THERMAL MARK READING STATIONS

by

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EXECUTIVE SUMMARY

Funding was received to purchase equipment for additional otolith reading stations in the Mark Recovery Laboratory, Mark, Tag, and Age Laboratory, Alaska Department of Fish and Game, Juneau, Alaska. This equipment was needed to accommodate increased workload associated with new projects related to Transboundary River fish, a new Northern Fund Initiative (the Spring Troll Restratification project), a Northern Fund Sentinel Project (also known as the McDonald Lake Project), and a large-scale hatchery salmon straying project. Purchase of new microscopes, grinders, scanners, and computers permitted updating of older equipment and creation of an additional otolith reading station.

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

INTRODUCTION

Salmonid otoliths are thermal marked by exposing them to repeated temperature cycles that create patterns of optically dense bands (Volk et al. 1990). Thermal marking of salmonid otoliths is an effective tool for identifying hatchery salmon (Munk and Smoker 1991; Volk et al. 1990), because identification of the marks is quick and fairly accurate (Hagen et al. 1995). Thermal mark identification is used by the Alaska Department of Fish and Game (ADF&G) for in-season management of Alaska's salmon stocks (TTC 1990) and for evaluation of program success at hatcheries. Recent studies have used thermal marks to document the presence and distribution of stray hatchery chum salmon (*Oncorhynchus keta*) in index streams throughout Southeast Alaska (Piston and Heinl 2011).

The MTA Lab is responsible for coordinating marking activities, validating the marks produced, and identifying marked otoliths recovered from salmon caught in select fisheries throughout Alaska. The objective for this project was to purchase and install otolith mark reading equipment in the MTA Lab.

METHODS

The processes and equipment needed to recover thermal marks from otoliths are relatively simple and are outlined by Volk et al. (1990) and Hagen et al. (1995). We used these funds to increase the number of reading stations and to update existing stations. We purchased a digital, compound, and stereo microscope, two grinding wheels, two bar code readers, and two computers with touch screen monitors to create one additional reading station and updated the voucher imaging station with the new digital microscope. The digital microscope was projected to increase efficiency and throughput. We also purchased two grinders: one for the new station and another to update an older grinder that failed. Adding a reading station allowed us to increase our efficiency and accuracy, contributing to the thermal mark recovery and project success.

RESULTS AND DISCUSSION

With funds from the Northern Fund, we purchased and installed the following items (listed in U.S. dollars):

One Zeiss Compound Microscope	$ 4,093
One Zeiss Stereomicroscope with illumination	$ 4,901

One Leica Digital DMD108 Microscope	$15,661
Two Labopol-5 Grinders @ $4,810 each =	$ 9,621
Magnetic grinding disk (platen)	$ 899
Miscellaneous parts for microscopes	$ 4,689

A compound microscope was required to view the otoliths after grinding to determine the presence or absence of a mark. A stereomicroscope (e.g. dissecting microscope) was used to age the whole otolith, which assisted mark identification. The digital microscope used a computer screen instead of eyepieces to view samples and has assisted with workflow and imaging. We originally requested funds to purchase computer workstations with touch screen monitors for data entry. We used funds from other sources to purchase these items and the Honeywell scanners necessary to read the bar code label on each sample. We purchased two new grinders, which use a magnetic system to retain the grinding paper. Because we did not purchase the computers and bar scanners with grant funds, we used those funds to purchase additional parts for the grinders and microscopes.

Our proposed objective was to use these funds to purchase and install otolith reading equipment in the MTA Lab. We met all required timelines and objectives. To improve the quality of the digital microscope, we used ADF&G funds to purchase a specialized objective lens. This high quality fluorite 25 x lens was similar to the preferred lens used on our older microscopes and is the preferred power for taking voucher images, one of the tasks we plan to perform the most with this new addition to our microscope fleet. We could not use funds from this grant, because the slightly-used demo lens cost ~$8,000, exceeding the remaining project funds.

We measured progress towards completion of this project by determining whether we accomplished our objectives. The major benefit from this project was that we increased the Lab's productivity and capacity for reading otoliths due to the updated equipment and an additional workstation. The updated grinder prevented us from losing 25% of our work capacity. In addition, we were able to purchase the digital microscope to increase our imaging ability and move forward in micro-imaging technology.

A summary of the financial expenditures will be sent separately by ADF&G Headquarters. We deviated slightly from the projected budget by purchasing the miscellaneous microscope and grinder parts. All of these items (platens for the grinders, ergonomic adjustable wedges for the microscopes) are integral parts of a smooth workflow. The microscope wedges, especially, provide a more ergonomic working environment when a reader is viewing otoliths through the microscope for hours at a time.

REFERENCES

Hagen, P., K. Munk, B. Van Alen, and B. White. 1995. Thermal mark technology for inseason fisheries management: a case study. Alaska Fishery Research Bulletin 2(2):143-155.

Munk, K., and W. W. Smoker. 1991. Temperature-induced mass-marking of pink salmon otoliths. Production trial at Gastineau Channel. University of Alaska Fairbanks, Juneau, Alaska

Piston, A. W., and S. C. Heinl. 2011. Chum Salmon Stock Status and Escapement Goals in Southeast Alaska.

TTC (Transboundary Technical Committee). 1990. Long-term research plans for the transboundary rivers. TCTR (90)-3.

Volk, E. C., S. L. Schroder, and K. L. Fresh. 1990. Inducement of unique otolith banding patterns as a practical means to mass-mark juvenile Pacific salmon. American Fisheries Society Symposium 7:203-215.