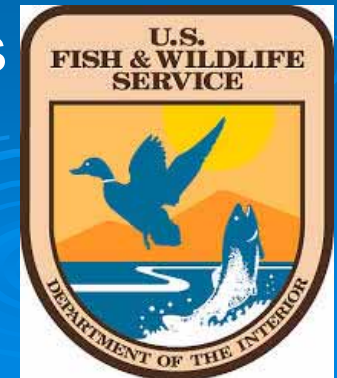


Restoring Fish Passage to Illinois Streams and Rivers



Presented By:
Randy Stowe
Natural Areas &
BioTechnical Erosion Control Ltd.
Harvard, IL

- Many dams in Illinois were constructed in the 1800's, primarily to create mechanical power for gristmills and sawmills. Other dams were built to provide water supply sources, or aid navigation. Many dams are no longer used for these purposes.
- The National Fish Passage Program was initiated by the U.S. Fish and Wildlife Service in 1999 to address structures built on rivers and their effects on fish and other aquatic species.
- Service employees work with local communities and partner agencies to restore natural flows and fish migration by removing or bypassing barriers.



- Fish passage is important to allow fish access to spawning, nursery, and rearing habitat.
- Perched culverts and sediment inputs are common problems that impact fish passage at road stream crossings. Dams and other artificial barriers can also interfere with the movement patterns of fish.
- Properly designed projects allow fish passage for native species, while preserving other uses.



Table 4. Channel dams on the Fox River in Illinois. Data are from IDOT (1976), Butts and Evans (1978), and the present study.

Dam	Owner	River mile above mouth	Spillway characteristics			Original function
			Length (ft.)	Height (ft.)	Crest elevation (ft. above NGVD)	
Stratton	State of Illinois	98.9	275	7.0	736.8	Navigation
Algonquin	State of Illinois	82.6	308	10.5	730.3	Recreation
Carpentersville	Kane County	78.2	378	9.0	720.7	Milldam/ Hydropower
Elgin	City of Elgin	71.9	325	13.0	708.4	Milldam
South Elgin	State of Illinois	68.2	357	8.3	700.0	Milldam
St. Charles	City of St. Charles	60.6	294	10.3	684.6	Recreation/ Hydropower
Geneva	State of Illinois	58.7	441	13.0	675.4	Milldam
North Batavia	City of Batavia	56.3	244	12.0	665.1	Milldam
South Batavia	Kane County	54.9	143 E 203 W	6.0 5.0	653.9 654.2	Water supply
North Aurora	State of Illinois	52.6	375	9.0	646.0	Milldam
Stolp Island	City of Aurora	48.9	177 E 170 W	11.0 15.0	628.4 628.4	Milldam
Hurd's Island	City of Aurora	48.4	365	2.8	619.0	Increase depth
Montgomery	State of Illinois	46.8	325	8.0	614.0	Navigation
Yorkville	State of Illinois	36.5	530	7.0	575.0	Recreation
Dayton	North American Hydro	5.7	600	29.6	498.8	Hydropower

Many of the dams on the Fox were originally built in the early to mid 1800's to provide mechanical power for grist or saw mills. They have been rebuilt over the years and today most function to maintain high pool levels for recreational use. Exceptions include the Dayton Dam, a hydropower dam, the Elgin Dam, used to store water for the municipal drinking water supply, and the Stratton Dam, used to control pool elevations in the Chain of Lakes.

