

“GREEN SLIME”

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“GREEN SLIME” is a perjorative term for a biological complex of algae consisting of the Family Chlorophyceae. When in sufficient abundance, they form green algal mats (Figure 1). In Maine, *Enteromorpha sp.* and *Ulva sp.* are the species most often encountered. “Green slime” has been drawn in to the aquaculture debate as an undesirable result of fish farming’s release of nutrients to surrounding waters (McClosky, 2003). This concern of nutrient enrichment is not unfounded, regardless of source. In fact, we have been following the issue and conducting field analysis since the early-1980s.

We have observed *Enteromorpha* and *Ulva* mats on mudflats and beaches throughout the coast of Maine (Figure 2), from New Hampshire to New Brunswick in areas where human activity is prevalent and where human activity is absent. We even find mats on isolated offshore islands. To conclude that green algae are necessarily “bad,” however, would be a mistake. These algae form the base of the food chain for many marine animals, especially grazers such as periwinkles, and add habitat structure to an otherwise flat surface.



Figure 1
Green algae mat

However, in excess, these algae can form thick mats that consume and block the exchange of oxygen to the flats resulting in anoxic (devoid of oxygen) conditions.

Sedentary animals living under the mats in the mud then die. Obviously, we are concerned about economically important species, such as clams and marine worms, but we are equally concerned about less obvious and economically unimportant species for their ecological implications. For example, extensive flats with an abundance of forage prey for migratory shorebirds is critical to the birds successfully completing their long distance intercontinental flights between nesting and wintering grounds. On rocky shores, green algae can outcompete and displace perennial rockweeds that offer spawning and nursery habitat for fish.



Figure 2
Green algae mats on South Portland mud flats, August 2002.

Did Salmon Farming Cause “Green Slime”?

In Cobscook Bay, salmon farming is said to be responsible for green algae mats (Figure 3). Some people assert that it did not exist prior to salmon farms (Julie Hodgkins, personal communication). The evidence is to the contrary. Extensive algae mats in Cobscook Bay pre-existed salmon farming by at least a decade. In addition to the many residents around Cobscook Bay with whom we have talked, documented evidence of green algae mats dates back to the 1970s, well prior to marine salmon farming. The Maine Geological Survey’s Coastal Marine Geological Environments (CMGEs) indicate that approximately 1,062 hectares of flats were covered with green algae in the mid 1970s (Timson, 1976). And in 1984, when salmon aquaculture had barely begun in Cobscook (Vadas and Beal, 1987) reported on green algae mats. So the answer to whether salmon farms “caused” these mats is unequivocal, “They did not.”

But is salmon farming causing green algae mats to increase?

First, this question presumes that an increase has in fact occurred. What evidence exists, however, suggests otherwise. A recent comparison of 1996 aerial mapping of the bay with earlier CMGE data indicates that green algae coverage has increased only slightly if at all (Peter Larsen, Bigelow Laboratories for Ocean Sciences, personal communication,). In 2002, when Cobscook Bay was depopulated due to an outbreak of Infectious Salmon Anemia, green algae was reported to be “as bad” as in years when salmon farms were fully stocked (Julie Hodgkins, personal communication).

Even if we could conclude that the mats have increased, we have not yet established the cause. Herbivory, abundance of overwintering propagules, ice scour, climate change, and human physical disturbance (eg. scallop dragging) also control algal abundance in addition to nutrient supply (assuming that nitrogen could be used by the plants in Cobscook for growth) (Lotze et al., 2001; Pihl et al., 1999, and Trimmer et al., 2000).



Figure 3
Aerial photo of green algal mats in Carrying Place Cove, Eastport, August 2002.

Conclusion

To jump to false conclusions based on incomplete evidence is counterproductive to effective resource management. On the otherhand, to wait for complete information before acting is equally folly. Though we may not know with 100% certainty that salmon farming is not contributing to green algae mats, we know two important facts:

1. aquaculture did not cause “green slime”
2. green algae in Cobscook Bay is not causing problems that did not exist prior to salmon farming in the bay.

Lastly, regardless of whether aquaculture continues in Cobscook Bay, for sound ecological reasons, we will continue to follow this issue along the entire Maine coast.

References

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