G) and Canadian Department of Fisheries and Oceans Canada (CDFO) fishery managers – data needed to effectively manage sockeye resources in the transboundary Taku and Stikine Rivers in southeast Alaska. These data consequently allows participants to meet their state and Treaty obligations regarding sockeye salmon fisheries management.

METHODS

Sockeye salmon otoliths were shipped to the MTA Lab from commercial fisheries throughout southeast Alaska. Some otoliths were removed from fish in the field by port samplers prior to shipment whereas other samples arrived at the lab as heads. Otoliths were subsequently removed from such heads by MTA Lab technicians. Each otolith was cleaned and mounted to a petrographic slide with thermoplastic cement and labeled with a bar code to track its progress through the mark recovery process. Each otolith was polished with a 1500 grit grinding paper until the primordia were visible and the otolith thin enough to allow light to pass through and illuminate its growth rings and thermal mark. Because thermal marks are unique among hatcheries and years, thermal mark patterns were used to identify each individual's brood year and hatchery of origin.

RESULTS

The first 100 sockeye salmon otolith samples collected from commercial TBR fisheries were examined for thermal marks within 24 hours of recovery. All associated mark recovery data (sample location, mark pattern, hatchery of origin, brood year, etc.) were entered into an online relational Oracle database. These data were available on the ADF&G Mark, Tag, and Age Lab website immediately after entry and were therefore available for use in real-time fishery management. All remaining otolith samples were examined in-season for marks when time permitted. The website for the interactive thermal mark recovery report is located at *http://mtalab.adfg.alaska.gov/OTO/reports/MarkSummary.aspx*.

Of the 20,064 pairs of sockeye salmon otoliths sampled from commercial fisheries between July 1st, 2015 and June 30th, 2016; 18,505 (92%) were collected from fisheries associated with the US/Canada Enhancement Program. Approximately 3,535 (19%) of these TBR salmon were thermally marked and thus of hatchery origin. Approximately, 61% of otolith samples were examined twice by different readers to assess reader agreement and maintain data quality. Reader agreement exceeded 98%.

DISCUSSION AND CONCLUSIONS

All our proposed objectives and timelines were met. Sample sizes and otolith mark recoveries from TBR-related fisheries met proposed expectations during the grant period. Otolith samples began to arrive at the MTA Lab in mid-June and continued until September. Lab technicians consistently met the requirement that the first 100 otoliths collected per week from each sampling location be examined for marks within 24 hours of receipt and they successfully posted all results to the MTA Lab website as they were generated. Specimens and data flow through the lab were monitored continuously by personnel to ensure efficient and timely data production. Because each otolith sample is bar coded, the thermal mark laboratory supervisor and the MTA Lab program director were able to monitor production in real-time using Oracle-based queries. All otoliths from the 2015 commercial fishing season were mounted, polished, examined for thermal marks and second read for quality control purposes by November 1st, 2015.

Support from the Northern Fund has helped the MTA Lab meet one of its primary obligations: to provide fisheries managers with the data needed to efficiently manage southeast Alaskan salmon fisheries~~,~~ and meet US/Canada Pacific Salmon Treaty obligations. Because thermal mark recovery results were posted to the web the instant data were generated, the benefits to its users, primarily fishery biologists at ADF&G, CDFO and the Pacific Salmon Commission (PSC), was immediate such that the data could be used to manage southeast Alaskan fisheries in real-time. All past and present mark recovery data are stored in a relational Oracle database that is accessible to online to users through a variety of customizable web-based reports. In addition to providing summary information, raw data can be downloaded directly to Excel spreadsheets. Three backup copies of the database are made weekly and stored in off-site locations for security purposes.

An official summary of the financial expenditures was sent to the PSC NF separately by ADF&G Commercial Fisheries Division Administrative staff. We did not deviate significantly from the projected budget described in the original proposal. The majority of funds provided salaries and benefits for laboratory staff directly involved with dissection, processing, and reading of otoliths, as well as entry of associated data into the online Oracle database. This amounted to approximately 5.5 months of technician time and 1 month of time for a Fishery Biologist. Remaining funds were used to purchase the consumables and lab supplies needed to recover thermal marks from otoliths. These included petrographic glass slides, slide labels, freight for shipping slides, wet-lock boxes for shipping heads , microscope

maintenance, and the replacement of four computers needed to view reference otolith images and enter data for otolith samples.