UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND REGION
Centredale Manor Restoration Project

WOONASQUATUCKET RIVER ENVIRONMENTAL UPDATE

January 2002

The U.S. Environmental Protection Agency (EPA) and Rhode Island Department of Environmental Management (RIDEM) are working to address contamination at the Centredale Manor Restoration Project located along the Woonasquatucket River in North Providence, Rhode Island. This is an update on recent EPA activities to address the environmental health of the river and its associated waterbodies.

What's the latest on the assessment studies for the Woonasquatucket River?

Since dioxin was detected in fish caught in the Woonasquatuc River, EPA has conducted environmental studies to assess the contamination in and along the river. Since last year, hundreds of samples including fish, crayfish, worms, insects, tree swallows, sediments, floodplain soils and waters have been collected for chemical and toxicological testing. EPA will be evaluating these test results to determine strategies for future cleanup actions that will protect public and environmental health.

C. Rosiu, USEPA

EPA created this update to tell you more about the studies being performed to assess the environmental health of the Woonasquatucket River and the Centredale Manor area. We've also provided a short description of actions undertaken at the site to protect the public and a brief overview of the assessment activities that continue to occur.

What is the EPA doing to assess the site and protect the public?

EPA has collected environmental samples in and along the Woonasquatucket River (see Figure 1) to better understand the:

- Extent of contamination in the river and the Centredale Manor area
- Impact on human health and the local environment.

EPA is evaluating the results from these sampling activities to determine strategies for future cleanup actions that will protect public and environmental health.

Actions that EPA has already undertaken to protect public and environmental health include:

- Fencing and capping affected areas
- Allendale dam reconstruction and planned restoration of Allendale Pond
- Posted fish consumption advisories at the site
- Planned removal of contaminated soil from residential properties abutting the river.

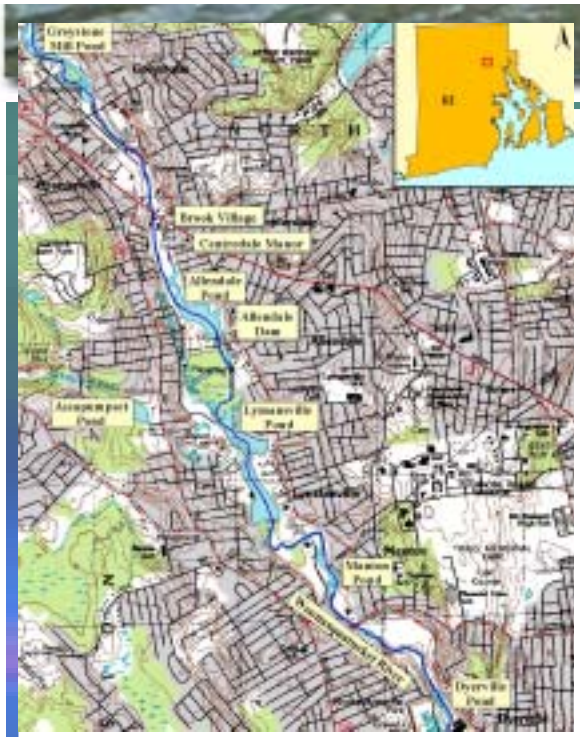
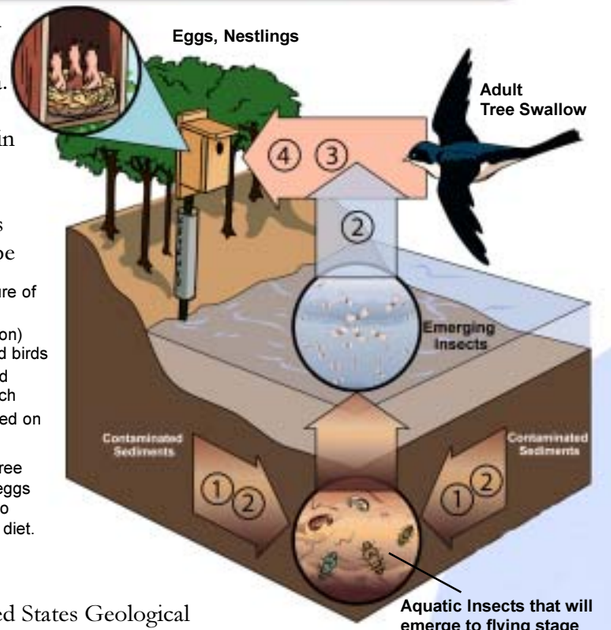


Figure 1 shows the Centredale Manor Site and the Woonasquatucket River and its associated waterbodies including Greystone Mill Pond, the reference area located upstream from the site, and Allendale Pond, a contaminated area located downstream of the Centredale Manor and Brook Village apartment complexes.

Woonasquatucket River Tree Swallow Study

EPA created this update to tell you more about a tree swallow study performed to assess the environmental health in the Woonasquatucket River and the Centredale Manor area. Tree swallows were chosen as a study species because they consume flying insects that emerge off bottom sediments in the river. The insect larvae (sediment invertebrates) are directly exposed to contaminants in the river. Swallows, which feed locally, are exposed to these same contaminants in their diet (see Figure 2). As a result, tree swallows can be used to evaluate distribution and effects of local sediment contamination.



1. Direct (contact) exposure of aquatic insects
2. Indirect (bioaccumulation) exposure of insects and birds
3. Adults lay contaminated eggs and nestlings hatch
4. Adults and nestlings feed on emerging insects

Figure 2 shows how adult tree swallow birds and swallow eggs and nestlings are exposed to contamination through their diet.

C. Rosiu, USEPA

Figure 3 shows USGS and USFWS scientists setting up tree swallow nesting boxes at Greystone Mill and Allendale Ponds in the summer of 2000.

