Seabird Die-offs and a Warming Ocean



Difference from average temperature (°C)

0

Climate Change, Part 1 - Sea Level Rise



Climate Change, Part 2 - Food Mismatch



Full of Them?

Young?

Male Genes?



Common murres washed up on beaches by the thousands this year. Often described as "a football with wings," the bird can dive several hundred vards below the water's surface. But its inability to fly well means it and other flight-challenged birds like Brandt's cormorants could not adapt to difficult conditions.

ning last spring, as many as 100,000 bird carcasses washed up on shore along the Pacific Coast from California to Washington. Although much of the mystery of the die-off remains, researchers are starting to untangle the puzzle. Ecologist Julia Parrish of the University of Washington in Seattle says the deaths may be due to weather. Early in the year, weak winds failed to stir the Pacific kept deep, nutrient-rich rish says: "Do you stay

Did Mild Weather Kill Pacific Seabirds? ENVIRONMENT-Begin- water from reaching the and defend your chick surface—an upwelling that serves as "a kind of turbo boost to the ecosystem," Parrish says. Without it, the food

chain suffered: Plankton went missing, as did the little fish that ate them. Birds couldn't just pick up and go elsewhere, because they were breeding. The stress caused many seabirds to mate much later than usual or not at all, and those that tried to raise young were faced with as much as usual. That a grim quandary, Par-

from predators, or do you leave and get food? A lot of them waited too long." At a time when the birds should have been "fat and sassy, in the best body condition," she says, many ended up dead.

Why the winds were light is still a mystery. "If we are experiencing a new weather or climate phenomenon along the Pacific Coast," Pa says, "we will see matic changes ... it keeps me up at ni

64 DISCOVER JANUARY 2006

Climate Change, Part 3 – Harmful Algal Blooms



Climate Change, Part 4 – Ocean Acidification



a more acidic ocean (30% rise since the Industrial Revolution)







Another Sad Animal Story – Common Murres in 2015



- Population ~13-21 million, with 4-8 million in western NA
- Lifespan 15-20 yr
- Starts breeding at age 3-7
- Surface nester
- Fledges a single chick
- Eats fish and krill (and sometimes squid)







Of the August 2015 Total Carcass Count

(all years before 2015)







Harmful Algal Bloom Pathways

blooms of: Toxic Algae (phytoplankton)



eaten by: Forage Fish (sandlance, herring) Shellfish (mussels, clams)



Toxin concentration but no obvious ill effects

eaten by: Seabirds, Marine Mammals



Neurotoxicity, death

Harmful Algal Bloom Events, and Suspect Mortality of Seabirds and Marine Mammals



Google earth

Image IBCAO Image Landsat Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Imagery Date: 4/9/2013 lat 56.766024° lon -156.725728° elev -62 ft eye alt 1174.22 mi 🔘

Data and map of composite events from Bruce Wright

Sea Surface Temperature Difference from August 2015 compared to the Long-term Average (1981-2010)



this figure adapted from Climate.gov



Citizen Science and Massive Mortality Events



A Sad Animal Story – Cassin's Auklets in 2014-15



- Population ~3.5 million
- Lifespan 6-10 yr
- Starts breeding at age 3-4
- Burrow nester
- Fledges a single chick (2x in southern portion of the range)
- Eats krill and other large zooplankton; larval fish





Birds of North America, 2015 photos: Cassin's Auket, Tom Johnson; Triangle Island, Jo Smith





The "Blob" - Northeast Pacific Sea Surface Temperatures



Bond, Cronin & Freeland 2015; data are NCEP/NCAR Reanalysis ()

Warm Fall/Winter Water Results in ~100,000 Auklet Deaths



"There is a 95% chance that El Niño will continue through Northern Hemisphere winter 2015-16"





from ENSO: Recent Evolution, Current Status and Predictions

www.cpc.ncep.noaa/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf

