FOR THE LOVE OF HUMANS, FISH, AND BIODIVERSITY

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THE URGENT NEED TO CONTROL SEWAGE DUMPING IN BC WATERS

Pleasure boats in BC waters are almost unrestricted in their sewage dumping. For the health of both the marine ecosystem and seafood consumers, it is recommended that **a) land-based sewage dumping be encouraged through implementation of pumping stations at every marina b) at-sea dumping be limited to treated sewage only.**

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While legislation preventing the discharge of garbage and pollutants from vessels does exist, there is only weak policy in place to control the dumping of human waste in to the marine environment (Ministry of the Environment, 2013). There is a policy that any vessel with a toilet should also have a holding tank, but this policy in many cases does not translate into use of the tank. Existing policy also does not specify that the sewage be treated as opposed to dumped raw. One might think that there would at a minimum be a policy in place to prevent the dumping of human excrement into contained bays and lakes that receive little circulation, but dumping is in fact permitted in all but 17 named bodies of water in British Columbia (Ministry of the Environment, 2013). These 17 bodies include a variety of coves, bays and lakes but sum to a pitiful proportion of coastal BC.

SHELLFISH

One striking reason to clean up our act is human health. Sewage is rife with both bacteria and viruses that can cause disease. . The viruses of concern are primarily gastro-intestinal, though the polio virus and hepatitis A have both been known to be transmitted by this route (Lees, 2000) Although the ocean is a "virus soup", with one litre of ocean water containing up to ten billion viruses, the specificity of a virus for its host cell means that there has never been a recorded incident of an ocean-originating virus causing illness in a human seafood consumer (Lees, 2000) The viruses that are transmitted back to humans through the fecal-oral route and cause sickness originate in shellfish contaminated with human waste. Sewage treatment is relatively ineffective at removing viruses from water and thus a strong argument is provided for land-based treatment facilities.

DIVERSITY AND DISTRIBUTION OF MARINE LIFE

Our poor dumping practices are also wreaking havoc on the organization of the marine ecosystem. An experiment in California analyzed the effect of human sewage on biodiversity and found that the contaminated regions exhibited a decrease in spatial heterogeneity, meaning that there was less community stratification (Littler & Murray, 1975). It found that, in general, rapid-colonizers were favored. Organisms using this opportunistic life strategy often become abundant after a disturbance at the cost of biodiversity.

HEALTH OF FISH

Almost every aspect of a fish's lifecycle is vulnerable to sickness when exposed to sewage. Fish exposed to sewage pollutants under experimental conditions are found to develop skin and internal hemorrhages, blindness and fin rot (Snieszko, 1974). Polycyclic aromatic hydrocarbons (PAHs), along with

polychlorinated biphenyls and natural and synthetic estrogens are among the components of human sewage known to have a negative effect on the survival of fish embryos (McElroy, et al., 2012). An accumulation of sewage in contained bays can also result in increased nitrogen levels causing a hypoxic marine environment. There are several environmental chemicals that, when induced by hypoxic conditions, alter signaling systems and can result in abnormal physiological changes such as reproductive impairment and altered sex ratios (McElroy, et al., 2012).

CONCLUSIONS AND RECOMMENDATIONS

For reasons of public safety and marine health, it is suggested that it be **made mandatory for all marinas to have a pump-out and treatment facility** to make it a more convenient option. It is also suggested that it be **made illegal to dump untreated sewage in coastal waters**. While constant enforcement may be impractical, a large fine for each transgression may serve to increase compliance. This increased pressure in combination with the concurrent increased convenience of land-based pump facilities will serve to mitigate damage to the marine environment and keep us healthy.

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