Public Outreach for Oceanographic Research: A Case Study of the U.S. GLOBEC Program

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Honors College Thesis Defense

Today's Presentation

- U.S. GLOBEC
  - Northwest Atlantic
  - Northeast Pacific
  - Southern Ocean

- Public Outreach Efforts

- Future Outreach

U.S. GLOBEC

- U.S. GLOBal Ocean ECosystem Dynamics
- National collaboration of scientists
- Goal

  "to understand how climate change and variability will translate into changes in the structure and dynamics of marine ecosystems and in fishery production"

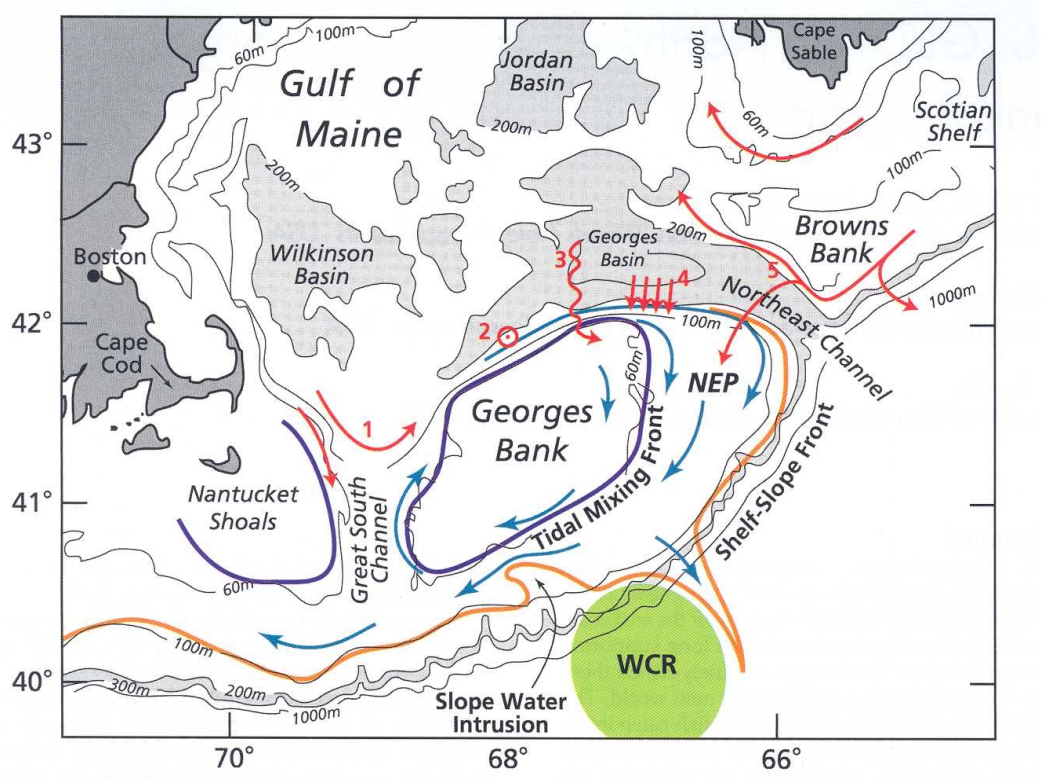
- Why?

  to provide information useful for more sustainable management of marine resources

U.S. GLOBEC…continued

- How?
  - Regional programs
    - *Northwest Atlantic: Georges Bank*
    - *Northeast Pacific: California Current System, Coastal Gulf of Alaska*
    - *Southern Ocean: West Antarctic Peninsula*
  - Research Strategy
    - *Modeling, process studies, observational studies, retrospective analysis, technical innovation*

Northwest Atlantic: Georges Bank



(Figure from Wiebe et al. 2002)