Study Design

EPA and the United States Geological Survey (USGS) conducted a tree swallow study at the site in June 2000 to determine whether dioxins and other contaminants such as polychlorinated biphenyls (PCBs) are being accumulated from their diet and potentially causing reproductive harm. Tree swallow samples were collected again in the summer of 2001; however, results from that study are not available as yet. This update will only discuss results from the tree swallow study performed in the summer of 2000.

Field Activities

C. Rosiu, USEPA

- 59 swallow nesting boxes were placed at Greystone Mill and Allendale Ponds in early summer 2000 (see Figure 3)
  - Allendale Pond is downstream of the Centredale Manor and Brook Village apartment complexes in the most contaminated area of the Woonasquatucket River
  - Greystone Mill Pond is upstream of the site contamination and served as a reference location
- Weekly field observations were recorded to determine the hatching success of swallow eggs and nesting behaviors (e.g., nest abandonment)
  - Adult swallows were visually examined for physical abnormalities (e.g., lesions and tumors)
  - Swallow nestlings, unhatched eggs, and food samples from the stomachs of tree swallows were collected (see Figure 4) and analyzed for chemical contaminants.

Figure 4 shows USGS scientists collecting tree swallow samples (eggs and nestlings) for chemical analysis.

Study Results

- Egg survival was significantly lower at Allendale Pond than at Greystone Mill Pond, with <50% hatching success at Allendale Pond compared with >90% at Greystone Mill Pond
- Abnormal adult nesting behavior was observed in the Allendale Pond swallow population but was not seen in the Greystone Mill Pond population
- No obvious physical abnormalities were observed in nestlings from either Allendale or Greystone Mill Ponds
- Egg, nestling, and swallow diet samples from Allendale Pond contained significantly higher concentrations of dioxins (see Figure 5) and PCBs compared with samples from Greystone Mill Pond.

Figure 5 shows significantly higher concentrations of dioxin in tree swallow egg (a), nestling (b), and diet (c) samples collected at Allendale Pond compared with swallows from Greystone Mill Pond. Note that concentrations plotted represent the dioxin compound 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) in parts-per-trillion (pptr) in wet weight samples.

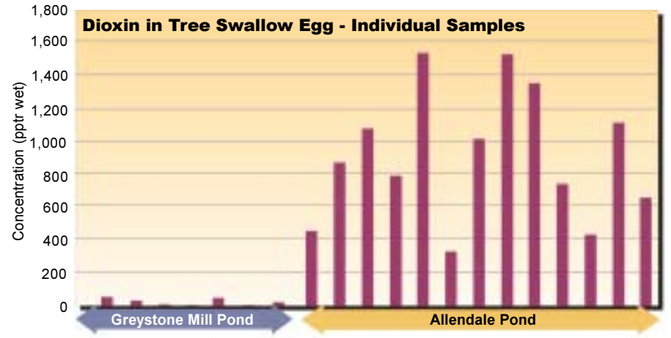


Figure 5a

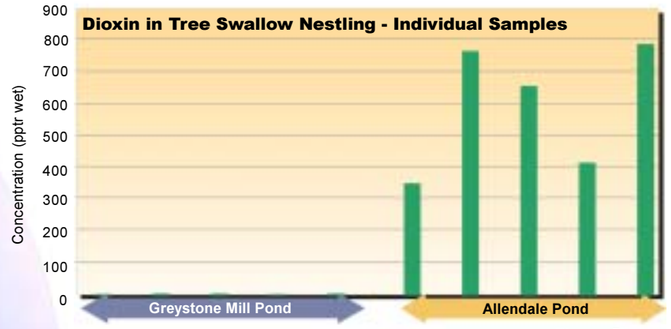


Figure 5b

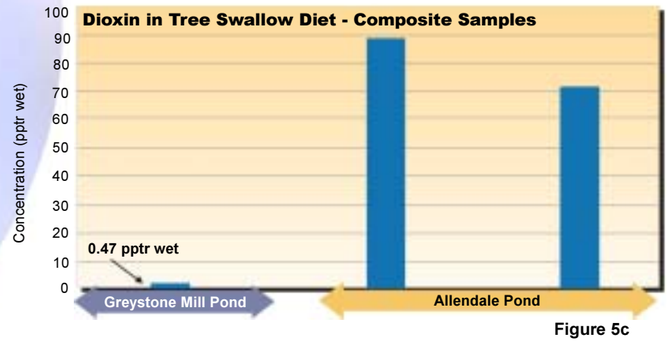


Figure 5c

Conclusions

- Concentrations of dioxins in tree swallow eggs from Allendale Pond were some of the highest levels reported in the United States from a half-dozen similar tree swallow studies
- Concentrations of dioxins in tree swallow nestlings from Allendale Pond were approximately 100 times higher (more contaminated) than in Greystone Mill Pond, upstream of the Centredale Manor area
- High contaminant concentrations were associated with a reduction in egg hatching success in tree swallows nesting near Allendale Pond.

Next Steps

T. Chapman, USFWS

The tree swallow study revealed that swallows nesting at Allendale Pond contained significantly higher concentrations of contaminants compared with swallows from Greystone Mill Pond and that the contamination appeared to cause reproductive harm.

EPA is continuing to conduct environmental studies to assess the ecological health along the Woonasquatucket River. An extensive field investigation was performed in the summer of 2001 that collected samples from additional study areas (i.e., Lymansville, Assapumpset, Dyerville, and Manton Ponds) for chemical, toxicological, and biological testing.

Results from these tests will be used to

- Estimate risks to plants and animals in the Woonasquatucket River and waterbodies
- Establish preliminary site-specific remediation goals for the habitats at the site
- Guide decisions on the long-term cleanup strategy

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www.epa.gov/region01/superfund/sites/centredale
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