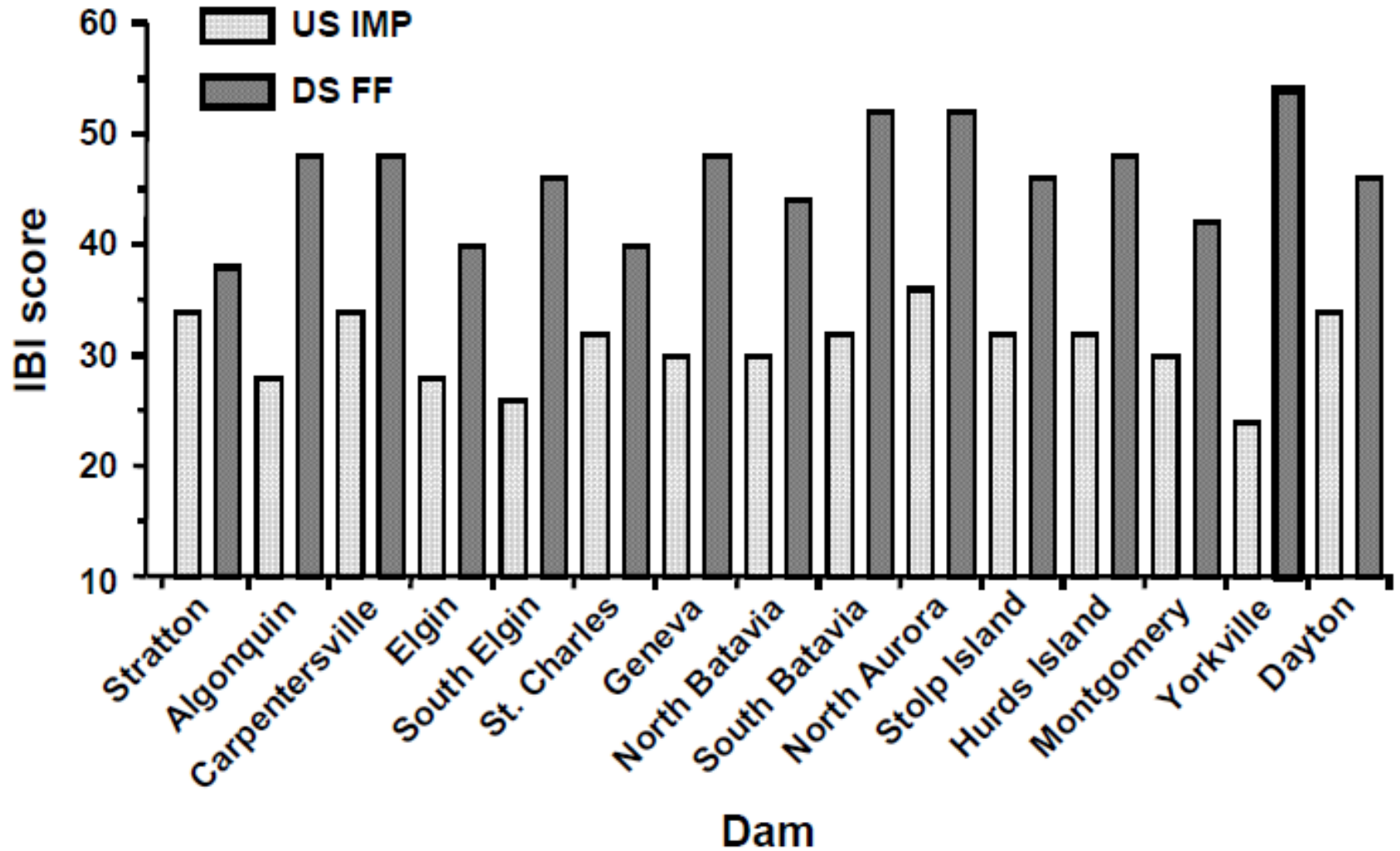


Figure 5. Index of Biotic Integrity (IBI) scores for upstream-impounded (US IMP) and downstream free-flowing (DS FF) stations at 15 Fox River dams between McHenry and Dayton, Illinois. Fish were sampled by boat electrofishing, backpack electrofishing, and seining at 40 stations during July through early September 2000.

How Can Dam's Affect Fisheries?

- Without fish passage, dams serve as a physical barrier to upstream migration.
- Dam pools often feature higher water temperatures, lower dissolved oxygen levels, and higher levels of turbidity.

