



Speculations on the Effects of Climate Warming on Alaska's Fisheries

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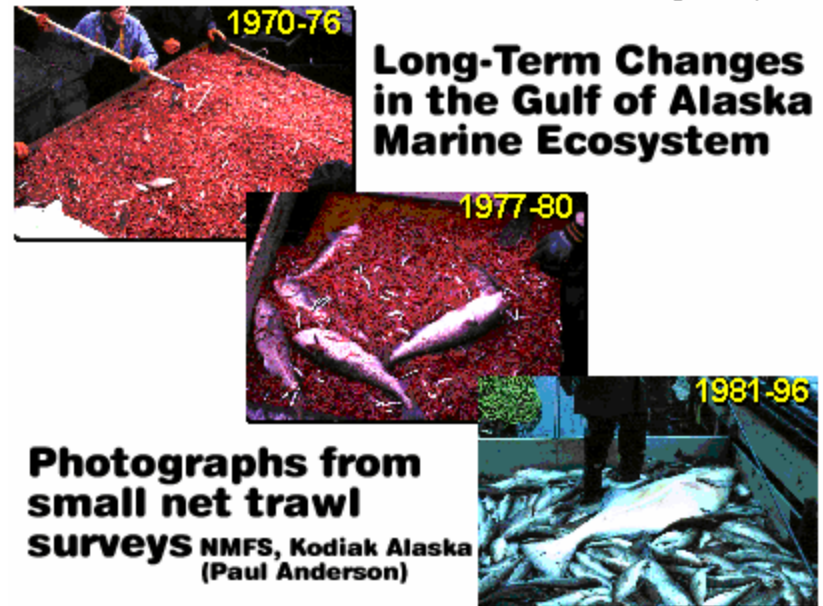
“At current rates of greenhouse gas emissions, predicted temperature increases under a doubled CO₂ climate are large enough to shift the position of the thermal limits into the Bering Sea by the middle of the next century. Such an increase would potentially exclude sockeye salmon from the entire Pacific Ocean and severely restrict the overall area of the marine environment that would support growth.”

--- D. M. Welch et al. (1998)

Warming of the climate, for whatever reason, will produce broad geographic changes in ecosystems with consequences to local fisheries, economies, and societies. Supporting evidence comes from:

- Paleo-limnology and paleo-oceanography
- Consequences of temporary warming events, such as El Niño
- Oral histories of

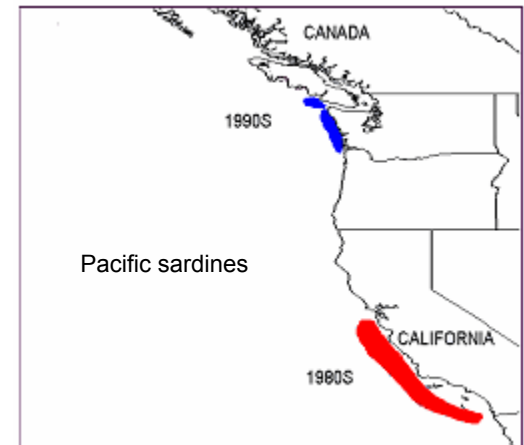
First Peoples that tell
of starvation



The Global Perspective

Ranges of species will shift to higher latitudes in the North Pacific Ocean and into the Bering-Chukchi seas and the Arctic Ocean.

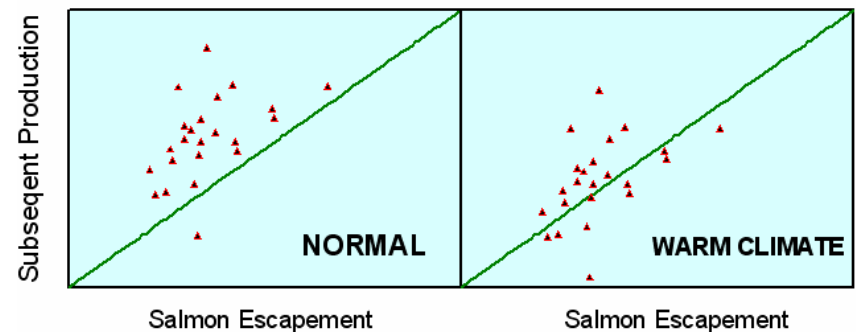
- New populations of non-native species will become established in the Arctic
- Populations of species whose range extends south beyond the Gulf of Alaska will “disappear” in southern latitudes
- Populations of species native to waters south of Alaska will become established in Alaska.



