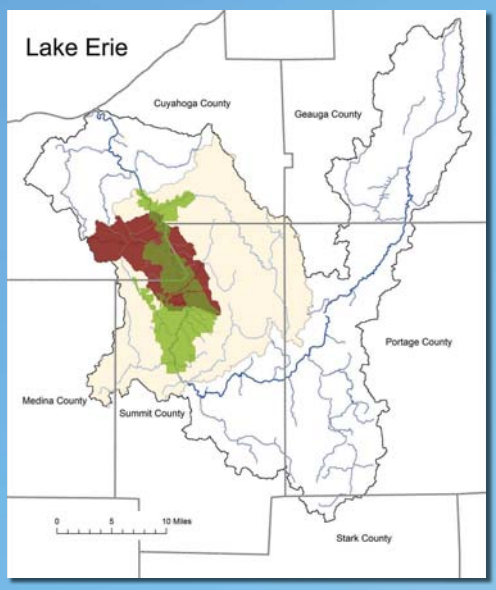
How does sediment get in the river and how is it sampled?



The lightly shaded section of the watershed is the area that contributes the largest sediment load to the river. This includes land areas upstream of the United States Geological Survey (USGS) gage at Independence and downstream of the USGS gage at Old Portage. Also included in this area is the Cuyahoga Valley National Park comprised of 33,000 acres (green shading). The darkly shaded section contributes sediment to the river at a higher rate than anywhere else in the watershed.

Example of landscape erosion - the primary source of sediment loading in the Cuyahoga River

Sediment Sampling of the Cuyahoga River and Proposed Open Lake Areas

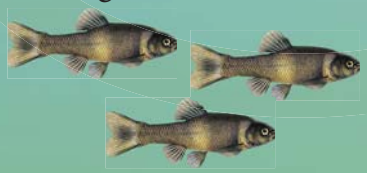
A large scale sampling and testing effort was completed on the Upper Cuyahoga River Channel and proposed open water sites. In accordance with the Federal Clean Water Act, the Corps of Engineers collected surface grab samples to evaluate the sediment.

The Corps of Engineers typically samples the Cuyahoga River once every five years. The Buffalo District sampled the river channel three times in a five year period. The sample sites are annotated (on the map to the right) with "CH-#". For assessment purposes, the river was divided into three management units as indicated on the image as DMMU 1, 2a, and 2b. DMMU stands for Dredged Material Management Unit.

Sediment from the upper Cuyahoga River Channel is dredged at least annually and the sediment to be removed has accumulated since the last dredging operation. Sediment is composed of sand, gravel, silt, and clay that have eroded from land areas upstream of Independence, Ohio and downstream of Old Portage, Ohio, including sediment eroded from the Cuyahoga Valley National Park.

The sampling results from 2007, 2010, and 2012 continued to show a net improvement in sediment quality in the Upper Cuyahoga River Channel. Data can be used to support delisting of the dredging beneficial use impairment.

This is an expected and positive result!



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Is dredged sediment suitable for open lake placement?

Misconception: Open lake placement would result in a harmful increase in polychlorinated biphenyl (PCB) contamination in bottom-dwelling organisms and fish in the lake.

Scientific Evidence: PCB contamination exists in the dredged sediment as well as the lake background sediments and water. PCB concentrations in the dredged sediment are similar to those in lake sediments. The uptake of PCBs from the dredged sediment in bottom-dwelling organisms would either be the same as what already occurs from lake sediments, or somewhat higher such that uptake in fish (walleye and yellow perch) would not be measurable and not negatively affect fish populations.

How PCB concentrations are evaluated

Open bottom barge placing sediment

These worms are bottom-dwelling organisms that live in sediments and accumulate contaminants from the dredged sediment

Test: In a laboratory setting, these worms were placed in a beaker containing sediment proposed to be placed into the open lake. The worms were then tested to see if there was an increase in their PCB levels according to USEPA/USACE requirements.

Results: The worm's PCB levels showed that the placement of dredged sediment in the open lake would either not result in an increase PCB accumulation, or would result in an increase PCB accumulation that would not be harmful to fish.

Walleye and yellow perch are important sport fish species that feed on other organisms in the lake (including worms similar to those tested on the left). We often eat these fish from the lake!

Test: Using the levels of PCB accumulation in the worms, it was found that fish that may eat the worms would not accumulate harmful levels of PCBs. Since the fish do not accumulate harmful levels of PCBs from the dredged sediment, they would not pose an increased risk to the people who eat the fish.

