DRAFT June 16, 2009

The Diadromous Species Restoration Research Network Science Meeting 2009
Restoration of Diadromous Fishes and Their Ecosystems: Confluence of Science and Restoration
22 – 24 July 2009 University of Maine

Annotated Bibliography for Breakout Session:

Restorations as Experiments

Please note that this bibliography is not intended to be a complete list of publications on the topic. Rather it represents only those publications that were suggested by panelists and moderators of this breakout session. We hope to add to this list over time.
Please visit DSRRN KB webpage for full citations and abstracts:
http://www.umaine.edu/searunfish/dsrrn_activities/data.htm

Geomorphology and Hydrology

- Snyder NP, Kammer LL. Dynamic adjustments in channel width in response to a forced diversion: Gower Gulch, Death Valley National Park, California. Geology 2008;36(2):187. We studied the 1941 diversion of Furnace Creek Wash (drainage area 439 km^2) into Gower Gulch (5.8 km^2) as an experiment in the transient response of a channel to a large change in water and sediment discharge. Over long periods, the lowering rate of Gower Gulch probably depends on knickpoint retreat, but the present-day response of this non-steady-state system is a hybrid of incision and narrowing in detachment-limited reaches and widening in transport-limited reaches. This system demonstrates the importance of evolving channel geometry in setting the transient response of rivers to changes in forcing parameters.
- Snyder NP, Castele MR, Wright JR. Bedload entrainment in low-gradient paraglacial coastal rivers of Maine, U.S.A.: Implications for habitat restoration. Geomorphology 2009;103(3):430. Our results suggest that the frequency and magnitude of bedload transport are reach specific, depending on factors including local channel geometry, upstream sediment supply and transport, and formation of anchor ice. This presents a challenge for stream practitioners in this region: different reaches may require contrasting management strategies. Our results underscore the importance of understanding channel processes at a given site and assessing conditions upstream and downstream as a prerequisite for conducting habitat restoration projects.
- Collins, M.J., 2009. Evidence for Changing Flood Risk in New England Since the Late 20th Century. Journal of the American Water Resources Association 45(2):279-290. Identifiable hydroclimatic shifts should be considered when the affected flow records are used for flood frequency analyses. Special treatment of the flood series can improve the analyses and provide better estimates of flood magnitudes and frequencies under the prevailing hydroclimatic condition.
- Collins, M.J. and J.C. Knox, 2003. Historical changes in Upper Mississippi River water areas and islands. Journal of the American Water Resources Association 39(2):487-500. The present study uses GIS mapping to quantitatively compare historical changes in mapped land and water phenomena in the upper Mississippi River Pool 10, located along southwest Wisconsin's border. Results are representative of a valley reach where a major tributary contributes a large sand bedload, forming an alluvial fan of considerable size in the floodplain.
- Benda, L., N. L. Poff, D. Miller, T. Dunne, G. Reeves, G. R. Pess, M. M. Pollock. 2004. The network dynamics hypothesis: How channel networks structure riverine habitats. Bioscience 54: 413-427. Abrupt changes in water and sediment flux occur at channel

confluences to river networks and trigger changes in channel and floodplain morphology. This observation, when taken in the context of a river network as a population of channels and their confluences, allows the development of testable predictions about how basin size, basin shape, drainage density, and network geometry interact to regulate the spatial distribution of physical diversity in channel and riparian attributes throughout a river basin.

Evolution and Genetics

- Kinnison MT, Hendry AP, Stockwell CA. Contemporary evolution meets conservation biology II: impediments to integration and application. Ecological Research 2007;22(6):947. In particular, we consider (1) alternative perceptions of "evolutionary" and "ecological" time, (2) the role of contemporary evolution as an ecological process, (3) fitness as a bridge between evolution and conservation, and (4) challenges faced by conservation strategies based on gene flow estimation or manipulation. We close by highlighting some situations in which current conservation approaches and contemporary evolution may require reconciliation.
- Kinnison MT, Hairston Jr NG. Eco-evolutionary conservation biology: contemporary evolution and the dynamics of persistence. Functional Ecology 2007;21(3):444. An eco-evolutionary perspective suggests that we expand our focus beyond the acute problems of threatened populations and growing invasions, to consider how contemporary evolutionary mechanics contribute to such problems in the first place or affect their resolution.
- Ayllon F, Martinez JL, Juanes F, Gephard S, Garcia-Vazquez E. Genetic history of the population of Atlantic salmon, Salmo salar L., under restoration in the Connecticut River, USA. ICES Journal of Marine Science 2006;63(7):1286. We examined variation at microsatellite loci in historical scale and modern tissue samples to evaluate the degree and direction of any genetic changes that have occurred in salmon originating from the Penobscot and restored to the Connecticut River. Found the Connecticut River fish to be genetically similar to their donor stock, and no evidence of genetic bottlenecks.
- Haney RA, Dionne M, Puritz J, Rand DM. The Comparative Phylogeography of East Coast Estuarine Fishes in Formerly Glaciated Sites: Persistence versus Recolonization in Cyprinodon variegatus ovinus and Fundulus heteroclitus macrolepidotus. Journal of Heredity 2009;100(3):284. Comparatiye studies of the response of ecologically similar species can provide a useful complement to those examining response across disparate species in defining what parameters influence persistence. Patterns of mitochondrial genetic variation in 2 estuarine fish subspecies from the Northwest Atlantic, Fundulus heteroclilus macrolepidotus and Cjprinodon variegalus onions, indicate that ecological similarity does not necessarily predict propensity for glacial persistence. These contrasting patterns of variation illustrate how ecologically similar species can respond to large-scale environmental change in distinct ways.

