Malia, Nick, Adia: How many animals (or how many species) do you expect to find in the deep coral reef?

Ken Longenecker, Invertebrate Zoologist (Ichthyologist, Bishop Museum)

Well I can't even begin to think of a number. This is partly because we don't know how well we'll be able to sample. On one dive, we saw at least 56 species of fish, but we know this is an underestimate because we couldn't see the very small species, and on the next day, more species were seen. For another group I'm particularly interested in (amphipods - tiny, shrimp-like animals), I expected to find several dozen species, but we've barely collected a dozen individuals. This may be due to our sampling technique. We may fall off the algae and rubble sandwiches as we are being put into our collecting baskets by the submersible collecting arm. We may need to figure out a better way to collect the little huggins.

Dean, Justin, Riley, Sierra B.: What kind of nutrients do seaweeds live off of in deep water?

Heather Spalding, Physicist (graduate student), University of Hawaii at Manoa, Botany

Marine algae, or seaweeds, is like to absorb the same types of nutrients as plants, such as nitrates (especially ammonium) and phosphates. Deepwater algae may be absorbing nutrients from many different sources. If the algae live over soft sediments, then fast-flowing currents can "pump" nutrients out of the sediments and into the water column, thus fertilizing any surrounding algae in a bund of nutrients. There could also be current coming from deeper water bringing nutrients, or freshwater seeps that leak out nutrient-rich water from the land. Finding out the nutrient sources for the algae is a major objective of our research. In some areas in deep water, the bottom is COVERED with algae, while other areas only have a little. These patchy patterns of abundance may be linked to different types of nutrient sources, so we are trying to take different types of measurements from the algae to try and figure this out.

Erik, Yacine, Blaire, Sean: Why is black coral found deep, why is it expensive and worth a lot?

Daniel Wagner, Oceanographer (graduate student), University of Hawaii at Manoa, Hawaii Institute of Marine Biology

Black coral is a zoanthellate, meaning it does not have symbiotic algae (zooxanthellae) in its tissues. Therefore, it contains all of its nutrients by feeding on zooplankton in suspension as opposed to many other corals that have zooxanthellae and photosynthesis. Consequently, black coral does not require light. In fact, it appears that larvae of black coral move away from light and settle in dark areas, such as in caves, or on the deep reef where we don't have light. Black coral is expensive because it is difficult and expensive to harvest due to the fact that it grows so deep (up to 1200 meters, or 4000 feet) in Hawaii. Operations at those depths require submersibles or technical diving, which is also expensive.

When Halimeda dies, it forms calcium carbonate sand. Over time, these little white Halimeda flakes will erode into a fine, white sand.

Dr. Kate: What is the major sediment type in the deep water around Maui? Is it terrigenous? What is its origin?

Brian Popp, Oceanographer, University of Hawaii at Manoa, Geology

The sediment is mostly carbonate that is formed in situ. That is, the sediment is derived from reef organisms. Some terrigenous alga, such as Halimeda, produce calcium carbonate and grow relatively quickly and can result in much sediment. Terrigenous fine-grained materials can also be transported offshore as mud settle. Certain planktonic algae produce carbonate (coccolithophores) and some small zooplankton make carbonate tests (foraminifers), and when they die, they settle and form carbonate sediments.