The Local Perspective

While effects of climatic warming play out over a vast geography, consequence of climatic change will be felt first in the management of area-specific fisheries and in the economic, social, and cultural life of local communities. Harbingers of problems in specific fisheries due to a warming climate are:

- Increased frequency in the incidental catch of non-native species
- Declining abundance of new recruits to populations typically harvested in the fishery
- Increased frequency of problems in fishery management
 - More fishery closures
 - More stocks of concern

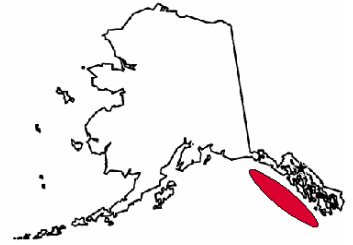


The Government Perspective

Official recognition that a climatic shift has occurred will happen well after the fact.

- Anecdotal evidence will be readily available, however
 - Importance of anecdotal evidence will be obscured by natural variation
 - How to react to anecdotal information is often unclear
- Scientific verification of a shift in range will come much later because:
 - Length of the life history of the animal
 - Problems in salmon fisheries will be noticed first
 - Rockfish last
 - Lack of defensible stock assessment for many populations
- Issues involving allocation will obscure needs for conservation

Fisheries First Affected

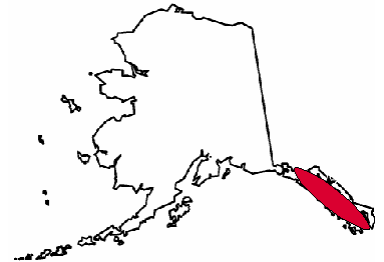


Outside Troll/Sport Fishery for Chinook salmon in Southeast Alaska will be the first fishery significantly affected by a warming climate.

- Much of the catch comes from populations originating in the Columbia River and in streams along the Oregon-Washington coasts, populations near the margins of the southern range of this species outside of Alaska.
- Effects will be muted to some extent as fishing is shifted to local stocks and other species with more local origin (such as coho salmon), markets permitting.

Shellfish fisheries in Southeast Alaska will be next.

- As ranges of species move across Alaska, fisheries on the margins will be affected.
- Shellfish populations, particularly crab and shrimp, are more localized than finfish and have young that are more susceptible to warming sea temperatures.
- Commercial, subsistence, and personal-use fisheries on these populations are also local, making adapting to change difficult for Alaskans.



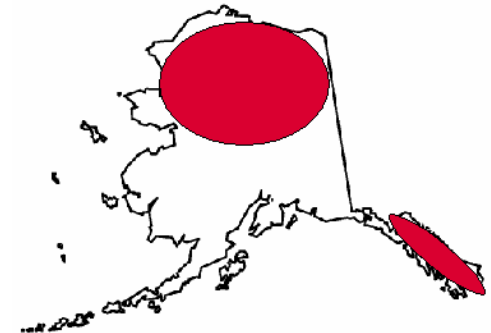
Fisheries Affected Next



Industrial fishing for shellfish in the Bering Sea will be affected as ranges for crab move north and recruitment declines because of warmer water.

- Negative impacts will be lessened somewhat given the fleet's mobility and its capacity for processing at sea.
- On-shore processing and local communities will suffer from a lack of this mobility.

Subsistence fisheries for sockeye salmon in Southeast Alaska and for whitefish in northern Alaska will be affected.

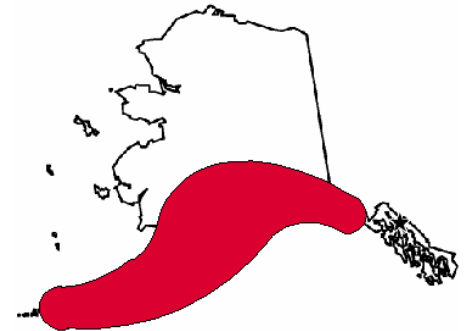


- Ranges of these species will move across Alaska north past Ketchikan and towards Barrow.
- Subsistence fishers will partially adapt by using other, less preferred species.
- Other species previously endemic to more southern areas will move north, but probably not fast enough to fill the void left by whitefish and salmon.

More Affected Fisheries

Salmon fishing from southeast through southcentral Alaska to Bristol Bay will suffer from smaller returns and frequent closures.

- Because salmon fishing is localized in these areas, subsistence, sport, commercial, and personal-use fishing will all suffer.
- Infrequent fishing will cause loss of commercial and recreational markets.
- Tourism will suffer some loss in revenues.
- Allocation issues before the Board of Fisheries will intensify as will conflicts with the Federal Subsistence Board.



Complicating Matters ...

While we can “think globally”, there are circumstances that impede our ability to “act locally”:

- Shared jurisdictions for management in and outside Alaska.

The more jurisdictions involved in fisheries management, the longer it takes for joint decisions to be made.

- The Endangered Species Act.

Current and potential applications presume that local intervention can restore a subspecies. Multi-stock fisheries could potentially be closed even though the closure would be of no benefit for the endangered subspecies.

- Lack of Defensible Stock Assessment in and outside of Alaska.

Poor stock assessment prevents trends from being recognized, issues concerning allocation to be unresolved, and realistic escapement goals or levels of allowable biological catch to be determined.