Habitat and Migration

- Juanes F, Gephard S, Beland KF. Long-term changes in migration timing of adult Atlantic salmon (Salmo salar) at the southern edge of the species distribution. Canadian Journal of Fisheries & Aquatic Sciences 2004;61(12):2392. We examined 23 years of migration timing data collected at two capture locations in the Connecticut River drainage. We found that the changes in migration timing were not unique to the Connecticut River stock and instead observed coherent patterns in the shift towards earlier peak migration dates across systems.

- Spicer AV, Moring JR, Trial JG. Downstream migratory behavior of hatchery-reared, radio-tagged Atlantic salmon (Salmo salar) smolts in the Penobscot River, Maine, USA. Fisheries Research 1995;23(3-4):255. Salmon smolt movement tracked with radio tags in 1990 and 1991. Only 3% of smolt tracked more than 40 km downstream from release site, with an average daily movement of 3.7 km/day.
- Armstrong JL, Hightower JE. Potential for restoration of the Roanoke River population of Atlantic sturgeon. Journal of Applied Ichthyology 2002;18(4-6):475. Telemetry and netting data indicate that juvenile Atlantic sturgeon in Albemarle Sound are most abundant in shallow nearshore areas where commercial gill-netting is concentrated. However, immediate mortality rates from survey and commercial gill-netting in Albemarle Sound were only 0–2%. Additional field studies are needed to refine estimates of immediate- and longer-term mortality associated with gill-net bycatch.
- Beasley CA, Hightower, J. E. Effects of a low-head dam on the distribution and characteristics of spawning habitat used by striped bass and American shad. Transactions of the American Fisheries Society 2000;129(6):1316-1330. Striped bass spawned at sites with significantly higher water velocity and significantly larger substrate than was found on average at randomly sampled locations. American shad spawned at sites that were significantly shallower and had significantly larger substrate than was found in random samples. The type of spawning habitat selected by both species indicates that improved access to upstream reaches would benefit both species.
- Burdick SM, Hightower JE. Distribution of Spawning Activity by Anadromous Fishes in an Atlantic Slope Drainage after Removal of a Low-Head Dam. Transactions of the American Fisheries Society 2006;135(5):1290-1300. Spawning of American shad and striped bass occurred primarily in main-stem river reaches that were further upstream during the year of higher spring flows. Hickory shad generally spawned in downstream reaches and in tributaries above and below the former dam site. These results demonstrate that anadromous fishes will take advantage of upper basin spawning habitat restored through dam removal as long as instream flows are adequate to facilitate upstream migration.
- Boumans, R.M.J., D.M. Burdick and M. Dionne (2002) Modeling habitat change in salt marshes following tidal restoration. Restoration Ecology 10: 543-555. For three New England tidal marshes we show species distributions of plants for tidally restricted and nonrestricted areas. Elevation ranges of species are used for short-term predictions of changes to salt marsh habitat after tidal restoration. In addition, elevation changes of the marsh substrate measured at these sites are extrapolated to predict long-term changes in marsh geomorphology under restored tidal regimes.
- Neckles, H. A., M. Dionne**,** D. M. Burdick, C. T. Roman, R. Buchsbaum, and E. Hutchins. (2002). A monitoring protocol to assess tidal marshes at local and regional scales. Restoration Ecology 10:556-563. We developed a hierarchical approach to evaluate the performance of tidal restorations at local and regional scales throughout the Gulf of Maine. The cornerstone of the approach is a standard protocol for monitoring restored and reference salt marshes throughout the region.

Planning and Restoration

- Beechie, T., G. Pess, and P. Roni. 2008. Setting river restoration priorities: A review of approaches and a general protocol for identifying and prioritizing actions. North American Journal of Fisheries Management 28 (3): 891-905. We recommend the use of simple decision support systems for cases in which watershed assessments provide incomplete information; the cost effectiveness approach is recommended for cases in which watershed assessments identify (1) restoration actions needed to restore riverine

habitats, (2) biological benefits associated with each action, and (3) costs of restoration actions.

- Pess, G. R., M. L. McHenry, T. J. Beechie, and J. Davies. 2008. Biological impacts of the Elwha River dams and potential salmonid responses to dam removal. Northwest Science 82 (Special Issue): 72-90. We collected data on the impacts of the Elwha River dams on salmonid populations and developed predictions of species-specific response dam removal. Dam removal impacts will likely cause a lag in recolonization and population rebuilding. These negative sediment effects will be locally buffered by the extent of functioning floodplain, and management attempts to minimize sediment impacts.