Background

- 40% of Chinook salmon populations have been extrapolated from their natural areas.
- Climate drivers such as increased temperatures, stream flow, and sediment have a negative effect on Salmon survival.
- NOAA Fisheries uses life cycle models to study how life stages are affected by environmental factors, depicted in Figure 1.
- The objective of my work was to evaluate the vulnerability of life stages in relation to climate drivers.

Research Questions
1. Which salmon-environment relationships are most influential in Life Cycle Model research?
2. What actions can be taken to increase survival rates of Chinook Salmon?

Internship and Methods
- **NOAA NW Fisheries**: Research focused on how existing research can guide modeling to promote recovered salmon populations.
- **Literature Review**: Conducted literature reviews about importance of Life Cycle modeling in research.
- **Qualitative Interviews**: Facilitated 10 interviews with researchers discussing the most important salmon-environment functional relationships.
- **GitHub Data Repository**: Accessible library of important fish-environment functional relationships to support research.

Results

- **Figure 1**: Life stages and climate drivers that influenced each stage. Freshwater stages were influenced by stream flows (Flow) and temperatures (Temp). Figure referenced from (NOAA Fisheries).

- **Figure 2**: Interview results for important life stage in Life Cycle Model (LMC) research. Egg to fry stage was the most influential and researched life stage according to researchers.

- **Figure 3**: Interview results for important environmental factors. Temperature was the most influential and researched environmental factor according to researchers.

Key Takeaways

- Egg to fry in response to temperature change is the most influential/most researched life stage as eggs have the lowest tolerance to temperature variability.
- Policies should emphasize restoration actions to decrease temperature in freshwater spawning habitats.
- When implemented this will increase Chinook Salmon populations in the PNW.

Implications

- **Restoration**: Focus on reducing temperature in spawning habitats, protecting riparian zones (planting native trees and plant species to increase shade cover).
- **Policies**: Local and national to maintain instream flows by limiting water withdrawals, enhancing flood-plain connectivity, removing anthropogenic barriers to fish movement (Dams), and protecting riparian forests.
- **Additional Funding**: To support further Life Cycle Modeling research and fund restoration projects.
- **Public Engagement**: Increase community involvement in conversations about effects of climate change to advocate for action within local governments.

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