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# Demonstration of Seedstock Transportation and Spawning Synchronization in Sturgeon

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## General Information

<i>Reporting Period</i>	June 1, 2006–May 31, 2007 (termination report)
<i>Funding Level</i>	<b>\$12,000</b>
<i>Participants</i>	<b>Frank A. Chapman</b> , Ph.D., Associate Professor Department of Fisheries and Aquatic Sciences, University of Florida.  Carmen Perez-Frayne, Education Program Specialist Pacific Aquaculture and Coastal Resources Center (PACRC) University of Hawaii at Hilo  Kevin D. Hopkins, Ph.D., Interim Director and Professor PACRC, University of Hawaii at Hilo  James P. Szyper, Ph.D., Extension Specialist Sea Grant College Program, University of Hawaii at Manoa  Howard Takata Hawaiian Sturgeon and Caviar Company (dba)

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## Objectives

1. Develop transportation guidelines for sturgeon embryos (*seedstock*), with special emphasis placed on the importance of temperature during shipment.

2. Establish final maturation and spawning protocol for Russian sturgeon *A. gueldenstaedti* in Hawaii, including short-term storage of semen for spawning synchronization.
3. Conduct a one-day workshop on sturgeon aquaculture practices, with emphasis in acquisition and shipping of sturgeon livestock and the rearing of sturgeon for meat, caviar, and broodstock.

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## Principal Accomplishments

### ***Objective 1: Develop transportation guidelines for sturgeon embryos (seedstock), with special emphasis placed on the importance of temperature during shipment.***

Studies were conducted to monitor water temperatures on shipments of sturgeon embryos imported into Florida and Hawaii from Germany and Italy. Water temperatures were also monitored in a shipment of sturgeon embryos from Germany to China. Water temperature readings downloaded from loggers placed inside each shipping container indicated that water temperatures remained constant while in transit; no significant water temperature fluctuations were detected in all the shipments.

Sturgeon embryos were successfully imported to Hawaii from Italy. During a stopover in Atlanta, Georgia, an exchange and re-oxygenation of the water inside shipping boxes was made. Approximately 500 Siberian sturgeons remain of this lot (50 w/the University of Hawaii at Hilo and 350 w/private sector). A feeding trial at the Oceanic Institute is using 100 sturgeons; the average weight of fish is about 300 g.

In April 2007, a second shipment of sturgeon was again imported into Hawaii from Italy. However, this time, all embryos were found dead in the Atlanta stopover. The shipping box contained no ice-pack, and the airline did not refrigerate as requested in the shipping label.

Results from this study demonstrate that standard, insulated shipping boxes used in the trade e.g., for transport of ornamental fishes (or shipping fish embryos) can maintain a designated water temperature for prolonged periods of time (e.g., 48 hours). Therefore, if embryos are properly packed inside standard insulated shipping boxes, the water temperature inside the box can remain close to constant and not deleteriously affect the quality of embryos during shipping. On the other hand, if shipping containers are not well insulated and properly packed to maintain constant water temperatures (e.g., by using ice, or a cold/heat pack), the water temperature in the container can rapidly increase or decrease, leading to water quality deterioration, and embryo mortality.

### ***Objective 2: Establish final maturation and spawning protocol for Russian sturgeon A. gueldenstaedti in Hawaii, including short-term storage of semen for spawning synchronization.***

Individual sturgeons were sampled for determination of sex and sexual maturity at the University of Hawaii at Hilo (UHH) and a private sturgeon farm. Ripe males were identified and induced to spawn. Semen was collected in two of the males and confirmed to be motile. Semen of sturgeon can be extended for more than a week using an extender solution. Ripe females, with black eggs (i.e., oocytes/

follicles), were also identified in the group of sampled individuals but were not suitable for induced spawning because already these follicles were undergoing degeneration and resorption (i.e., atresia).

Findings and protocols were discussed with personnel of the University of Hawaii. A sampling schedule designed to monitor progression of maturity in females is necessary to successfully spawn sturgeon stocks in Hawaii. It was recommended to sample the females periodically and conduct in-vitro assays to determine the stage of maturity of oocytes/follicles.

Broadcast journalists from KITV 4 News, the ABC affiliate on Oahu, documented sturgeon sampling activities at the private farm. The resulting video story, titled “UH researchers raise sturgeon on Big Island,” can be viewed at <http://www.thehawaiiichannel.com/video/13279512/index.html?taf=hon>.

***Objective 3: Conduct a one-day workshop on sturgeon aquaculture practices with emphasis in acquisition and shipping of sturgeon livestock and the rearing of sturgeon for meat, caviar, and broodstock.***

A workshop was conducted on March 14, 2007 on the island of Hawaii, at the Matt Barton Pacific Aquaculture and Coastal Resource Center (PACRC) Panaewa site. Number of Attendees: 20. Representatives included people from the aquaculture farming industry and the University of Hawaii.

Summary of comments from workshop participants:

- This workshop provided excellent hands-on training and pertinent information.
- Good number of people to manage the tasks and materials covered.
- Nice interaction between farmers, students, and researchers.
- Great connections and resources for future farmers in Hawaii.
- Really benefited from the all-day activity that was focused at one site.
- Enjoyed the cooked sturgeon prepared by a local chef.

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## Impacts

This project further supports the feasibility of sturgeon aquaculture in Hawaii. Sturgeon embryos can be successfully imported into Hawaii and individual sturgeon can sexually mature under domestic conditions. University of Hawaii personnel and farmers interested in farming sturgeon are now well-informed on sturgeon husbandry and the major obstacles facing this industry.

## **Recommended Follow-Up Activities**

The biggest challenge remains the identification of ripe sturgeon females that are in the process of final oocyte maturation and ready to spawn. This task is important, because the constant water temperatures where sturgeons are maintained in Hawaii, while optimum for growth, do not permit the seasonality necessary to synchronize the ripening of males and females. Semen availability can be extended for weeks at a time; however, the presence of ripe females in process of final oocyte maturation remains the limiting factor. It is necessary to establish a routine sampling protocol.

Some monies remain in the current budget. I recommend that these funds be used for the purchase of two sets (one UF and one UH) of better surgical tools and incubators to facilitate sampling of females and increase the possibilities of achieving a successful spawn of sturgeon in Hawaii.

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## **Publications in Print, Manuscripts, and Papers Presented**

No publications reported.