BASIN-SCALE EVENTS TO COASTAL IMPACTS: AN OCEAN INTELLIGENCE SYSTEM FOR A CHANGING WORLD

A UN Decade of Ocean Science Program Proposal by the North Pacific Marine Science Organization (PICES), the North Pacific Anadromous Fish Commission (NPAFC), and partners

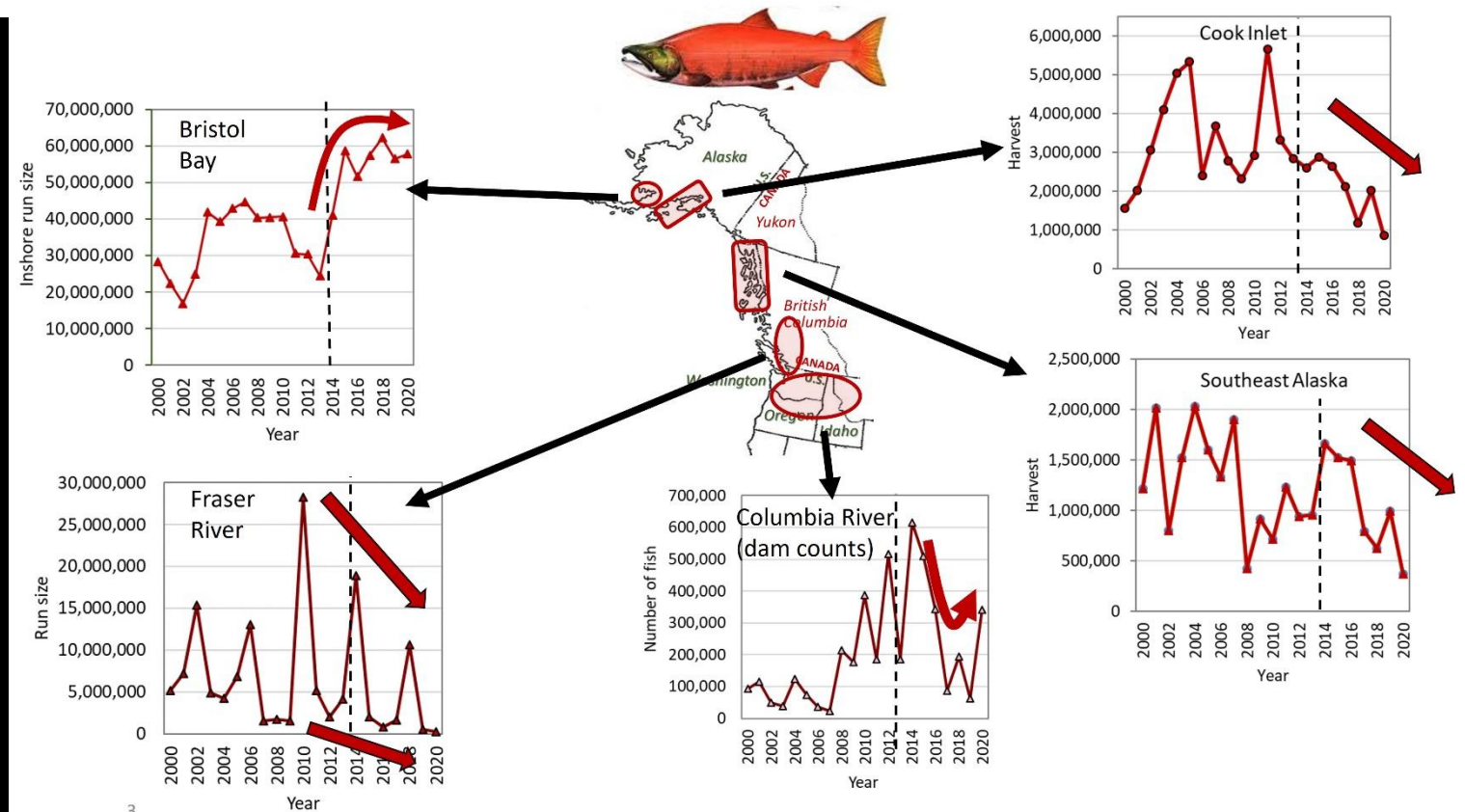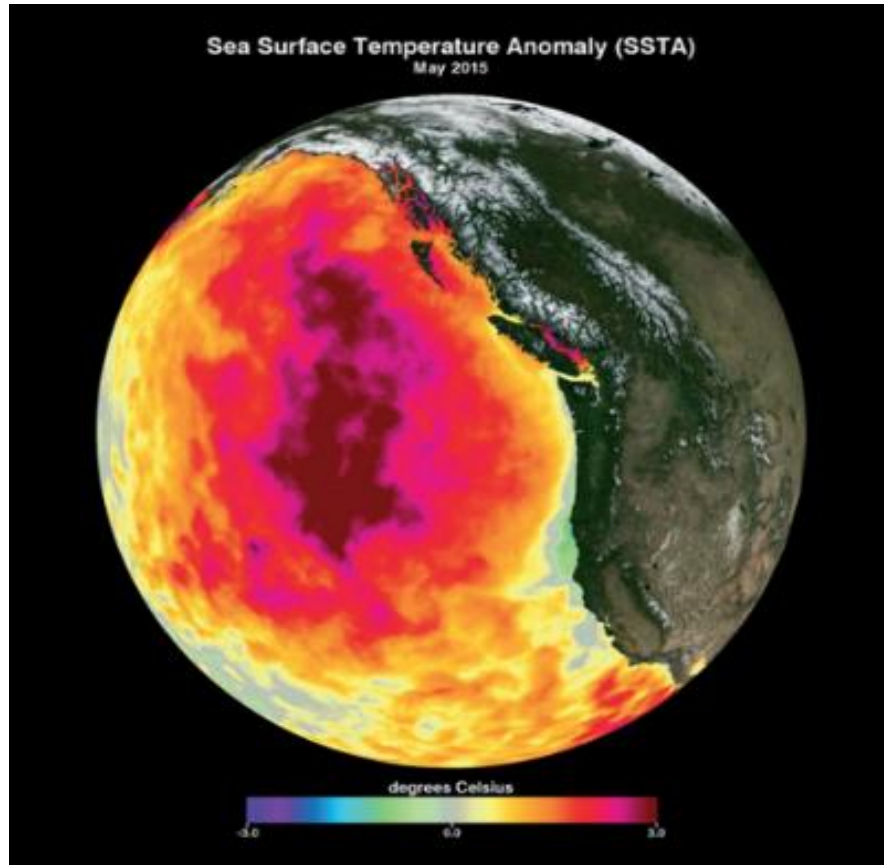