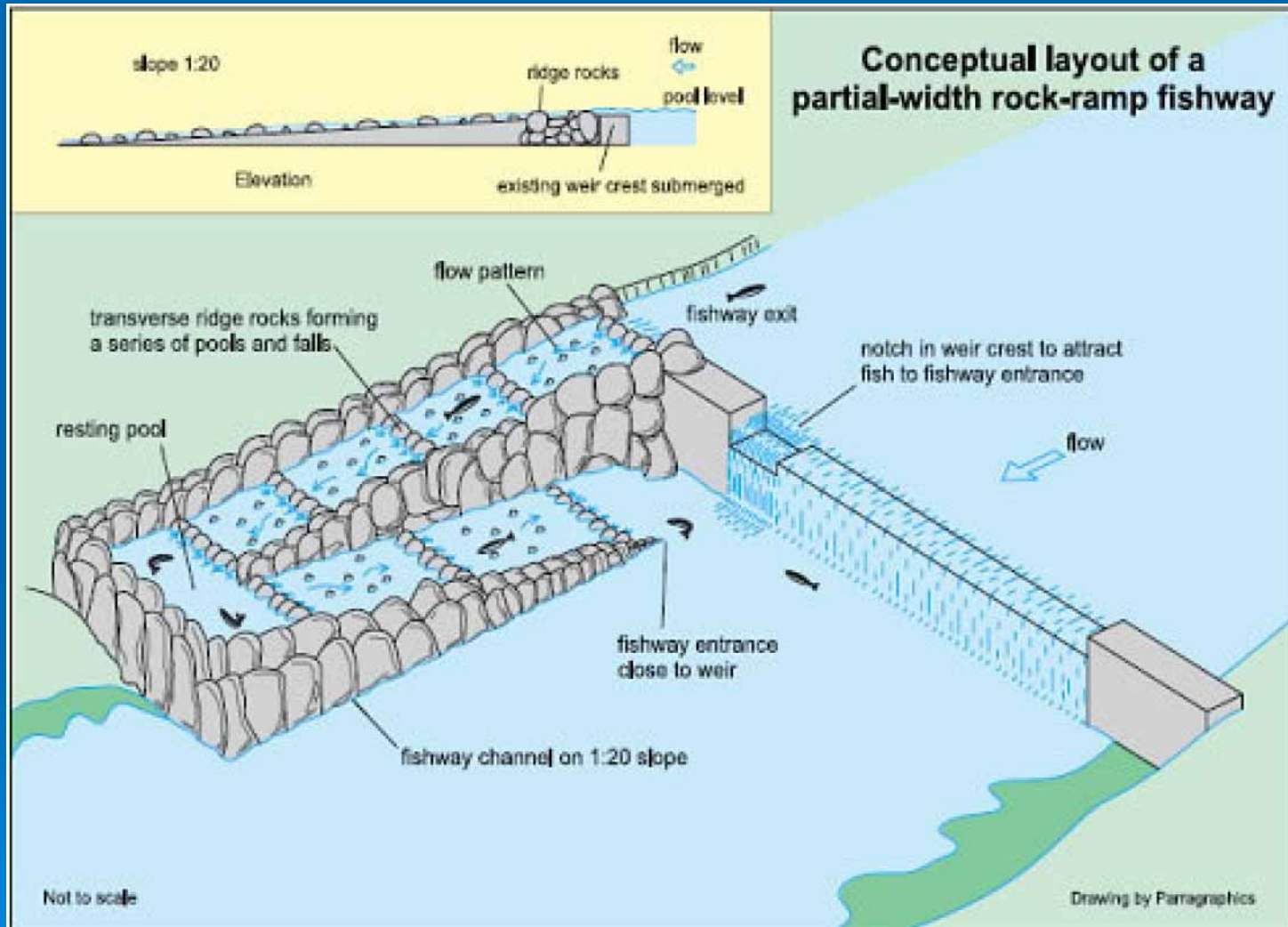


Possible Fish Passage Alternatives

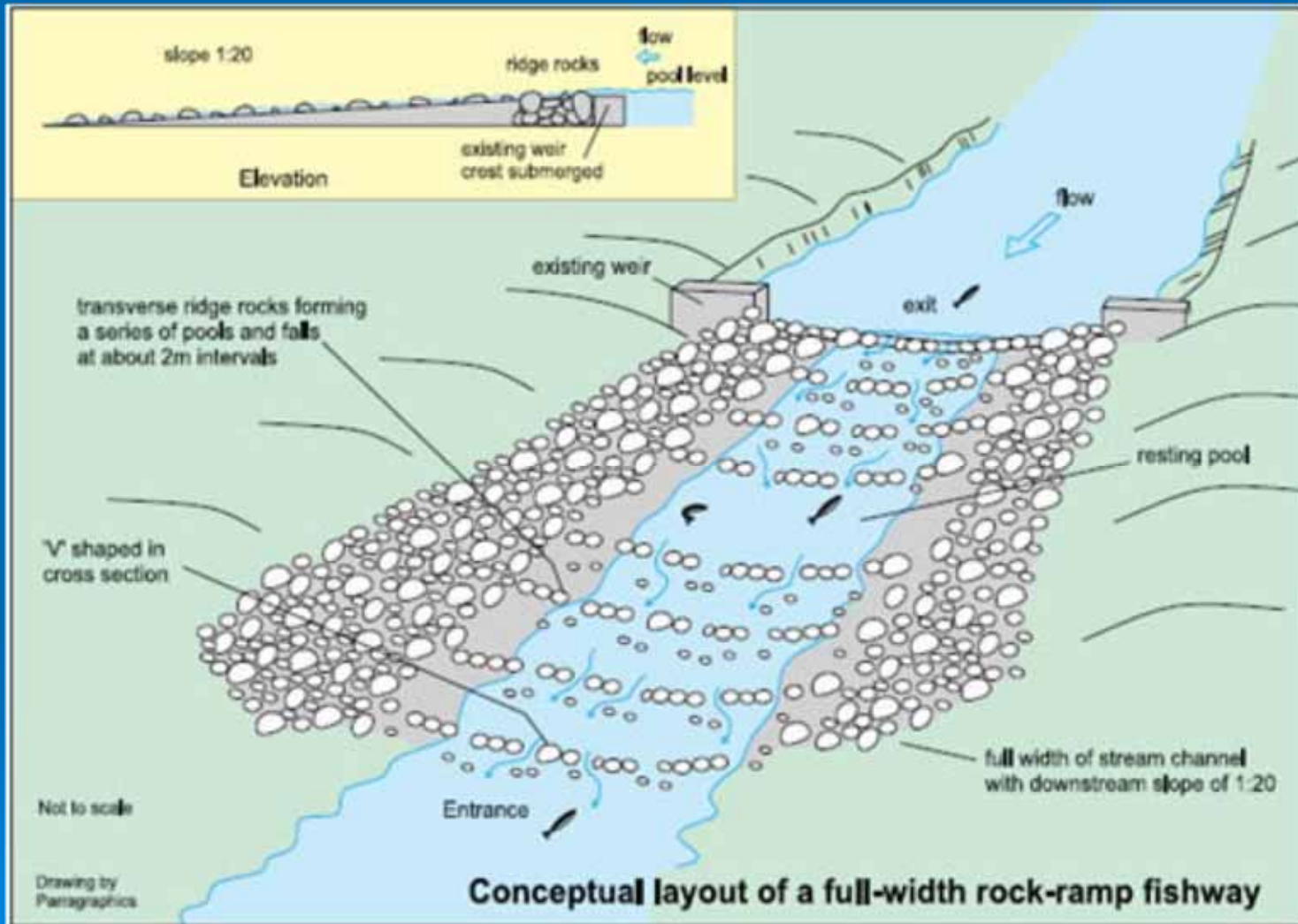
- Do Nothing
- Fish Ladder Fishway
- Rock Ramp
- Natural Channel / By-Pass Fishway
- Remove Dam



