Ocean Tipping Points

Through research and practical application we are discovering when, where, and how ocean tipping points occur and developing tools to help managers make decisions based on this knowledge. For more, visit www.oceantippingpoints.org

Ecosystem-based management in Gwaii Haanas National Marine Conservation Area Reserve and Haida Heritage Site

What is an ocean tipping point?

- When a small change in environmental conditions or human use results in a large, often abrupt, change in ecosystem structure, function and benefits to people.

What are we trying to achieve?

- In collaboration with local management partners in Haida Gwaii we are working to understand what pushes a marine ecosystem past a tipping point.
- With a focus on the nearshore ecosystem with Pacific herring at its core, we are characterizing the current state of the ecosystem, testing alternative hypotheses for what led to past ecosystem shifts, and evaluating potential outcomes of future management.
- This approach will help us to identify the most important indicators to monitor, better understand historical changes, and evaluate the effects of alternative management strategies on the coupled social-ecological system.

Why study tipping points in Haida Gwaii?

- Changes in ocean climate and pressure from human activities have led to significant changes in the marine ecosystems of Haida Gwaii in the past.
- The people of Haida Gwaii depend upon healthy nearshore ecosystems for food, clean water, commerce and culture. Rapid or dramatic changes to the nearshore environment can disrupt these benefits, sometimes irreversibly.
- Resource managers need to know when, where and why tipping points may be crossed for successful ecosystem based management.

How will this be useful to managers?

- This work will support ecosystem based management and fisheries management decisions by deepening our understanding of why the herring-centered coastal ecosystem experiences dramatic shifts.
- We will provide new analyses to inform herring management and evaluate actionable strategies to improve ecosystem health and resilience to benefit society (e.g., food security, cultural practices, livelihoods and biodiversity conservation).

"After 10,000 years
A fifty-year spree
And then there was none
The balance tipped
With no lesson learned"

-Guujaaw, former President of the Council of the Haida Nation, writing about the extinction of sea otters in the waters of Haida Gwaii.
How are we doing it

Our team is working closely with partners to understand how marine species, processes and the human communities that depend upon them respond to a suite of pressures, and how we can best predict tipping points in the ecosystem. We are focusing our work on Pacific herring, which are key species in the coastal ocean food web and are central to Haida Gwaii’s marine economy and Haida culture. We are examining why this once-abundant forage fish has failed to recover from a population decline in the 1990s, and how this has affected the species and human uses that depend upon it.

Key Deliverables

1. Characterization of expert perceptions of the role of herring in Haida Gwaii food webs and consequences of those perceptions for future scenarios
2. Theoretical modeling to explore expectations for herring recovery with and without high predator densities
3. Analysis of the spatial population dynamics of herring in Haida Gwaii since 1950, especially as associated with commercial fisheries catch, Steller sea lion predation, and Haida traditional use
4. Evaluation of potential ecosystem indicators to inform the Gwaii Haanas monitoring plan
5. Analysis of how alternative harvest strategies affect herring fisheries yield and closures, stock size, and the availability of herring for dependent predators
6. Identification and prioritization of key social values to inform the Gwaii Haanas management plan, with a focus on Haida and non-Haida youth.
7. Locally-defined conceptual models of sustainability and health in the context of the marine environment
8. Preferences for different socio-ecological conditions related to different management and environmental scenarios