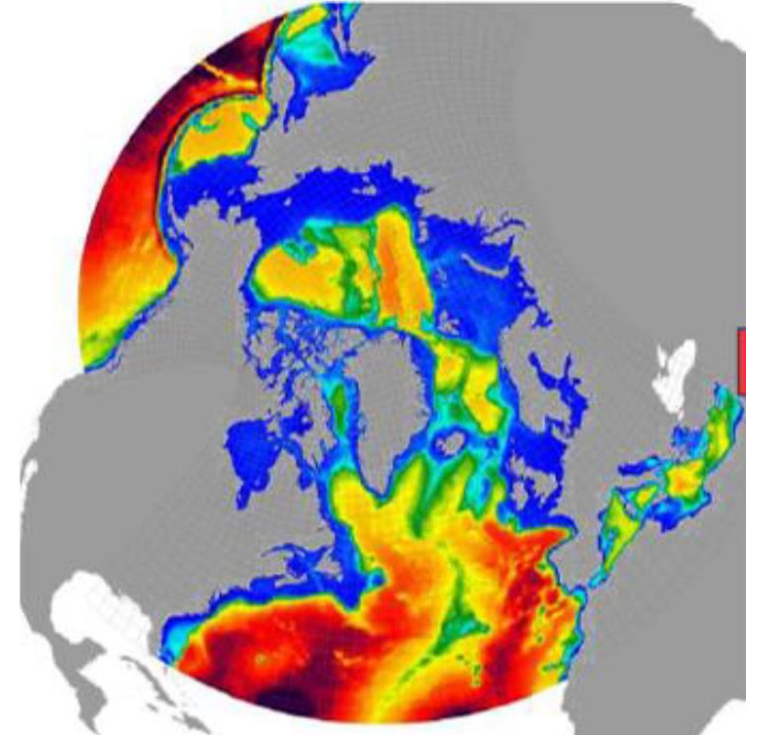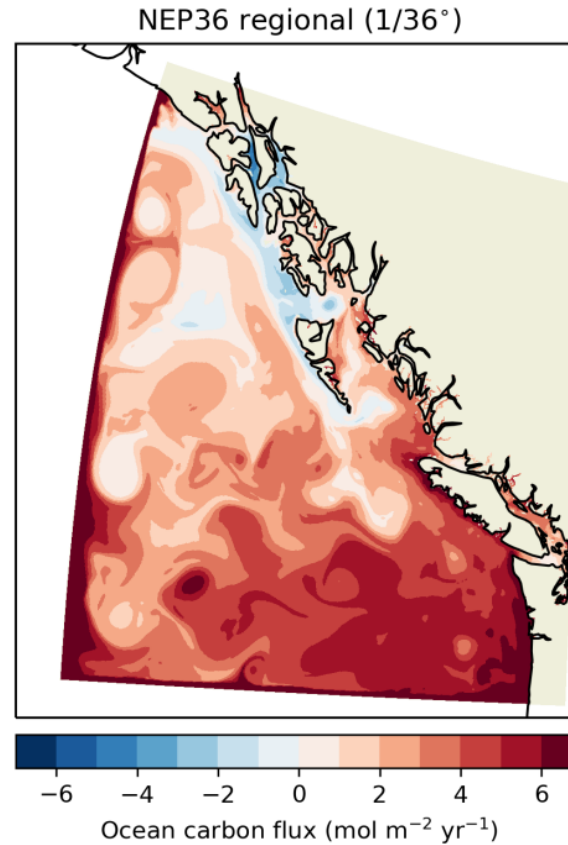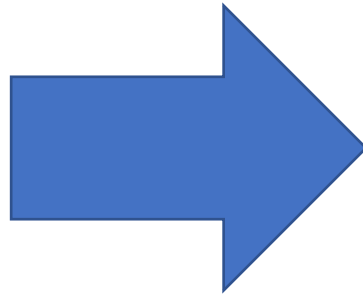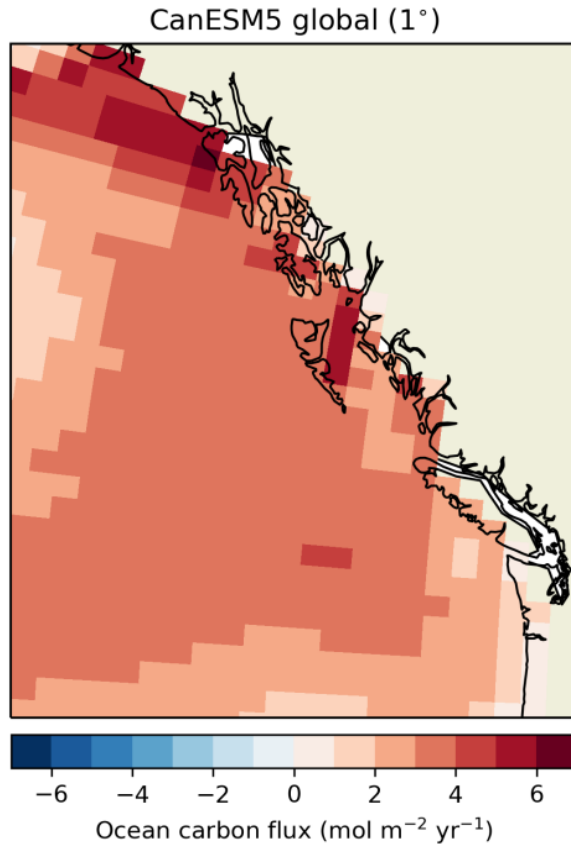**July 2022**