All dredged sediment testing and evaluation is accomplished in accordance with the ***Clean Water Act,*** *USEPA/USACE Great Lakes Dredged Material Testing and Evaluation Manual (1998), and Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual (1998)*

Is dredged sediment suitable for open lake placement?

Misconception: Open lake placement results in toxic effects to organisms in the lake.

Scientific Evidence: Largely because the residual contamination in the dredged sediment is similar to the range in background sediments in the lake, advanced testing has demonstrated that it will not negatively affect these organisms.

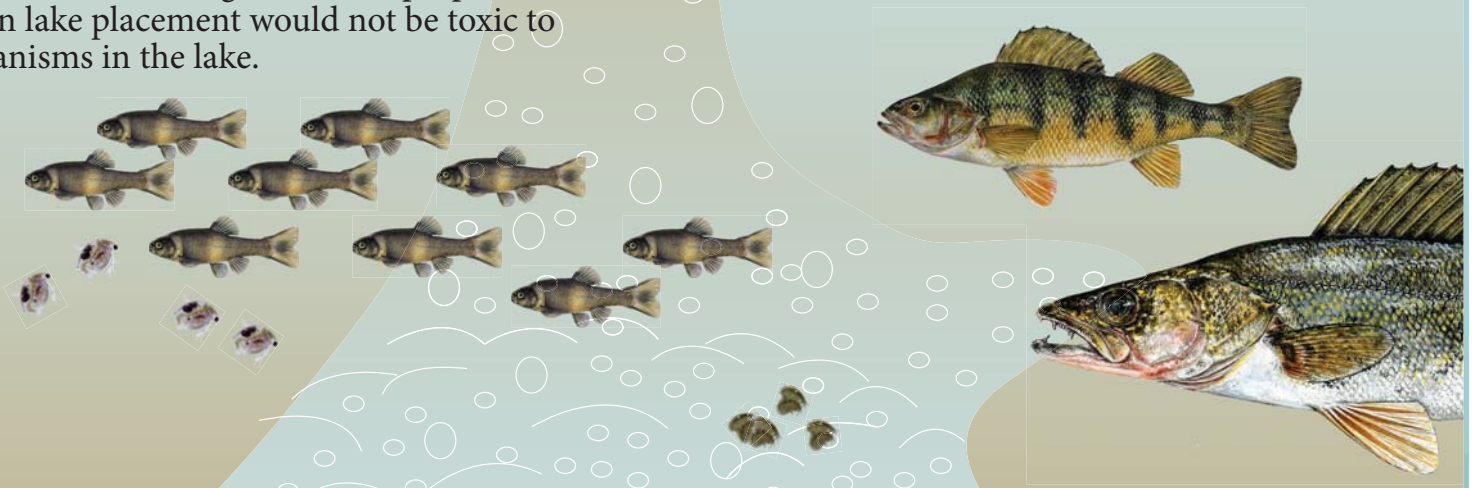
How toxicity of the dredged sediment is evaluated

Open bottom barge placing sediment

Test: In a laboratory, two sets of beakers were set up. The first set contained dredged sediment proposed to be placed in the open lake and the second set contained sediment already found in the open lake. Organisms like minnow, water flea, scud, and midge fly were placed in the two sets of beakers. Over time, test results on the organisms in the sets of beakers were compared.

Results: The tests showed that the two types of sediments had the same effect on the organisms. Therefore, the dredge sediment proposed for open lake placement would not be toxic to organisms in the lake.

Another test that was performed measures the amount of contamination that comes off the dredged sediment when it is placed in the open lake. The results show that it was in full compliance with Ohio water quality standards (safe chemical concentrations) for the protection of aquatic life and human health.



*All dredged sediment testing and evaluation is accomplished in accordance with the **Clean Water Act,** USEPA/USACE Great Lakes Dredged Material Testing and Evaluation Manual (1998), and Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual (1998)*

Why drinking water will remain safe?

Misconception: Dredged sediment, composed of total suspended solids (TSS) and pore water with dissolved contaminants, will reach Potable Water Intakes (PWIs) and affect settling, filtration and disinfection operations at the water treatment plant, resulting in degraded drinking water quality.

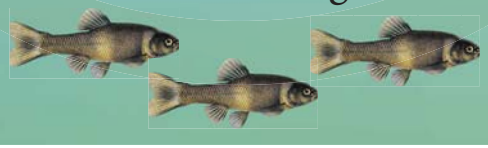
Scientific Evidence: Sediment plumes generated during placement will dissipate within hours after placement and the remnants miss the PWIs by at least a mile about 95% of the time.

