

Bell Bend Site Audit Supplemental Aquatic Ecology Report: Susquehanna River Issues

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2. **Technical Discipline(s):** Aquatic Ecology
3. **Sites Visited:** Bell Bend NPP
4. **ESP or COL?** COL
5. **Date of Meeting:** April 30, 2009
6. **Contacts:**

Kings College: Dr. Brian Mangan

Ecology III: Ted Jacobsen

Normandeau: Bryan Lees

7. **Discussions regarding issues facing the Susquehanna River:**

Nancy Kuntzleman (NRC aquatic ecologist) and I discussed the emerging issues facing the Susquehanna River with Dr. Mangan.

Invasive Species: Asian clams (*Corbicula fluminea*) are becoming a major problem in the river. They have moved upriver and are now in the Bell Bend stretch of the river. The zebra mussel (*Dreissena polymorpha*) is not yet at the site, but the species is moving down river (ER Rev 1, p. 2-451 documents as ~65 mi upriver). Mangan thinks that eventually they will reach Bell Bend. The rusty crayfish (*Orconectes rusticus*) has increased in abundance in the River and may be represented in recent collections in the area made by Dr. Mangan (he needs to confirm identifications). Dr. Mangan is concerned about the potential synergistic effects that the invasive species could have on the river. Crayfish abundances have generally increased in the river. The increase may in part be a result of the increased numbers of Asian clams, which provide forage for crayfish.

Endocrine Disrupting Chemicals: Vicki Blazer (USGS Leetown Science Center, Kearneysville, WV) has documented intersex smallmouth bass in the Susquehanna River. About 80% of the bass in her samples were intersex (males with female reproductive features). The concern is that the potential population-level effects of intersex fish are not known. Presently, the smallmouth bass populations in the river are doing fine. Samples were from seven sites, generally in the lower parts of the river (i.e., below Bell Bend). The study was just presented at the recent Northeast Fish and Wildlife Conference in Lancaster (check web for abstracts). White suckers have not yet shown the intersex condition.

Marsellus Shale Gas Extraction: Large blocks of gas-containing shale occur in the river basin. There is now a major effort underway to mine the gas. This

involves drilling followed by injection of water and chemicals into the shale (hydrocracking) to break up the shale making it easier to extract the gas. The problem is that the “effluent” water can have a high salt content (with other chemicals) and the industry approach is to contact local sewer districts for disposal of the effluent. The districts cannot treat the effluent but essentially provide a dilution service. The potential effects of discharging this material into the river are not known. The borough of Danville and the city of Harrisburg use the Susquehanna River as a source of drinking water.

Acid Mine Drainage (AMD): the discharges have decreased but remain a problem. AMD can become a major issue during low water periods. The river has improved quite a bit but has room for further improvement.

Land Use: the increase in impermeable surfaces in the basin is creating issues for the basin (not much specific discussion). Dr. Mangan expressed concern for the continuation of building dikes, thus creating more impervious surfaces. About one million people live upstream of the proposed Bell Bend Nuclear Power Plant (BBNPP). Municipalities can have an effect on the Susquehanna River by their general land use patterns within the watershed.

Fish Population Declines: In particular, white sucker populations have declined over the last 30 years. Ecology III has an extensive database back to the 1960s-1970s based on studies conducted for the Susquehanna Steam Electric Station (SSES). White suckers have decreased from about 25% of the sampled abundance in the 1970s to about 1% now (Mangan unpublished). Part of the reason may be related to increased smallmouth bass predation on smaller individuals. Dr. Mangan conducts electrofishing 5 times per year and seining 3 times per year and includes this stretch of the river. The long-term data set gives them a good handle on the changes in the river. None of the changes in the river can be linked to the operation of the SSES plant. White suckers are hosts for glochidia larvae of freshwater mussels. Ken Crawford has shown that American eel may be an important host. American eel no longer occurs at Bell Bend. Redhorse (*Moxostoma* spp.) populations may also be declining. Ecology III reports should be available.

Walker Run: Essentially two systems, one above Beach Grove Road and one below. Below Beach Grove Road the stream is largely impacted. Dr. Mangan says there is potential to improve the Walker Run system through relocation (particularly the section that runs through the field). One needs to consider what one is looking at when thinking about potential impacts to this part of Walker Run. Much can be done to improve it. For example, the area below Beach Grove Road is not lined by trees. (For example, this makes the stretch more susceptible to fluctuations in temperature).

Columnaris: bacterial infection in fish (smallmouth bass); may also be a secondary affliction related to stress. Stress from low DO at certain times of the day in areas where young smallmouth bass are (backwaters). There are declines in recruitment and it is worse in the Potomac River. Some evidence that it occurred near Bell Bend a couple of years ago.

Climate Change: Mangan has data that show an increasing trend in January Susquehanna River water temperatures as measured at Ecology III, but needs to remove other potential influences (e.g., water flow differences) before can come to conclusion. Dr. Mangan has spoken with ice fishermen who have told him there hasn't been as much ice on the river in recent years. Dr. Mangan also stated that he sees changes in water flow as it enters the watershed. Dr. Mangan also commented that water flow in the Susquehanna River is not artificially regulated.

Region of Interest for Assessing Cumulative Impacts: We discussed defining the region of interest with Dr. Mangan who stated that no real boundary was obvious and agreed that the entire Susquehanna River basin would be appropriate.