NEED AND OPPORTUNITY FOR CHANGE

Figure courtesy of Dr. Laurie Weitkamp, NOAA

USING OCEAN MODELS TO UNDERSTAND MECHANISMS AND DRIVE PREDICTIONS AND PROJECTIONS

Figures from Dr. Neil Swart: Canadian Centre for Climate Modelling and Analysis, Environment and Climate Change Canada.

# UNDOS: **B**asin **E**vents to **C**oastal **I**mpacts Program (BECI)

- **Objective:** Implement an international ocean intelligence system of monitoring, research and analytical approaches that provides timely advice to decision makers about the impact of current and future climate conditions on socio-ecological systems.

- Salmon will be an exemplar species while a modular approach will include all species of interest.

BECI: TRANSFORMATIVE ELEMENTS

- **Build a collaborative partnership** to link organizations working on ocean science with management/ bodies. The program will be administered as a North Pacific Marine Science Organization (PICES) special project

- **Develop** an integrated **ocean monitoring program** including deployment of existing and **emerging technology**

- **Mobilize north Pacific ocean data**

- **Develop modelling tools at the appropriate scale** linking climate-ocean observations to socio-ecological decisions

- **Develop a socio-ecological graph database system** to connect people, ideas, events and data
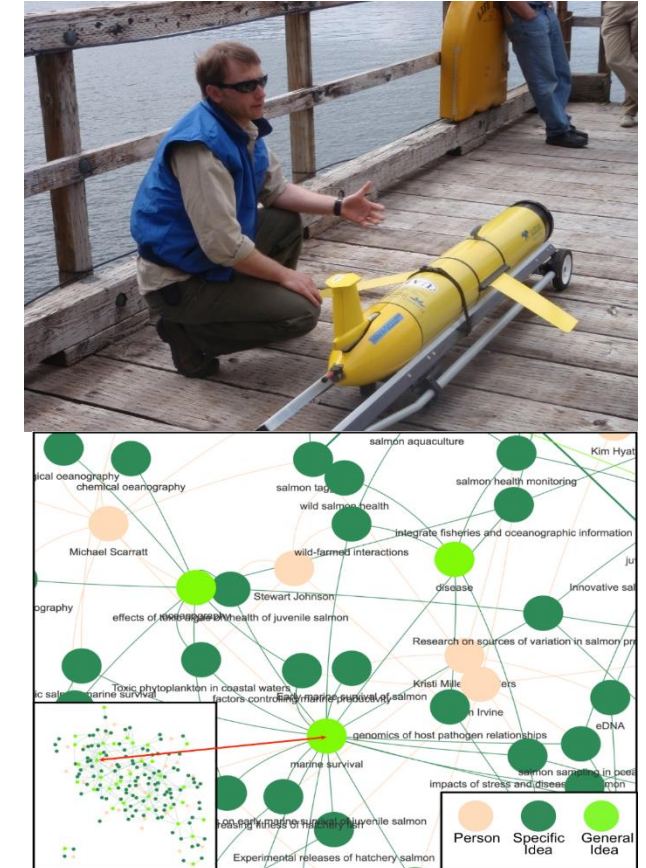
BECI: PRINCIPLES

- **Fund through partnership** arrangements across government, NGO's, foundations, academia and the private sector
- **Reflect generational, gender and geographic diversity** in all elements of the program
- **Incorporate indigenous knowledge and western scientific knowledge**

BECI TIMELINE

- Technical Workshops informing Science Plan – May through Aug 2022

  1. Climate and Ocean Ecosystem Modelling – Predicting the state of oceans and fisheries in the North Pacific and Bering Sea – May 9 and 10

  2. Linking Ocean Processes and Ecosystem Changes to Fish Production – May 31 and June 1

  3. Technology and Tools for Monitoring and Data Synthesis – June 13 and 14

  4. Data Mobilization and Knowledge Synthesis – July 7

  5. Bringing It Together: From Climate Change to Ocean Impacts and Fish Production – TBC

- Special Project proposal to PICES – early September 2022

- Ongoing development of BECI and outreach to potential partners and donors

- Decade project to run through 2030

Basin-scale Events to Coastal Impacts (BECI)

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WORKSHOP 1 – CLIMATE AND OCEAN MODELLING

- Ecological forecasting on a decadal to seasonal timeline is the most needed and most challenging.

- Development and application of down-scaled climate to geophysical ocean models is possible. Currently applied as a patchwork of geopolitically-based locations.

- Better integration of ocean and atmospheric modelling and monitoring needed.

- Current and emerging shelf and slope models with little connection to open basin dynamics.

WORKSHOP 2 – LINKING OCEAN AND FISH PRODUCTION

- It is time to expect the unexpected. We are seeing ocean states outside of historical envelopes. This weakens our ability to predict fish populations based on historical relationships.

- Better real-time (or near real-time) monitoring, reporting and communication are required in systems with low predictability and possible with scalable technology.

- More and better fisheries-relevant indicators are required to improve forecasting and risk assessment.

- We may need to re-think our models of salmon and their prey. The poorly-sampled micronekton may be competitors, not just prey.

- The limited international collaboration impedes progress.

WORKSHOP 3 – EMERGING TECHNOLOGY

- Autonomous Vehicles are proliferating and now operate over, on or under the surface of the ocean.

- A clever combination of platforms and sensors can drive affordable research and monitoring required by BECI.

- Ship-based monitoring and research will remain an essential part of any ocean research and monitoring program.

- New tagging, microchemistry and monitoring techniques can place species in ecosystems spatially and temporally to understand the impact of a changing ecosystem.

- Collaboration is essential to leverage investments and optimize application.

