

## Marine Bird and Mammal Observations and the Pacific Continuous Plankton Recorder Program (409)

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**What is the study about?** In an ecosystem there are many cross-linked food chains, which form a food web of multiple layers called trophic levels. These levels correspond to the different feeding positions in the food chain; ranging from the primary producers – the plants at the basis of the marine food web – to the primary consumers – which graze down this production – to the secondary and tertiary consumers – the predators which prey on the grazers. Researchers are trying to look at how the abundance of plankton (both phytoplankton primary producers and the zooplankton grazers) influences the distributions of the higher trophic level predators, such as seabirds and marine mammals. Comparing plankton and top predator distributions to surface water temperatures (indicative of ocean currents) and chlorophyll concentrations (indicative of ocean productivity) will teach researchers how the food webs of the North Pacific vary by geographic regions and across time (both seasonally, and from year to year).

### How do we measure plankton distributions and temperature?

Plankton distributions are very difficult to measure because these organisms are very small and numerous. The continuous plankton recorder (CPR) is a simple, rugged piece of oceanographic equipment used for many years to measure plankton distribution. CPR's are towed by commercial ships, like the *Skaubryn*, on their regular routes of passage across the North Pacific and Bering Sea. As the CPR is towed behind the ship, seawater containing plankton enters the front of the CPR through a small square opening, passes along a tunnel and through a silk filtering mesh which catches the plankton and allows the water to exit at the back of the machine. Researchers end up with a long piece of mesh with the plankton caught on it that represents the ship's track through the ocean. This mesh is divided up into separate samples and the different types of plankton are identified and counted. The CPR is also outfitted with a data logger that records the near surface water temperatures along the ships route.



**How do we count sea birds and marine mammals?** A researcher team travels aboard the commercial ship and conducts surveys of marine mammals and seabirds from the bridge or bow, depending on the weather conditions. This observer records the species, number, and behavior of the animals sighted within a 400 meter transect on one side of the bow, as the ship cruises at 15 – 20 knots.

**How do we measure chlorophyll concentrations?** For most of the world's oceans, the most important things that influence its color are phytoplankton. Phytoplankton (primary producers) are very small, planktonic plants, that contain chlorophyll. Chlorophyll is the molecule that traps sunlight and turns it into energy. It is found in the cells of green plants, and is what makes green plants, green. Although microscopic, phytoplankton can bloom in such large numbers that they can change the color of the ocean to such a degree that we can measure that change using a photograph taken from space by NASA. When the ocean looks green it contains lots of phytoplankton. When there is not phytoplankton it looks blue.

**Why are we studying this information?** The research team is comparing these images from space to the plankton and animal distribution data collected aboard the *Skaubryn* to develop a long-term ecosystem monitoring plan for the North Pacific and Bering Sea. This plan will help government agencies and resource managers adopt policies to manage how we impact ocean ecosystems.