

Research Objective

Pacific salmon are vital to Alaska's marine ecosystems and are a valuable commercial, recreational, and subsistence resource.

A major goal of current research is to determine how developing salmon in the freshwater environment are affected by environmental stressors.

Pacific salmon embryos develop over many months in gravel nests. This period of development is extremely important; during this window embryos are extremely sensitive to environmental stressors (i.e., elevated water temperatures and contaminants).

However, monitoring development at this critical time is challenging.

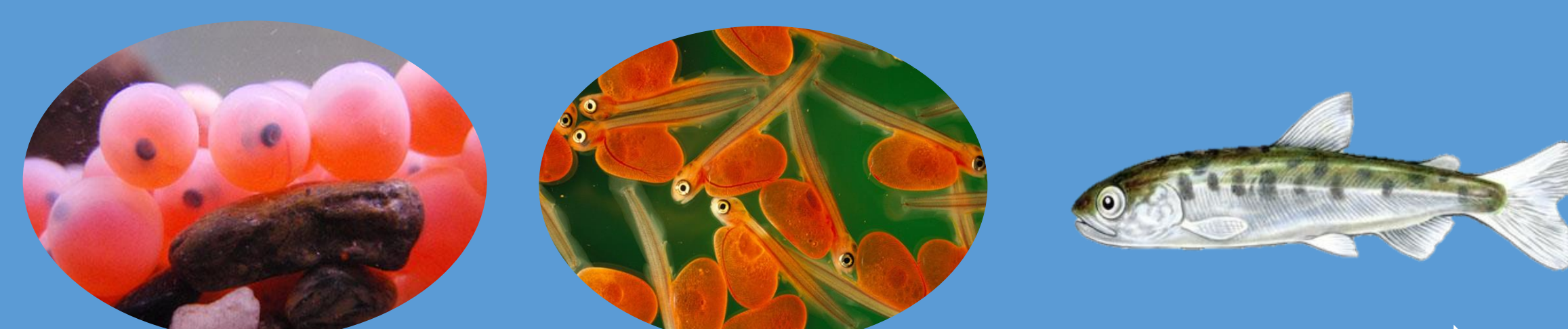
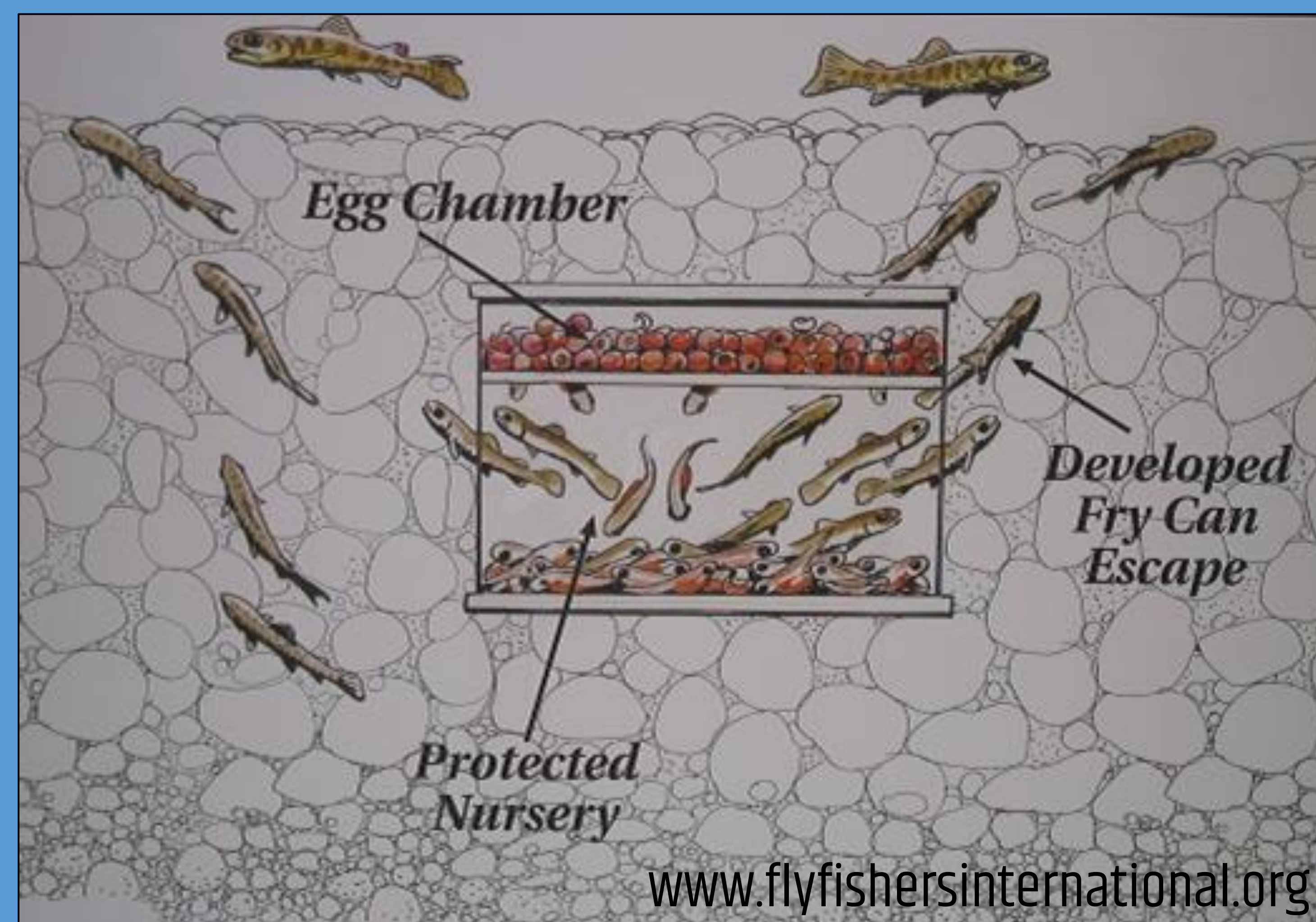
This project aims to develop tools to assess how early development of Pacific salmon is affected by environmental stressors.

Designing an Incubation Box to Monitor Development of Salmon Embryos and Characterize Environmental Stressors

The Streaming Service

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Early life stage salmon development

Incubation Box:

The commercially available Whitlock-Vibert box was modified to provide a clear view of the embryos on top and a grid system to keep the embryos separated. This box will serve as the incubation box for the developing salmon and will be attached to the bottom of a watertight compartment holding the electronic components.

Electronics System:

A Raspberry Pi Pico is being programmed using Circuit Python to control a camera (Arducam) and LED lights to take a picture of the developing embryos once a day over the incubation period. This setup was chosen since the Raspberry Pi Pico is equipped with a "sleep mode" which allows it to draw very little power in the increments between photo taking. Providing sufficient battery life has been one of the main challenges in this project, given that salmon embryos develop in freshwater habitats over many months.

Temperature Logger:

The HOBO temperature logger will be attached to the outside of the watertight compartment to record and store periodic stream temperature readings throughout the incubation time.

Embryo Separation Method:

Fungus, which grows well on dead embryos, may quickly spread to adjacent healthy embryos. To prevent the loss of an entire batch of embryos, a 3D-printed grid was developed to contain each embryo in an individual cell. This picture was taken using the Arducam.

Current Design

