

**After the TBT Era:  
Alternative Anti-fouling Paints and their Ecological Risks**

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With 3 Text-Figures and 1 Table

**Key words:** tributyltin, copper, biocide, silicone, anti-fouling, coating, shipping, bio-invasion, alien species.

**Abstract**

Due to the strong ecotoxicity of the biocide tributyltin (TBT), which is in use in anti-fouling paints on ships and the negative ecological effects observed worldwide, it is planned to impose a global prohibition on the application of TBT on ships in 2003. Although substitutes are already on the market, research-efforts for novel anti-fouling technologies are intensified. However, an essential requirement of any TBT-free anti-fouling product must be the environmental compatibility in order to avoid pseudo-alternatives. Many of these new paints require supplements of toxic biocides and/or high loadings of copper compounds to function effectively. Due to the lack of data the potential ecotoxicological risks to the marine environment from the use of these alternative coatings can hardly be estimated in their range at present. Also first results of German pilot projects on alternative ship coatings showed that in general macro-fouling is more pronounced on these materials than on TBT-containing paints. It has to be assumed that in the future an increase in bioinvasion by shipping will occur if alternative anti-fouling paints lack the effectiveness of TBT anti-foulants. Especially the biocide-free silicone coatings, from which fouling growth is easily removable, have an extraordinarily high potential for introduction of alien species.

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