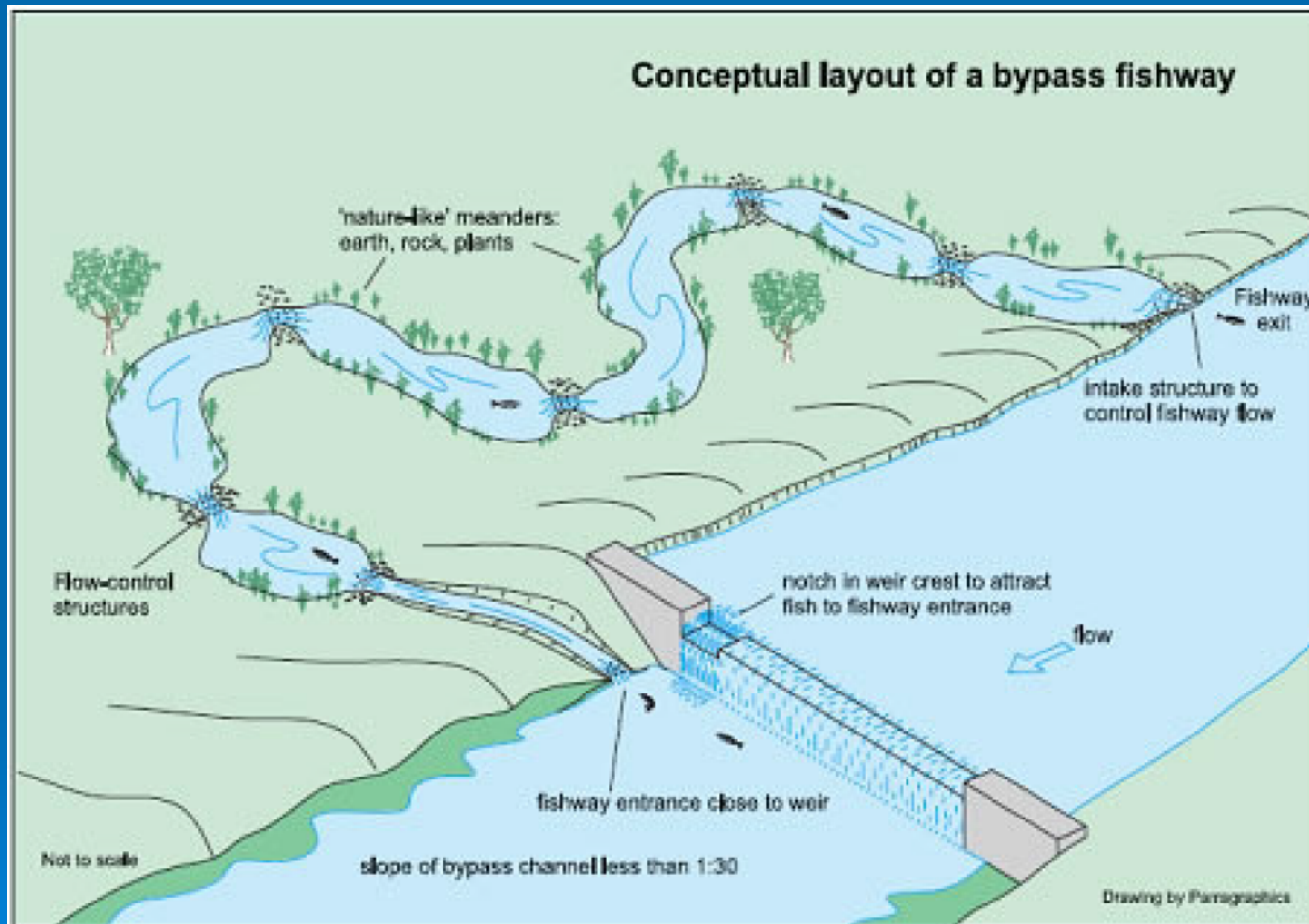
Fish Ladder Fishway



Rock Ramp



Natural Channel Fishway



A GENERAL COMPARISON OF FISH PASSAGE ALTERNATIVES

DESIRED GOAL						
ALTERNATIVE	CREATE FISH PASSAGE	IMPROVED SAFETY	BOAT / CANOE PASSAGE	IMPROVE WATER QUALITY	RESTORE HABITAT	RELATIVE COST
FISH LADDER	GOOD					\$\$\$\$\$
ROCK RAMP	EXCELLENT	EXCELLENT	FAIR	GOOD	GOOD	\$\$\$\$
BYPASS CHANNEL	GOOD		FAIR	FAIR	FAIR	\$\$\$\$
COMPLETE REMOVAL	EXCELLENT	EXCELLENT	EXCELLENT	EXCELLENT	EXCELLENT	\$\$\$