Test:

- Hydrodynamic Modeling of Circulation Velocities and Storm Shear Stresses
- Plume Modeling during Placement Operations
- Resuspension/Erosion Modeling of Deposited Material during Storm Events

Results:

- Plumes from placement operations are not predicted to affect PWIs except about 1% of the time when remnants of the plumes from Site 4 encounter Morgan and Baldwin PWIs.



- Maximum total suspended solid contributions at a PWI, from dredged sediment, are much smaller than background total suspended solids in the water.
  - Dredged TSS contributions are less than 1 mg/L whereas background concentrations are normally about 6 mg/L.
- All contributions of dissolved contaminants are predicted to be well below all drinking water standards.
  - Predicted increase in dissolved organic carbon is less than 4% of background concentrations.
- No resuspension/erosion of deposited sediment is predicted to occur except during severe sustained storms which will resuspend the thin fluff layer of clays and organic matter.
  - Background TSS concentrations at PWIs during severe storms are at least 6times greater than contributions from open lake placement areas (15 mg/L from open lake placement areas vs. 100 mg/L at PWIs).

Why open lake placement will not stimulate harmful algal blooms?

Misconception: Phosphorus releases from the dredged sediment will stimulate Harmful Algal Blooms (HABs)

Scientific Evidence:

- HABs more typically occur in western Lake Erie while green algal blooms occur in the central basin.
- HABs are rapid formations of dense populations of a blue-green algae (Microcystis) known as cyanobacteria that photosynthesizes like algae do, but differ from green algae (Cladophora).
- HABs peak growth often occurs in late summer, while green algal blooms often occurs early summer.
- HABs tend to remain suspended in the water and produce toxins that poses health threats from contact or ingestion.
- Green algae produces nuisance muck that may wash up on shoreline with E. Coli bacteria, but seldom poses a health threat.

Test: Elutriate Testing and Modeling

Results:

Placement operations will not stimulate HABs because:

- Water temperatures are too cold during placement operations
- Phosphorus concentration exceeding criteria in the plume does not persist long enough to stimulate blooms (less than 7 minutes)
- Releases are at the bottom of deep water with insufficient light until the plume is well dispersed

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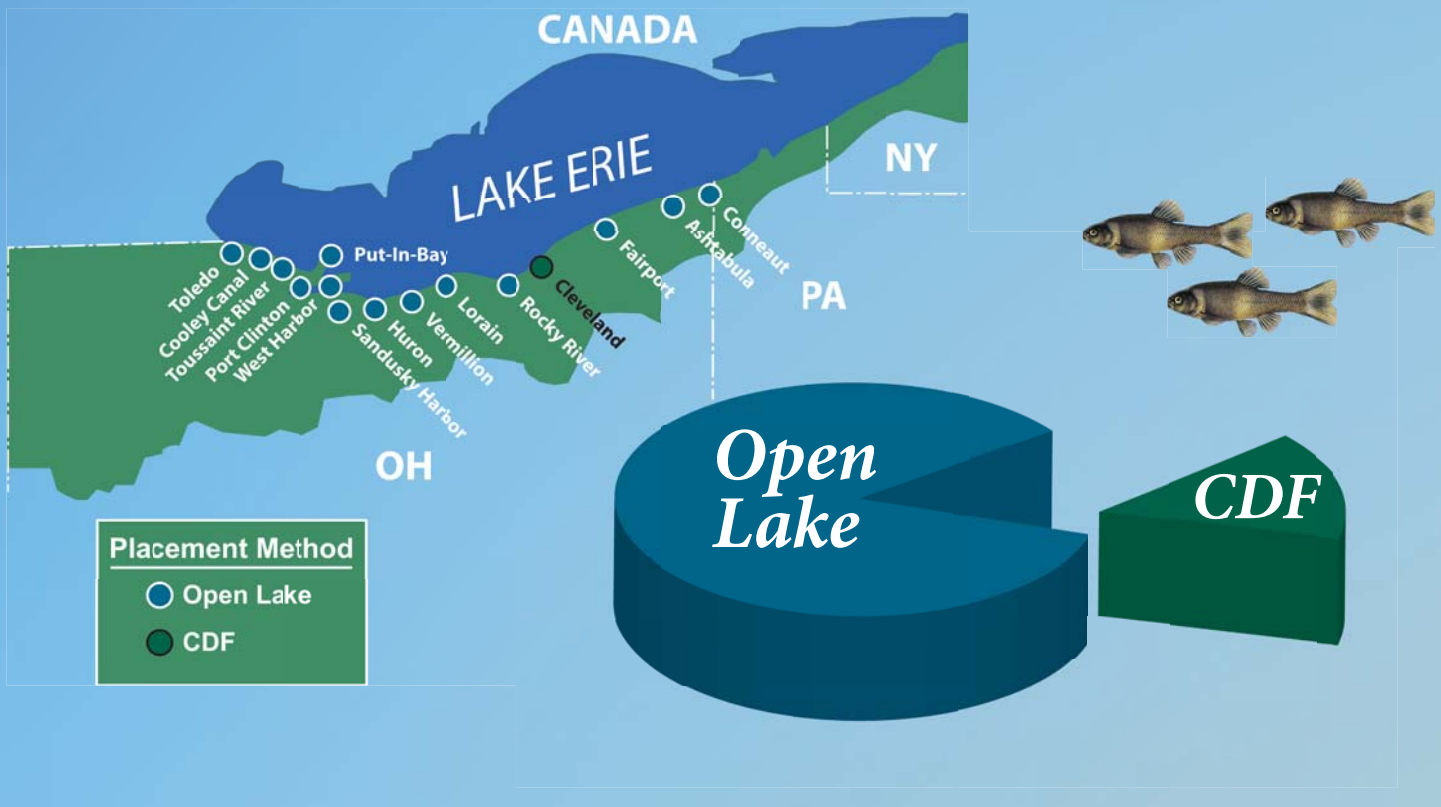
Dredged Sediment Placement
Ohio Harbors