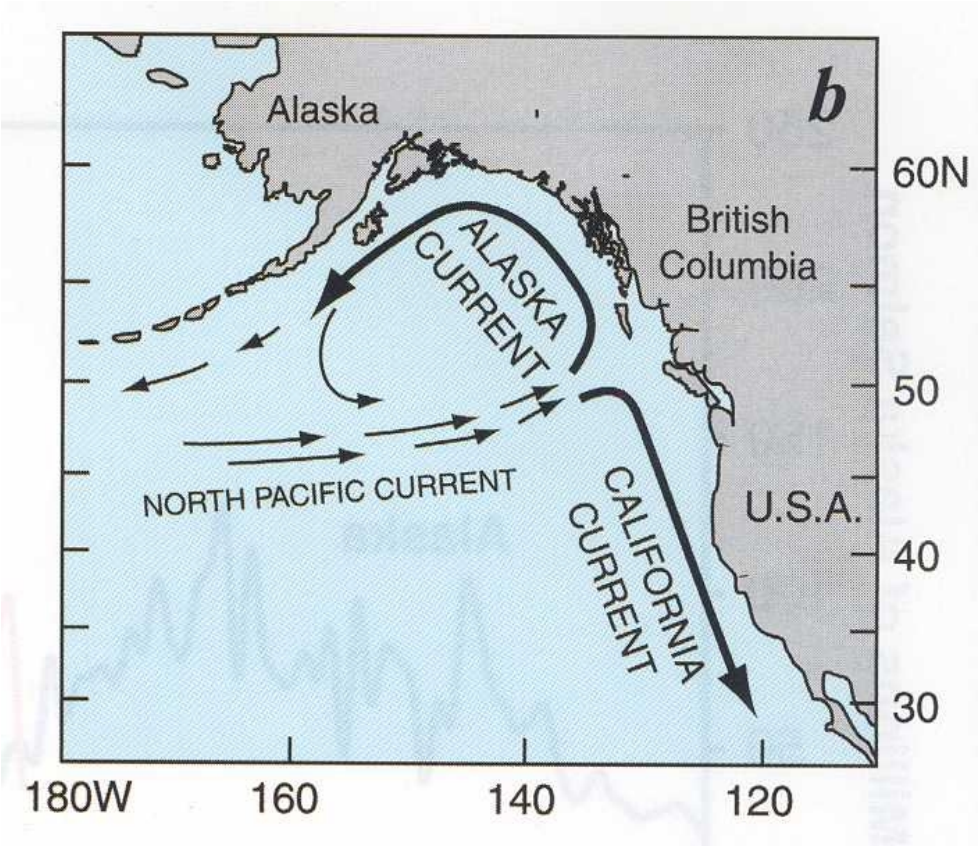
- High productivity
  - shallow bank
  - tidal mixing
  - Gulf of Maine
- Important fishery
- Targeted species
  - larval cod and haddock
  - copepod

Georges Bank

- Source waters vary in temperature
  - Northeast Channel colder and fresher
    - less nutrient rich
    - lower copepod abundance
- Larval growth is temperature dependant
  - Increases in temperature create prey limitations
- Prey distributions and abundances vary
  - Copepod reproduction can vary and limit food

