Fish for the Future: Promoting Sensible Growth While Preserving Fish Habitat

With proximity to the nation's capital, and surrounding metropolitan areas and desirability as a playground, Maryland's portion of the Chesapeake Bay watershed is rapidly developing. Often people are attracted to the area by good fishing, crabbing, and the availability of local seafood. However, these very resources that attract visitors and residents to the area become stressed in response to unchecked development in a watershed. Fisheries researchers and managers are becoming more aware of the effects of growth on the living resources of the Bay and the small rivers and streams that flow into the Bay. We need to impart this knowledge to citizens and governing bodies of the Bay's tributaries.

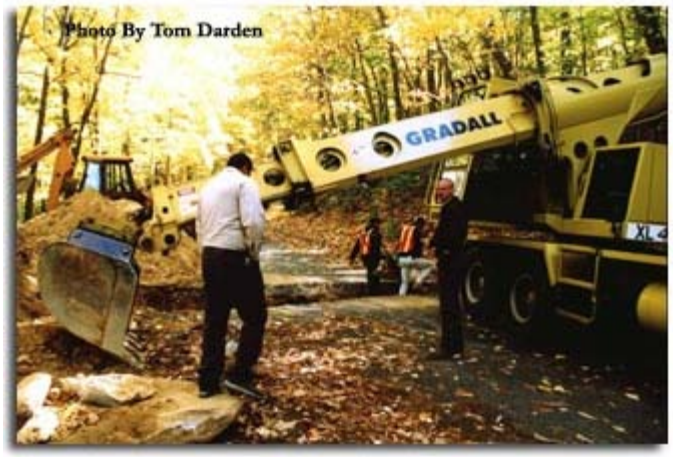
Maryland Department of Natural Resources, Fisheries Service initiated studies examining impacts of land development on fisheries in the Bay. These studies indicated that when impervious surface (rooftops, roads, sidewalks, parking lots and compacted soils) covers 10% or more of a watershed, fish habitat is significantly impaired and fish populations decline. Dissolved oxygen levels in bottom habitat fall directly with the amount of impervious surface in a watershed. The effect is a direct reduction of fish and crab abundance in the bottom to mid-depth waters because habitat is no longer suitable. This is not "rocket science"; these animals are not present where they cannot breath.

Our study of yellow perch in Severn River described the impact of urbanization on its biology. This study suggests that reproduction failed because adults no longer produced enough viable eggs, larvae, and juveniles. Spring salinity in the nursery was much higher than historic data suggested, probably because the stream function changed as land in the watershed was developed. Salinity appeared to have limited the extent of spawning area for adult fish and created conditions that were potentially fatal to larvae. Late spring and summer dissolved oxygen conditions were so poor over much of the river that adult female yellow perch exposed to this habitat were stressed. Research by Rudolph et al. (2003), showed that reproduction of adult carp declined when they were exposed to low oxygen. It is possible that we observed these same effects on yellow perch in the Severn River where egg hatch rates were low.

Other research has shown that contaminant levels in white perch in Chesapeake Bay tributaries increased with impervious surface (King et al. 2004). This is reflected by increased fish consumption advisories issued in urban areas. Many contaminants and compounds have not been tested for, but are expected to be higher in developed areas. Fish kills in Bay tributaries increase with impervious cover. Anadromous fish (white perch and herring) spawning in Hudson River streams fell off very rapidly with development (Limburg and Schmidt,

1990).

Planners should recognize degradation of fish habitat with development as they deal with infrastructure issues and they should be aware that watersheds with 10% or greater impervious cover have poor fish habitat. We recommend that land-use planning agencies consider a margin of safety (plan for no more than 8% impervious surface) in less developed watersheds slated for growth in order to protect these valuable resources. From the fisheries management perspective, our studies indicate that standard management options (stocking and harvest restrictions) cannot overcome degraded habitat once the 10% threshold is exceeded. We (DNR) may well be faced with large areas devoid of reasonable fisheries resources if we cannot convince planners of the land-to-fish connection.



We are working to strike an equitable balance that provides citizens and visitors of Maryland, with a quality experience of Maryland's resources and protects fish populations for the enjoyment of present and future generations.

References:

- King, R.S., J.R. Beaman, D.F. Whigham, A.H. Hines, M.E. Baker, and D.E. Weller. 2004. Watershed land use is strongly linked to PCBs in white perch in Chesapeake Bay subestuaries. Environ. Sci. Technol. 38:6546-6552.
- Limburg, K. E., and R. E. Schmidt. 1990. Patterns of fish spawning in Hud
- Rudolph, S., S. Wu, B. S. Zhou, D. J. Randall, N. Y. S. Woo, and P. K. S. Lam. 2003. Aquatic hypoxia is an endocrine disruptor and impairs fish reproduction. Environmental Science and Technology 37:1137-1141.