Evaluation Salish Sea marine bird Indicators with insights from recent research by professional and citizen scientists

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Evaluation Salish Sea marine bird Indicators with insights from recent research by professional and citizen scientists

Scott F. Pearson & Martin J. Raphael

Barry Troutman
Goals for Today

• Linking research and monitoring results in more informed indicators
Bird Vital Sign Indicator

Scott F. Pearson
Coarse-grained indicators

- Vital Signs are aimed at the general public and policy makers with the goal of providing a limited number of indicators of ecosystem conditions.
- Vital Signs show the collective impacts of new and ongoing management strategies.
What are we trying to “indicate”?

Primarily indicate – along with orca, herring and salmon indicators – whether or not the Puget Sound Partnership is achieving its goal of “healthy and sustaining populations of native species”
Marine and Terrestrial Bird Indicators for Puget Sound

Washington Department of Fish and Wildlife & Puget Sound Partnership
12/31/2013
Indicator Status

Puget Sound Vital Signs
a dashboard of indicators on Puget Sound’s health and vitality
Marine Birds
Seabird community in the Salish Sea: Summer
Marine Bird Indicator #1

Spring/summer density trends for seabirds breeding in Puget Sound and Strait of Juan de Fuca.

- Pigeon guillemot
- Rhinoceros auklet
- Marbled murrelet
Approach

- Data from the spring summer marbled murrelet survey effort conducted for the Northwest Forest Plan
- Use line-transect survey methods
The Salish Sea
from the north end of the Strait of Georgia
to the west end of the Strait of Juan de Fuca
and the south end of Puget Sound
Marbled Murrelet

Salish Sea
2001-2016

California Current
2001-2015

-4.9% Annual
$P = 0.003$
Rhinoceros Auklet

Salish Sea
2001-2016

California Current
2006-2015
Pigeon Guillemot

Salish Sea
2001-2016

California Current
2006-2015
Integrating Monitoring and Research

• More likely to result in informed trends
• Additional uses of the information
Washington State Marine Spatial Plan

• Need:
  – Potential new ocean uses such as offshore wind energy or offshore aquaculture could impact important ocean resources and uses
  – Multiple, overlapping jurisdictions and authorities create additional challenges for coordinated decision-making and proactive planning
Washington State Marine Spatial Plan

• The plan is a tool to:
  – Protect ocean resources and uses
  – Guide potential applicants as they develop proposals
  – Assist state in the evaluation of proposals
Predictive Mapping of Seabirds, Pinnipeds and Cetaceans off the Pacific Coast of Washington

A collaborative investigation by
NOAA's National Ocean Service and National Marine Fisheries Service
U.S. Geological Survey
Bureau of Ocean Energy Management
Washington State Department of Fish and Wildlife
Cascadia Research Collective

March 2016

NOAA TECHNICAL MEMORANDUM NOS NCCOS 216
NOAA NCCOS Center for Coastal Monitoring and Assessment
Marbled Murrelet
NORTHWEST FOREST PLAN
The First 20 Years (1994–2013)

Status and Trend of Marbled Murrelet Populations and Nesting Habitat
“Land-Sea” Modeling

- Question: What factors best explain marbled murrelet distribution and trends at sea?
- Used population and habitat monitoring results, plus data on marine conditions
Component % Influence

<table>
<thead>
<tr>
<th>Component</th>
<th>% Influence</th>
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<tbody>
<tr>
<td>Nesting</td>
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<td>Foraging</td>
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“Land-Sea” Modeling

- **Key Finding**: Terrestrial factors, particularly the amount and pattern of nesting habitat, best predict murrelet distribution and trends at sea.
- **In Puget Sound**: Marine factors become better predictors.
Status Report for the Tufted Puffin

Thor Hanson and Gary J. Wiles
Washington Department of FISH AND WILDLIFE
Wildlife Program
Trends of other species of conservation concern
Meta-analysis
Climate Change

Will the California Current Lose its Nesting Tufted Puffins?

Chris Hart, Ryan Kelly, and Scott Pearson

https://doi.org/10.7717/peerj.4519
Approach

• Three species distribution models to evaluate breeding range shifts under two IPCC emission scenarios
Results

• Under both IPCC emission scenarios, models predict loss of > 93% of the California Current suitable nesting habitat.

• Greater than 18% loss of suitable nesting sites throughout the entire North American range.

Integrating Monitoring and Research

- Additional uses of the information
- More likely to result in informed trends
Contaminants in Prey

• Fish from Puget Sound were 2–4 times more contaminated and had similar contaminant profiles compared to fish from the outer coast (Good et al. 2014)

• Do Pacific sand lance and herring act as conduits for the vertical transfer of microfibers in food webs?
  – Quantified microfibres in stomachs of 734 sand lance and 205 herring from rhinoceros auklet bill-loads from 6 nesting colonies.
  – Sampling at Protection Island in 2016 yielded most (sand lance) or all (herring) of the microfibers recovered over the 30 colony-years of sampling involved in this study.
Questions?