To Clean or Not to Clean: Managing Fouling on Boat Hulls

Boat owners must control hull fouling to maintain vessel speed and fuel efficiency. Widely used, copper-based, antifouling paints initially slow fouling on boat hulls due to their toxic nature, although some invasive species can grow on hulls coated with copper antifoulants.[6] These toxic paints face restrictions in California and possibly elsewhere due to water quality concerns. [1,3,7a,7b] Thus, nontoxic and less-toxic hull coatings will likely become more common. As a result, companion strategies, such as in-water hull cleaning, are also needed to control hull fouling.

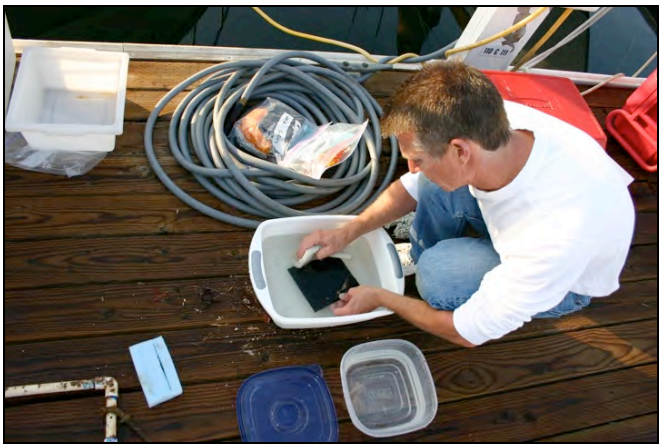
However, Australian research suggests that in-water hull cleaning practices may stimulate fouling growth.[4] This research used cleaning practices that are quite different than those used in California. Thus, we conducted research to assess responses of fouling growth to best management practices (BMPs) developed and used by the California Professional Divers Association (CPDA).

Evaluating California Hull Cleaning BMPs
We conducted our study at three locations: Santa Barbara Harbor and the inner and outer ends of Shelter Island Yacht Basin of San Diego Bay. The study occurred in 2008 from June through September when fouling is typically heaviest.

Experimental panels were submerged at local boat docks. Each panel had a base gel-coating. On top of the gel coating one of the following products was applied: copper antifouling paint; nontoxic ceramic-epoxy; or nontoxic, siliconized epoxy. We had three cleaning treatments: continuously cleaned; cleaned once; and not cleaned (new).

"Continuously cleaned" panels were cleaned in water for three months using California BMPs. "Cleaned once" panels were cleaned only at the end of three months. Then, both sets of panels were redeployed for a fourth month, and a set of new "not cleaned" panels was added.

Before each cleaning, we rated the fouling present on each panel and the cleaning tool and effort required to remove it, using a five-point scale developed with the CPDA.[2,5] At the end of the fourth month, all panels were cleaned and the levels of fouling growth, cleaning tool and cleaning effort were recorded along with the weight of the removed fouling growth.



To Clean or Not to Clean: California BMPs
Results of our study indicate that the in-water hull cleaning BMPs of the CPDA are an effective companion strategy for managing fouling on boat hull-coatings. We found:

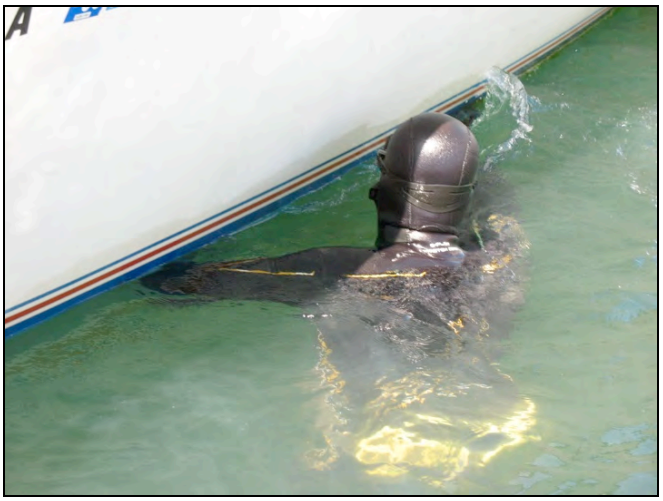
- There was no significant difference in amount of fouling among cleaning treatments.
- Slightly more abrasive tools and cleaning effort were required for the nontoxic-coated panels and for panels that had been cleaned (either once or continually).
- Panels with copper-based antifoulants were far less fouled than panels with nontoxic coatings, as expected for new, copper-based antifoulants.
- The amount of fouling was significantly less at the northern location (Santa Barbara) than at the two southern locations (San Diego).

Why the difference from Australian results?
We used California BMPs that employ frequent, gentle cleaning to protect the hull coating and to prevent fouling from maturing and accumulating to the point that aggressive tools and intense effort are needed.[2] In contrast, longer cleaning intervals were used in the Australian research and this allowed fouling organisms to mature and some to become tougher or harder. A more aggressive tool and greater effort were required to remove the older fouling organisms, resulting in scratching and/or chipping of the coating and leaving fragments of fouling organisms. Scraped surfaces with

remains of fouling organisms greatly enhanced settlement.[4]

Conclusions

Our results support using nontoxic coatings with in-water hull cleaning BMPs of California to co-manage water quality and invasive species. Frequent cleaning with the gentlest, effective cleaning tool and level of effort on a schedule that is suitable for the amount of fouling in a given location and time of year should improve fouling control without stimulating the next generation of fouling growth. These findings have implications for developing fouling control policies that are environmentally and cost-effective.



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