Harbor (Commercial Only)	Annual Dredge Need (CY)	Dredging Frequency
Ashtabula	50,000	Every 2 years
Cleveland	225,000	Twice per Year
Conneaut	40,000	Every 3 Years
Fairport	75,000	Every 2 years
Huron	95,000	Every 2 years
Lorain	75,000	Every 2 years
Sandusky	140,000	Every year
Toledo	800,000	Every year
Totals	*1,500,000*	

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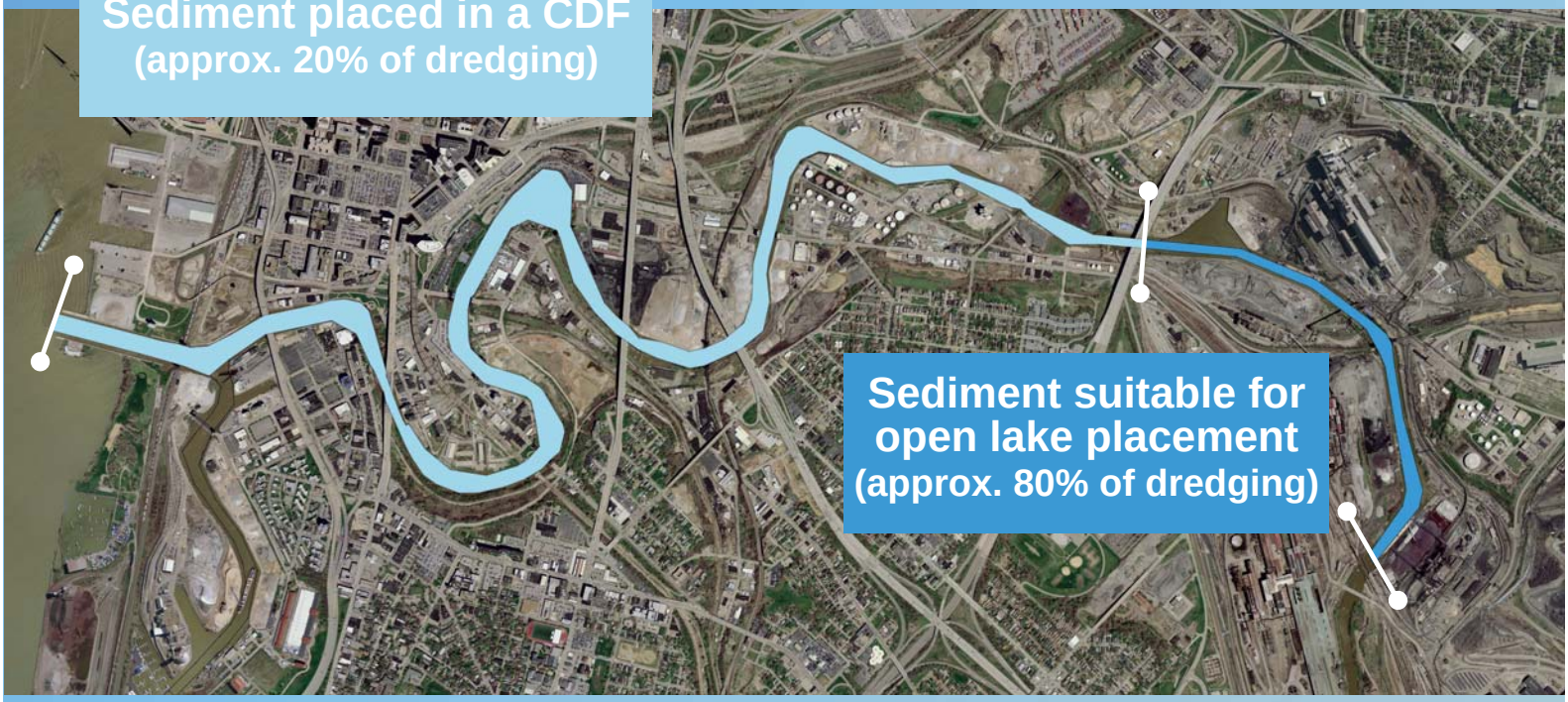
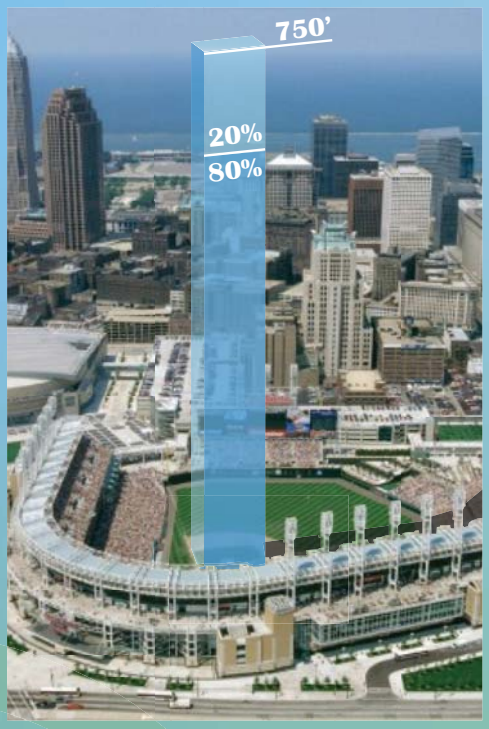
Dredged Sediment Placement
Cleveland Harbor

Sediment placed in a CDF
(approx. 20% of dredging)



Sediment suitable for open lake placement
(approx. 80% of dredging)



Infield represents 225,000 cy of sediment dredged annually from the Cuyahoga River

Proposed open lake areas

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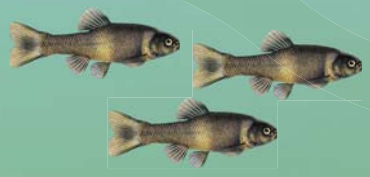


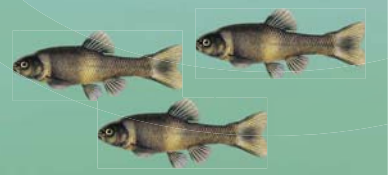
Beneficial use of dredged material

- Topic of task force discussions since early 2010
- Evaluation completed with USACE Engineering Center in 2011
- USACE supports beneficial use to achieve environmental and economic benefits
- 2010 Recovery Act Project demonstrated success in Brownfield redevelopment

Cleveland Lakefront Nature Preserve
(Former Confined Disposal Facility)

- Keys:
  - Requires local leadership
  - Requires local financial commitments
  - Incremental costs can be shared (Fed/Non-federal) or entirely Non-federal Responsibility depending on type of beneficial use

- USACE cost sharing provisions for beneficial use:
  - **Protection, Restoration, or Creation of Aquatic and Related Habitats.** ***Section 204 of WRDA 1992,*** authorizes USACE to carry out projects for creating, protecting, and restoring aquatic and ecologically related habitats, including wetlands, in connection with dredging for constructing, operating, or maintaining USACE navigation projects.
  - **Improvement of the Quality of the Environment.** ***Section 1135 of WRDA 1986,*** authorizes the review of water resources projects, primarily flood control and navigation projects, to determine the need for modifications in the structures and operations of such projects for the purposes of improvement of the quality of the environment.
  - **Placement of Dredged Materials on Beaches.** ***Section 145 of WRDA 1976,*** authorizes USACE to place suitable dredged material on local beaches if a state or local government requests it.
  - **Achieving Environmental Benefits.** ***Section 207 of WRDA 1996*** allows selection of a disposal or placement method other than the Federal Standard option in order to achieve environmental benefits. Use of this section requires a specific Congressional appropriation for each project.