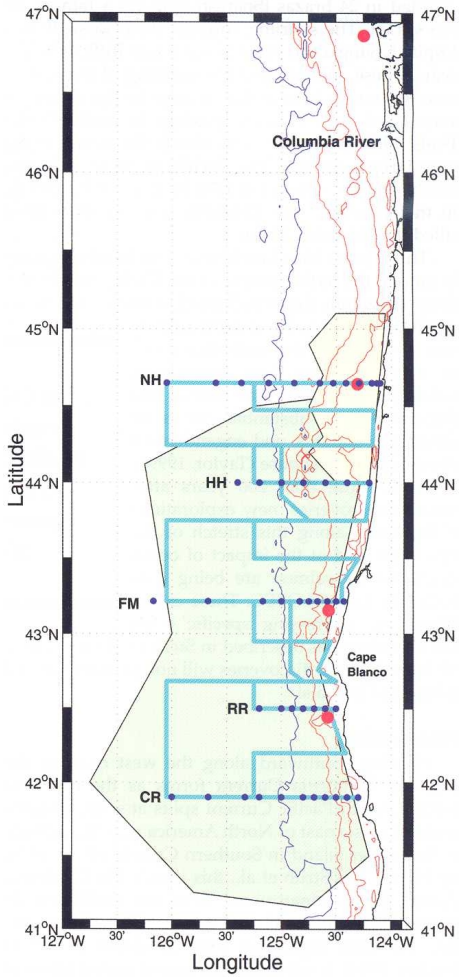
Northeast Pacific

- CCS and CGOA
- Productive fisheries
  - Vary out-of-phase
  - Interdecadal?
  - Interannual?
- Zooplankton and juvenile salmon



(Figure from Strub et al. 2002)

California Current System



Physical processes

- upwelling
- bathymetry

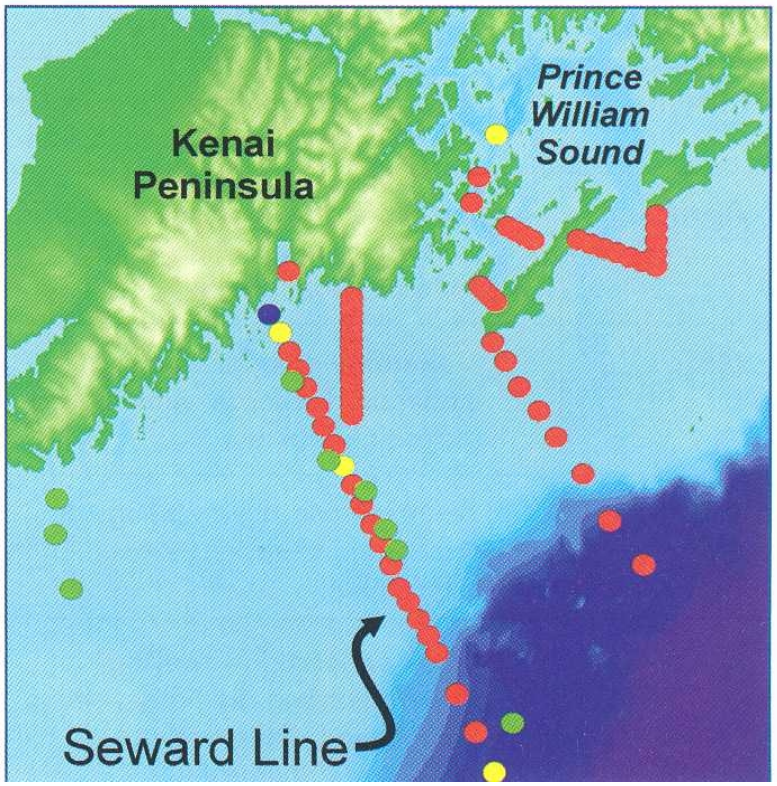
- Newport, OR to Crescent City, CA
- Targeted species
  - copepods, euphausiids
  - juvenile coho and Chinook salmon

(Figure from Batchelder et al. 2002)

CCS

- Discoveries
  - Change in zooplankton species and coho survival from warm, low productivity regime to cool, high productivity
  - Species concentrated at Heceta Bank and on shelf (nutrient availability from upwelling)
  - Species offshore associated with meander from Cape Blanco (bathymetric influence)

