

## Transplanting Coral Fragments to Damaged Coral Reefs in a National Park – Planting the Seeds to Recovery?

*Florida Caribbean Science Center and Center for Coastal and Regional Marine Studies*

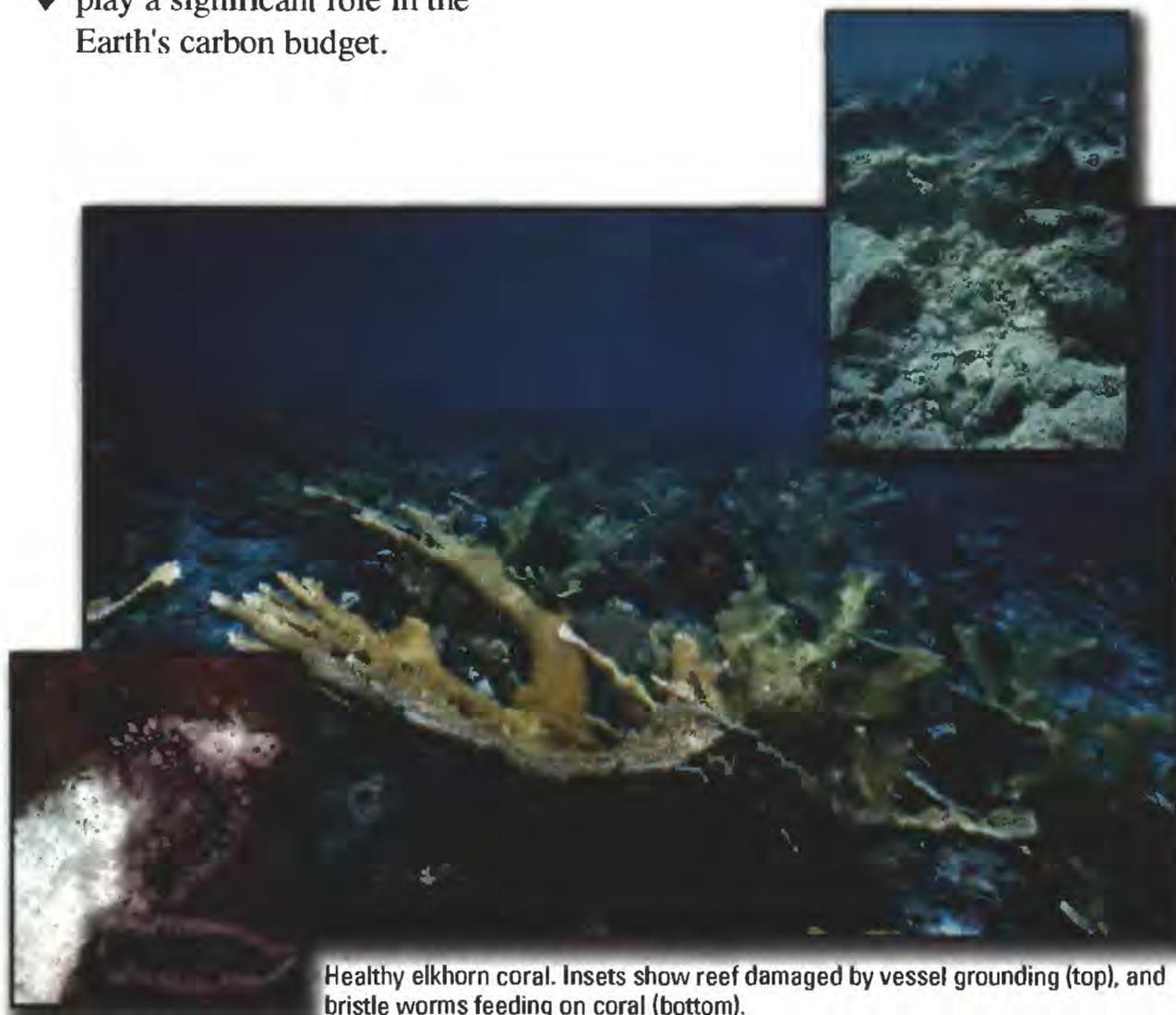
Coral reefs are the most complex marine ecosystem on Earth and are essential in the lives of literally hundreds of thousands of plant and animal species.

### Reefs:

- ◆ protect coastlines from battering storm waves;
- ◆ provide shelter and food for economically valuable fishery species;
- ◆ are sources of new compounds with pharmaceutical potential;
- ◆ provide food for local communities;
- ◆ attract snorkelers, divers, and recreational fishers who contribute millions of dollars to local economies;
- ◆ play a significant role in the Earth's carbon budget.



Healthy transplanted elkhorn coral fragment and tag.



Healthy elkhorn coral. Insets show reef damaged by vessel grounding (top), and bristle worms feeding on coral (bottom).

Over the past two decades, coral reefs in the western North Atlantic, including those within Virgin Islands National Park, have incurred damage from diseases, hurricanes, coral predators, and human activities. Diseases and hurricanes have played a major role. Degradation from human impacts has escalated simply because there are more and more people living near or depending on the sea. Most significantly, there has been little to no recovery on damaged reefs and the amount of living coral continues to decline.

Damaged coral reefs cannot be restored to their original condition. However, interest in restoration has heightened due to the increased incidence of damage and the continuing lack of recovery on Caribbean reefs. Reintroduction of coral colonies to damaged reefs may initiate and help speed recovery.



USGS scientist measuring growth of transplanted coral fragment while park visitors observe from the surface.

**Two questions arise:**

1. What is the best source for reintroduced colonies? Do we degrade one reef to restore another?
2. Do colony survival and growth rates warrant the cost and time required to transplant coral colonies?

We turned to natural processes on the reef for a source of colonies. We collected storm-produced fragments of three species of Caribbean coral (elkhorn, staghorn and finger corals) and transplanted them to other reefs. These species were selected because they grow relatively rapidly (for coral); occur at the same depths as areas most vulnerable to damage; colonize primarily by fragmentation; and provide an ample supply of naturally produced fragments.

USGS scientists, resource managers at Virgin Islands National Park, scores of community volunteers, and a 5th/6th grade science class at a local school participated in the two-year project. Together, our research team found that:

- ◆ Naturally produced coral fragments are an abundant source of coral for transplanting.
- ◆ Shallow coral reefs in the Caribbean are highly dynamic, with low rates of survival for small coral colonies. Corals colonize, survive for a period, and die.
- ◆ Of the three species studied, only elkhorn coral was robust (growing and surviving) on the reefs. Naturally occurring staghorn and finger corals had high mortality and low growth rates.
- ◆ Survival rates were similar for both transplanted fragments and naturally occurring fragments/colonies.
- ◆ This method of transplanting coral was highly successful.



An elkhorn coral 1 month after transplanting (top), and the same coral 22 months after being transplanted (bottom).

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A short video on the project is available on request.

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