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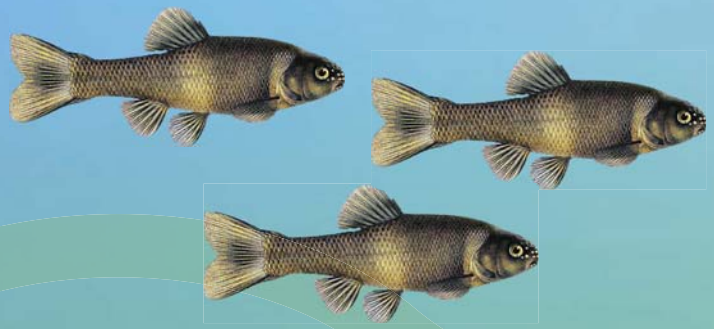
Beneficial use of dredged material

- Ongoing Section 204 Study evaluating options for restoring habitat at waterfront areas
- Non-Federal sponsor is City of Cleveland
- Options made possible by open lake suitability
- Volume range 66,000 cy - 346,000 cy
- Preliminary incremental cost range $2.37M - $12.1M subject to $5M Federal limit
- 2015 - complete feasibility study, if a cost-shared sponsor is identified for design and implementation

Watch

the March 4th web meeting



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Watch how dredging works

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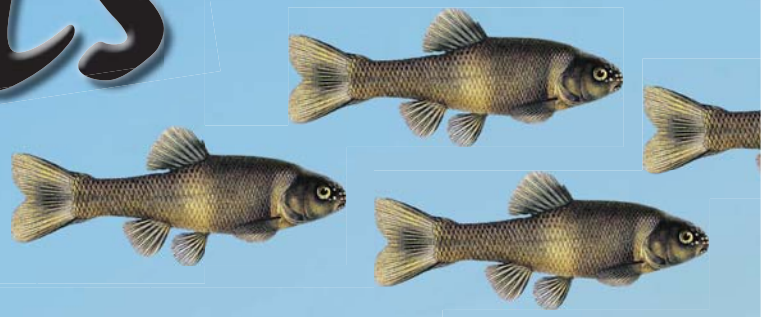
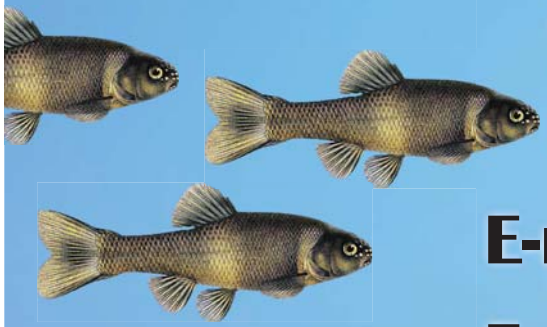
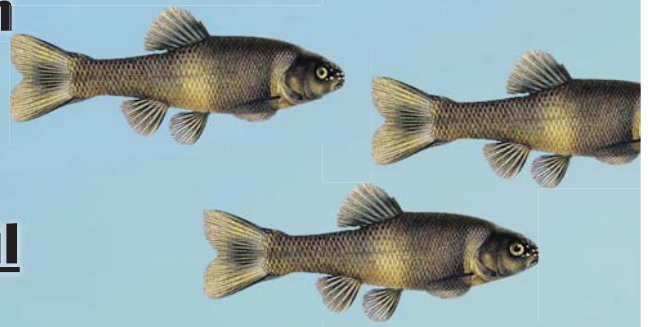
Comments



Postal Service:

U.S. Army Corps of Engineers, Buffalo District
Attn: Environmental Analysis Team
1776 Niagara Street
Buffalo, NY 14207-3199





E-mail: clevelandEA@usace.army.mil

Fax: 716-879-4225

Download the Report:

http://www.lrb.usace.army.mil/Portals/45/docs/CivilWorks/PublicReview/ClevelandOpenLakeEA-FinalDraft.pdf

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