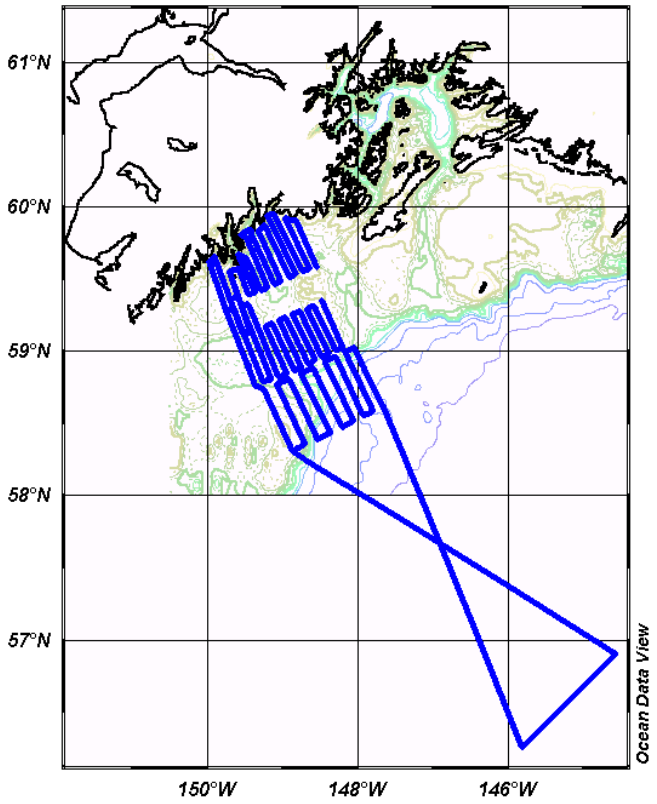
Coastal Gulf of Alaska



- Physical processes
  - downwelling
  - Alaska Coastal Current
  - seasonal variability
- Seward Line, PWS
- Targeted species
  - copepods
  - juvenile pink salmon

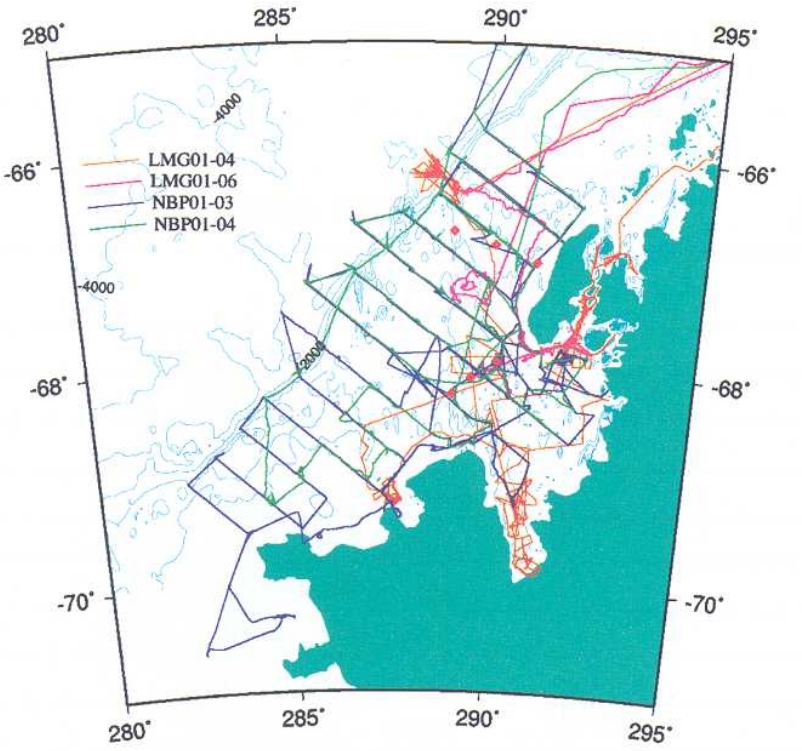
(Figure from Weingartner et al. 2002)

CGOA



- Shelf regimes
  - inner (low salinity)
  - Middle (intermediate)
  - outer shelf (high salinity)
- Nutrient availability
  - Fe limited offshore
  - anticyclonic eddy at shelf break

Southern Ocean



(Figure from Hoffman et al. 2002)

