

Anthropogenic Impacts to Fish Assemblages in Northern New Jersey Streams



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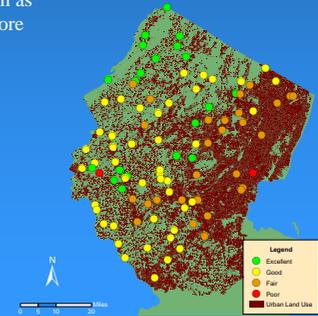
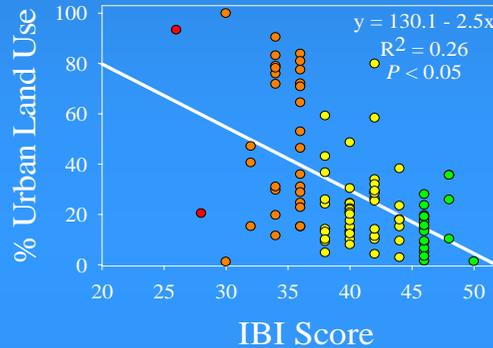
The New Jersey Fish Index of Biotic Integrity (IBI) has been used to assess the health and condition of fish assemblages and to identify potential stressors from high gradient streams in New Jersey. Since the initiation of the program in 2000, a number of impacted and potentially impacted waters have been identified. Seventy-six percent of urban streams sampled have been impacted or have suspected impacts as a result of human activities. The most common urban stressor to the aquatic community is loss or degradation of natural habitat. Bank erosion and siltation have eliminated overhead cover, bank vegetation, riparian buffer and suitable substrate in many urban streams.

The effects of such habitat alterations are evident in the fish community, as benthic insectivores, which require clean substrate, have exhibited a decreasing trend in response to urbanization. Trophic imbalance is often evident in urban waters, as specialized feeders such as insectivorous cyprinids are replaced by generalists. In addition, data from the 2005 season indicates external deformities in fish are more common in urban settings, likely a result of environmental stress or input of contaminants.

Outfalls

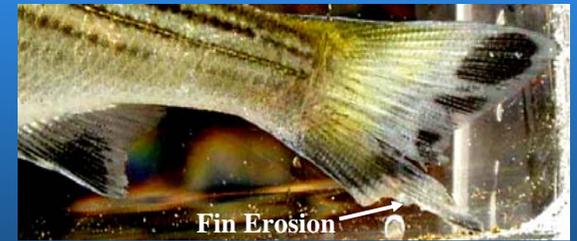


- Urban stream outfalls are used to drain impervious surfaces during storm events
- Deliver toxic materials and nutrients to streams during storm events (Wang et al. 1997)
- Impervious surfaces lead to a decrease in fish habitat quality and channel stability (Booth 1991)



DELT Anomalies

- Occur frequently below point sources & areas where toxic chemicals are concentrated (EPA 1999)
- Intermittent stresses from combined sewers and urban runoff create some of the highest incidences of DELT anomalies (Ohio EPA 1988)
- An increase in the number DELTs is generally an indication of stress and environmental degradation (Ohio EPA 1988)



Fin Erosion



Tumor



Multiple Anomalies

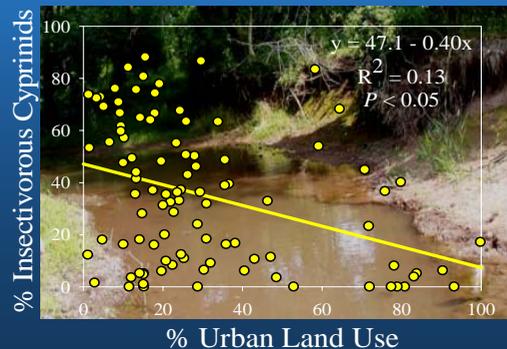
Habitat Loss and Degradation

- Fish habitat loss is usually a result of anthropogenic disturbances (Schmetterling et. al. 2001)
- Rock revetment used to stabilize banks in urban areas causes a loss of riparian vegetation and leads to simplified aquatic habitats (Fausch et. al. 1995)
- Bank erosion increases sediment loading, reduces overhead cover, and can decrease riparian buffer



Siltation

- Smothers benthic macroinvertebrates
- Impacts benthic and insectivores fish species
- Fills interstitial spaces in substrate
- Leads to increased turbidity
- Excessive suspended sediment levels can reduce fish feeding rates and impact hatching success (Newcombe 1996)



% Urban Land Use