Photo courtesy of Andy Ziegwied – Ocean Aero Triton

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BECI STRATEGIC CONSIDERATIONS

- Enhanced capacity to predict and adapt to changing climate conditions for national and international fisheries and impacted communities

- Will require an investment of financial, platform (e.g. ship time), computing and personnel resources

- Leverage investments in monitoring and understanding basin-scale change with international partners

- BECI is complementary to the proposed NOAA Climate, Ecosystem and Fisheries Initiative and the current Alaska Climate Integrated Modeling Project (ACLIM)
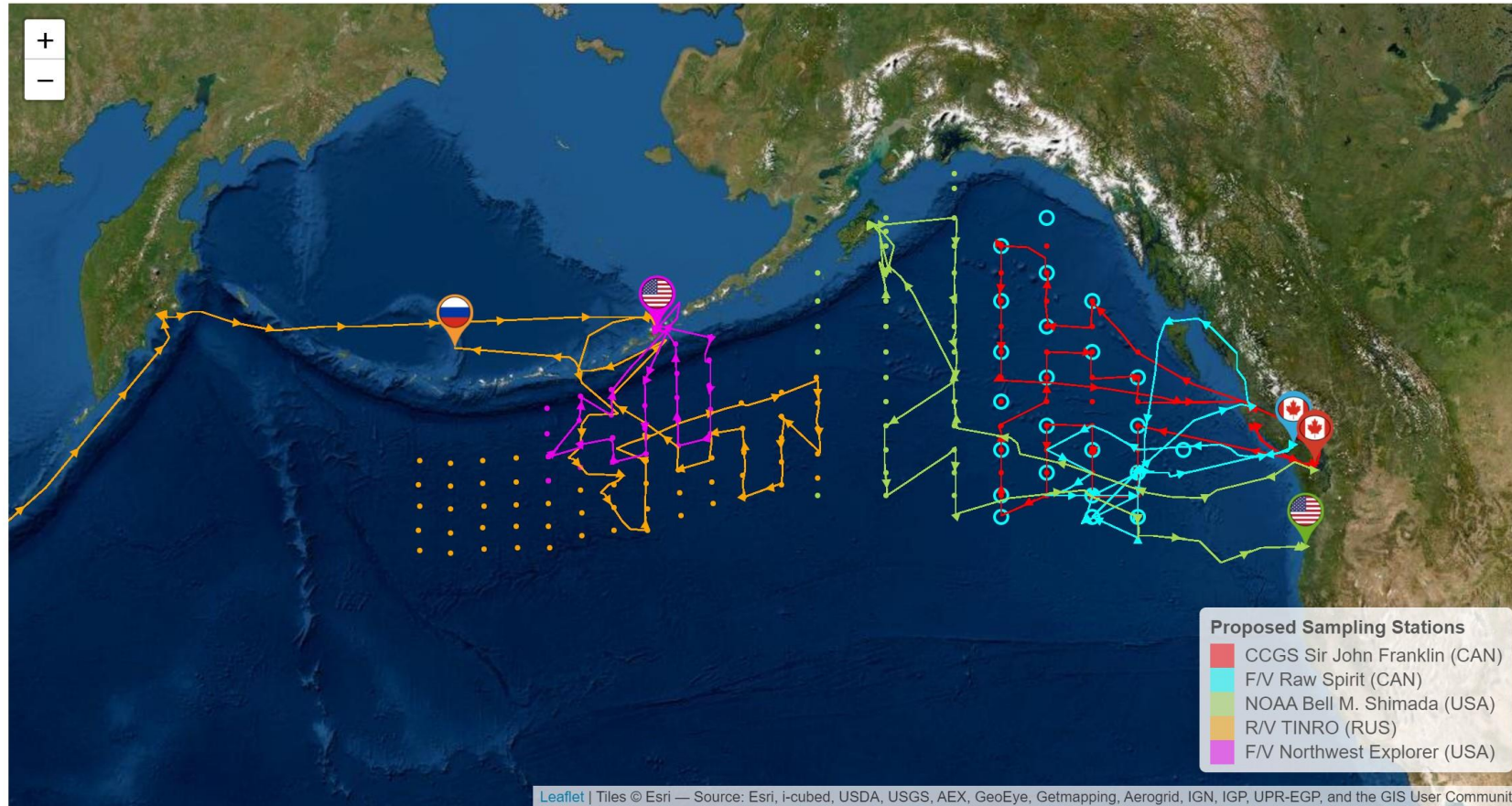
QUESTIONS

Proposed Sampling Stations
- CCGS Sir John Franklin (CAN)
- F/V Raw Spirit (CAN)
- NOAA Bell M. Shimada (USA)
- R/V TINRO (RUS)
- F/V Northwest Explorer (USA)

Leaflet | Tiles © Esri — Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, UPR-EGP, and the GIS User Community

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