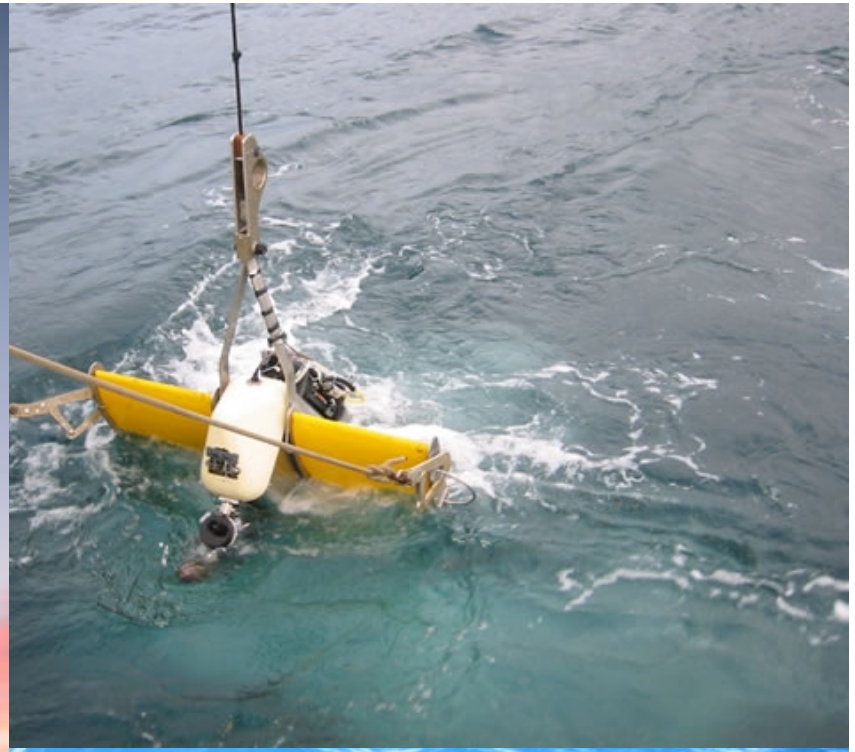
- International GLOBEC
- West Antarctic Peninsula
  - Marguerite Bay
- SO GLOBEC goal:

  "to understand the physical and biological factors that contribute to enhanced Antarctic krill growth, reproduction, recruitment, and survivorship throughout the year"

SO

- Results
  - timing of sea ice formation
    - krill habitat and food availability
    - whale abundance
  - krill abundance
    - adult versus larval krill
    - animal tracking

What *is* public outreach?



Public Outreach

- Definition: communication of expertise to external audiences
- Components
  - **Goal(s):** identify desired outcome
  - **Audience:** for whom is the outreach created (specified in goal)
    - Assumptions: education level, interests
    - Influences: language, style, media
  - **Media:** method of conveyance (newspaper, scholarly documents, brochures, interactive website)
  - **Monitoring**: technique for measuring effectiveness of outreach effort

Northwest Atlantic: Georges Bank

- Newspapers and magazines
  - **Goal/Audience:** inform general public about GLOBEC research
  - Reporters went to sea on numerous cruises
  - Published in *Boston Globe*, *National Fisherman Magazine*
- Chapter in book, Ocean Detectives
  - **Goal/Audience**: educate young children about oceanography
  - Educators informed for classroom use

Georges Bank…continued

- Television segment for local news broadcast
  - **Goal/Audience**: inform regional public about research
  - Chief scientist interviewed about research efforts

- No measurements of effectiveness
  - No central coordinating office
  - Nature of the outreach efforts, no practical way to measure effectiveness

Northeast Pacific: CCS

- Teacher at Sea for mesoscale cruise (2002)
  - John Hercher, high school science teacher from Salem, Oregon
- Outreach goals:
  - describe scientific activities & daily events aboard the ship to the general public via the Internet
  - create classroom exercise following the cruise
- Audiences:
  - general public: at least a high school-level education and an interest in ocean sciences
  - middle school and high school students in earth science courses