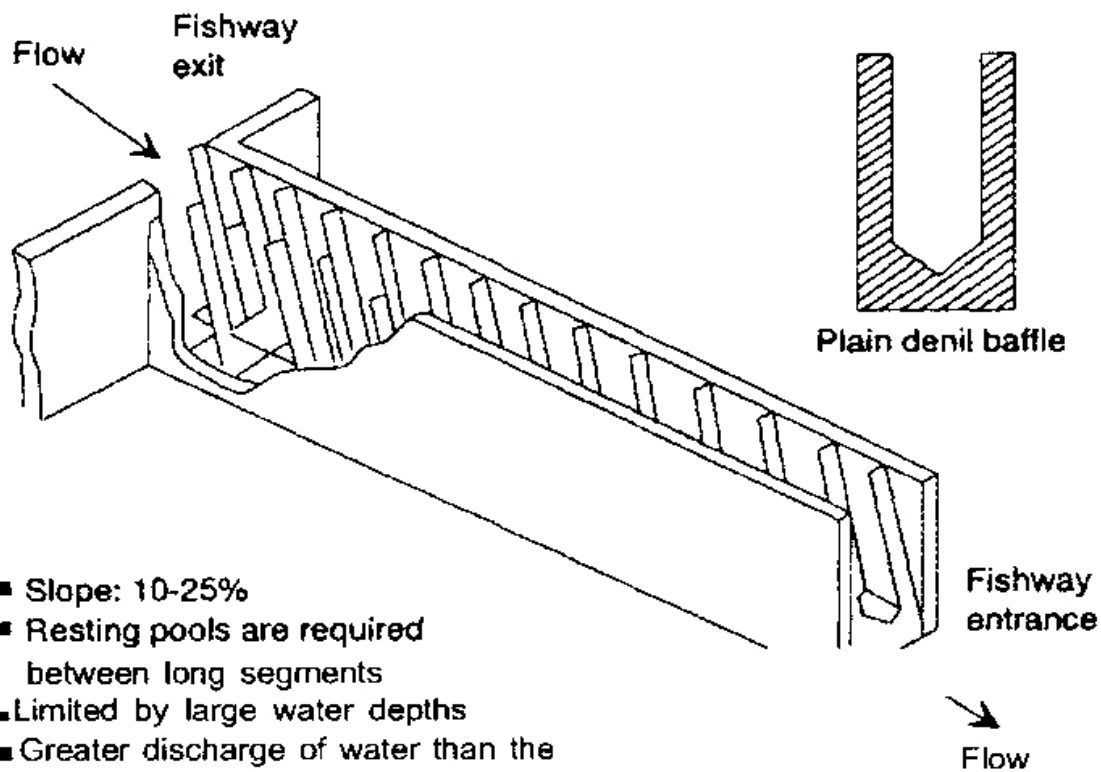
Fish Ladder



Fish Ladder

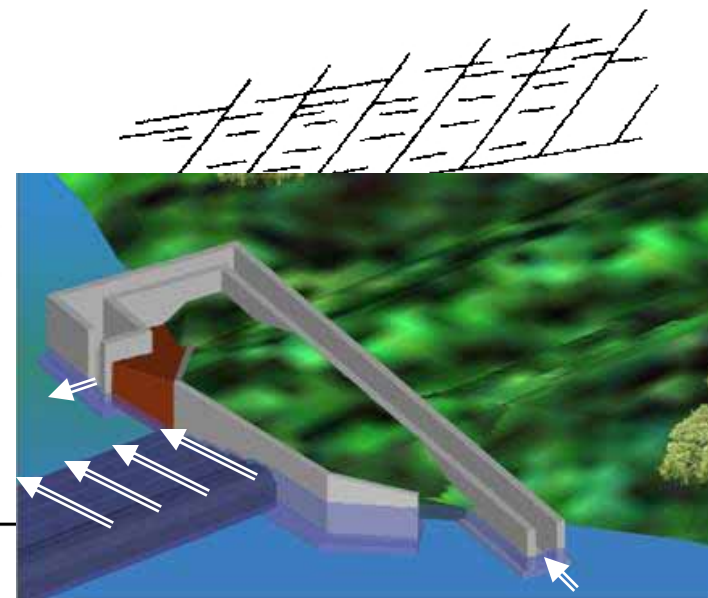


Denil Fish Ladder



- Slope: 10-25%
- Resting pools are required between long segments
- Limited by large water depths
- Greater discharge of water than the other fishways are, therefore, a greater attraction capability.

SOURCE: C. Katopodis, 1992.

