



P.O. Box 958
Wheatland, CA 95692
Telephone 530-633-4858
Fax 530-633-0365
www.CaliforniaShipstoReefs.org

COMMITMENT TO SCIENCE AS PART OF ARTIFICIAL REEFING

Reefing has been a human activity for hundreds, if not thousands of years. Humans have placed things in the ocean to attract and/or increase fish populations on every coast of every continent and island of the world. Numerous studies have been done which show fish population increases and fish breeding on artificial reefs. California Ships to Reefs (CSTR) is committed to, above all else, **Do No Harm**. Based on this commitment, CSTR has undertaken to do what we believe are the most comprehensive, and very possibly the first, studies of our reefing sites from at least one year pre-sinking, through the sinking event and on into the future.

We are absolutely convinced that reefing is a beneficial activity, both for the human community in the form of recreation (diving and fishing), and economics (dive tourism and fishing charters), and for the environment, in the form of increased/enhanced marine habitat and by taking some fishing and diving pressure off of existing natural reefs.

CSTR Vice Chairman and VP Science Andrew Lee, a marine biologist, has designed a series of observation and sampling protocols to commence on the proposed sink sites a minimum of one year prior to the reefing of a vessel, and to encompass not only the sink site, but a representative natural reef in the same area. These will take the form of transects (lines laid along the bottom to delineate a set, repeatable observational path) and quadrats (areas of the bottom marked out for the purpose of counting individuals/species per a designated area). This will give CSTR valid baseline data on what exists on the sink site (which will be hard bottom, sand and/or mud) and a comparable natural reef nearby.

Immediately prior to the sinking event, the transects and quadrats will be removed from the bottom. Immediately after the sinking event, they will be re-installed on the new ship-based artificial reef, and the observation/sampling protocol will continue, now on the new reef and the previously existing "natural" reef. These observations can continue for as long into the future as wanted or needed to establish exactly what occurs on the new reef, how the new reef affects the existing nearby reef(s), and by what mechanism the life on the new reef is recruited and becomes established.

This study design has been peer reviewed by the National Oceanic and Atmospheric Administration, the National Marine Fisheries Service (NOAA/NMFS) and the California Department of Fish and Game (DFG), as well as several university and marine laboratories. We are currently in the process of establishing partnerships with one or more of these facilities to provide the unbiased analysis of the data our volunteers will collect.

By following this protocol, CSTR will be able to establish the following, and perhaps much more:

- 1) What populations of species exist on both the sink site and the existing natural reef, pre-reefing?
- 2) What, if any, seasonal variations exist?
- 3) What species are recruited to the new reef from the existing natural reef(s)? From other areas?
- 4) Does recruitment take place among juveniles or adults of each species?
- 5) How long does each species take to establish a breeding population on the new reef, if ever?
- 6) At what point will populations stabilize?
- 7) At what point in the life of the new reef will populations start to decline, if they do?

There are many other questions which may come up and to which we may find answers. We may find answers, and in finding them, we may be led to the questions. By making this commitment to do good science while helping both the environment and the economy of California's ocean interface, we can better understand how we can improve our efforts to help improve and sustain a healthy ocean.

If properly funded and completed, these studies would provide large amounts of data that have not been generated in previous artificial habitat studies. In the past, these studies have been completed on several artificial habitats, commencing from the date of their creation for some period of time thereafter. The missing data regards the sites prior to the artificial reefing events and the impact on nearby natural reefs.

In this study, we propose to evaluate a potential reefing site for as much as two years, and in some cases more, prior to a reefing event so that natural, baseline data can be accumulated over a period of seasons and years to enhance scientific accuracy. At the same time, we propose to accumulate data on one or more natural, nearby rocky reef structure(s), thereby accumulating the same baseline data for that site. These two sets of data can be studied statistically by any number of researchers. Once the reefing event has occurred, this study will continue to accumulate data for a number of years, possibly decades, thus making it possible to evaluate the impact of the artificial reef, not only on its own site, but on the surrounding natural reefs. Ultimately, it should be possible to determine the effect of artificial reefs on their local ecosystems with scientific accuracy.

Completing such a study on a single new artificial reefing site will generate many opportunities for biologists to complete any number of studies on that site. However, scientifically, the results

cannot be considered convincing due to any unknown vagaries within that particular small ecosystem. For that reason, we propose to complete at least three and probably many more, exact replicates of this study on widely separated sites along the California coastline; potentially including the Central Coast, Santa Monica Bay and the Southern Coast.

For more information, please contact Andrew Lee at AndyL@californiashipstoreefs.org.