CCS…continued

- Real-time website for cruise
  - Background information about GLOBEC
  - Ship's schedule
  - Technology used to collect data
  - Video clips of events
  - Interactive question&answer page
  - Information about participants
  - Daily logs
    - Give a sense of what living and researching at sea is like

CCS…continued

- Hatfield Marine Science Center (HMSC)
  - **Goal:** "to extend as it is happening information about research cruises" to the the visitors through public presentations
  - **Audience:** mostly families
  - **Media:** interactive PowerPoint presentations
    - Information provided by Mr. Hercher's daily logs
    - Computer station set to the website available
    - Bookmarks with website on it for visitors
- No measure of effectiveness for either the website or Hatfield's efforts

Northeast Pacific: CGOA

- Website for 2nd mesoscale survey cruise in Gulf of Alaska (2003)
  - undergraduate student to participate in research & create website
- Outreach goal
  - communicate scientific info about the research cruise to a diverse, non-scientific audience via the Internet
- Audience
  - high-school level of education, assuming familiarity with basic scientific principles (biology, chemistry, physics)

CGOA…continued

- Mesoscale website
  - Background info about CGOA cruises
  - Preliminary data
  - Daily logs
    - Near real-time
    - Info about science and social activities
    - Annotated photo gallery
    - What life at sea is *really* like as a researcher

CGOA…continued

- Presentations after the cruise
  - Alaska SeaLife Center
  - OSU freshman orientation class
  - AGU poster
  - NEP Scientific Investigator's Meeting
- No measure of effectiveness for any of the efforts
  - No mechanism set up to monitor website or to follow up on presentations

Southern Ocean

- National Geographic reporter on cruise (2001)
  - Mark Christmas observed and participated in research
- Outreach goal
  - make the research more available to the general public and share what SO GLOBEC does
- Audience
  - assuming junior-high school level education

SO…continued

- Antarctica: SeaLab website
  - Designed specifically for this cruise
    - On land website managers
  - Daily reports
  - Interactive question & answer page
  - Television segment created with video footage
- Measured effectiveness of website
  - classroom involvement through questions
  - counted number of visits to the site

SO…continued

- Progress Reports
  - Graduate student from UC, Santa Cruz Science Writing Program
- Outreach goals
  - Describe research activities to the general public
  - Catch attention of national media
- Audience
  - Higher educational background than website (at least high school education)

SO…continued

- Posted on NSF website
  (accessible through SO websites)
- Published in *USA Today* newspaper

- No formal measurement of success
  - Do not count visits to website
  - Success, given national media coverage

Future outreach efforts…

Suggestions for “next time”

- John Hercher (CCS mesoscale cruise)
  - Teacher involved with research
    - More knowledge about scientific activities
    - Improve daily logs and course curriculum
  - Meet with scientists prior to cruise
    - Increase familiarity with project
    - Improve communication with scientific party

How to monitor effectiveness

- Bill Hanshumaker (Public Marine Education Specialist at HMSC)
  - Monitor effectiveness of daily presentations
    - Administer pre-post surveys
      - Include same scientific questions before/after presentation
      - Ask demographic info on one side of the survey

Through my experience

- CGOA mesoscale survey cruise
  - Preparation prior to cruise
    - Determine each of the four components
    - Structure webpages; complete as much as possible
  - One person writing daily logs
    - Consistency in style and language
  - Notify a targeted audience prior to cruise
    - Students could follow during cruise

Lessons learned

- Eileen Hofmann, chief scientist for several SO cruises
  - Give more direction to Progress Reports, now knowing people's interests
  - Pursue national media coverage by following up on NSF media briefings
  - Implement outreach efforts at the START of cruise planning

Final Comments

- Outreach valuable
  - share knowledge of natural world and how our actions impact it
  - Improve management of marine resources
- Accomplished various ways
  - Newspapers, magazines, websites
- Important considerations
  - Goal, audience, media, monitoring
- Overall, find ways to bridge the gap between scientists and the general public

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