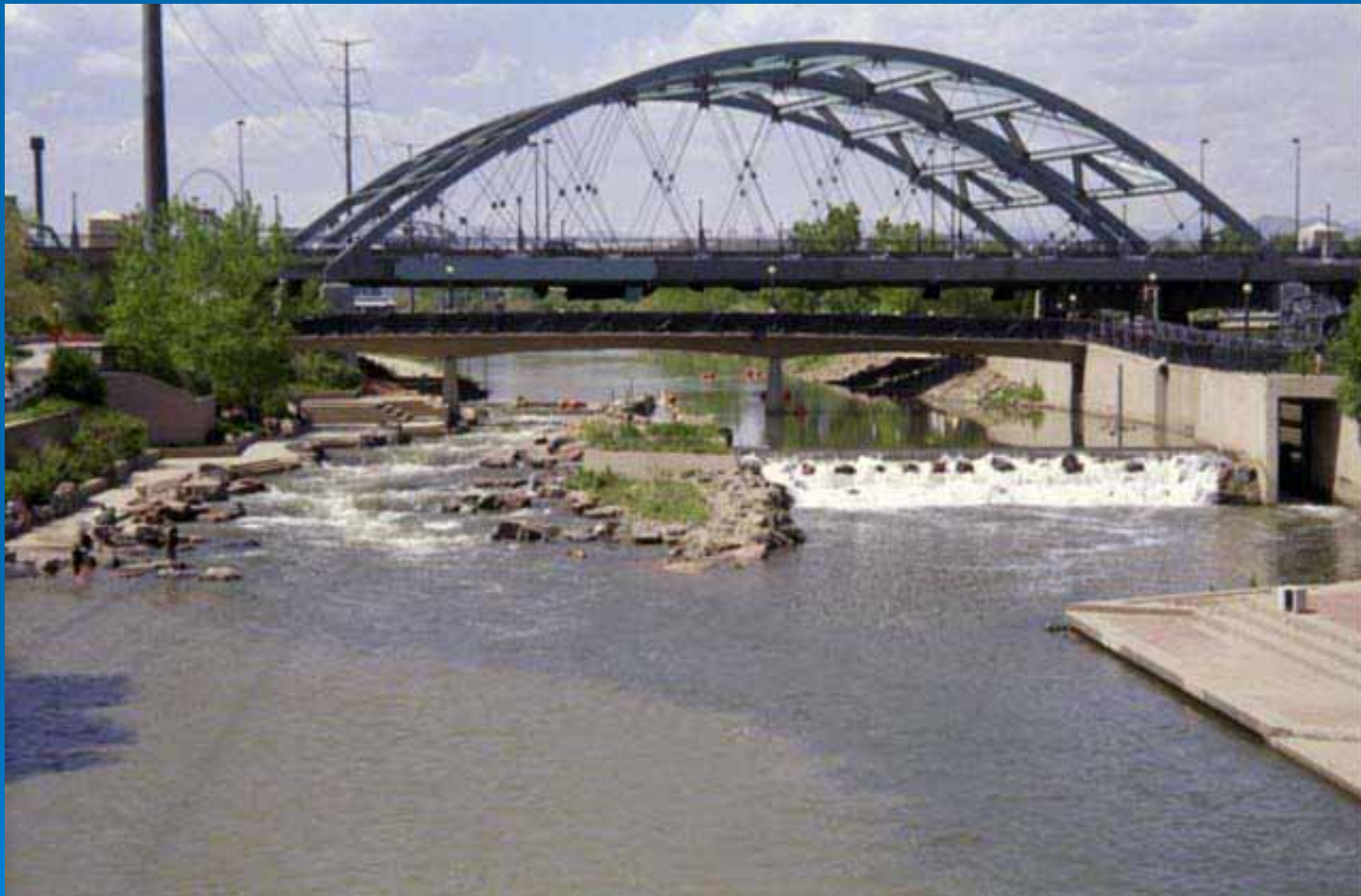


Above: 3D Model of Yorkville Dam Denil Fish Ladder; Fox River (Source: IDNR-OWR)

From Fox River Fish Passage Feasibility Study:

- Denil ladders are recommended for Midwestern river applications over other types of ladders.
- Slope of ladder should be 1:15 (< 6.5%), which will accommodate our slower moving native fish (walleye, bass, suckers, etc.)

By-Pass Channel



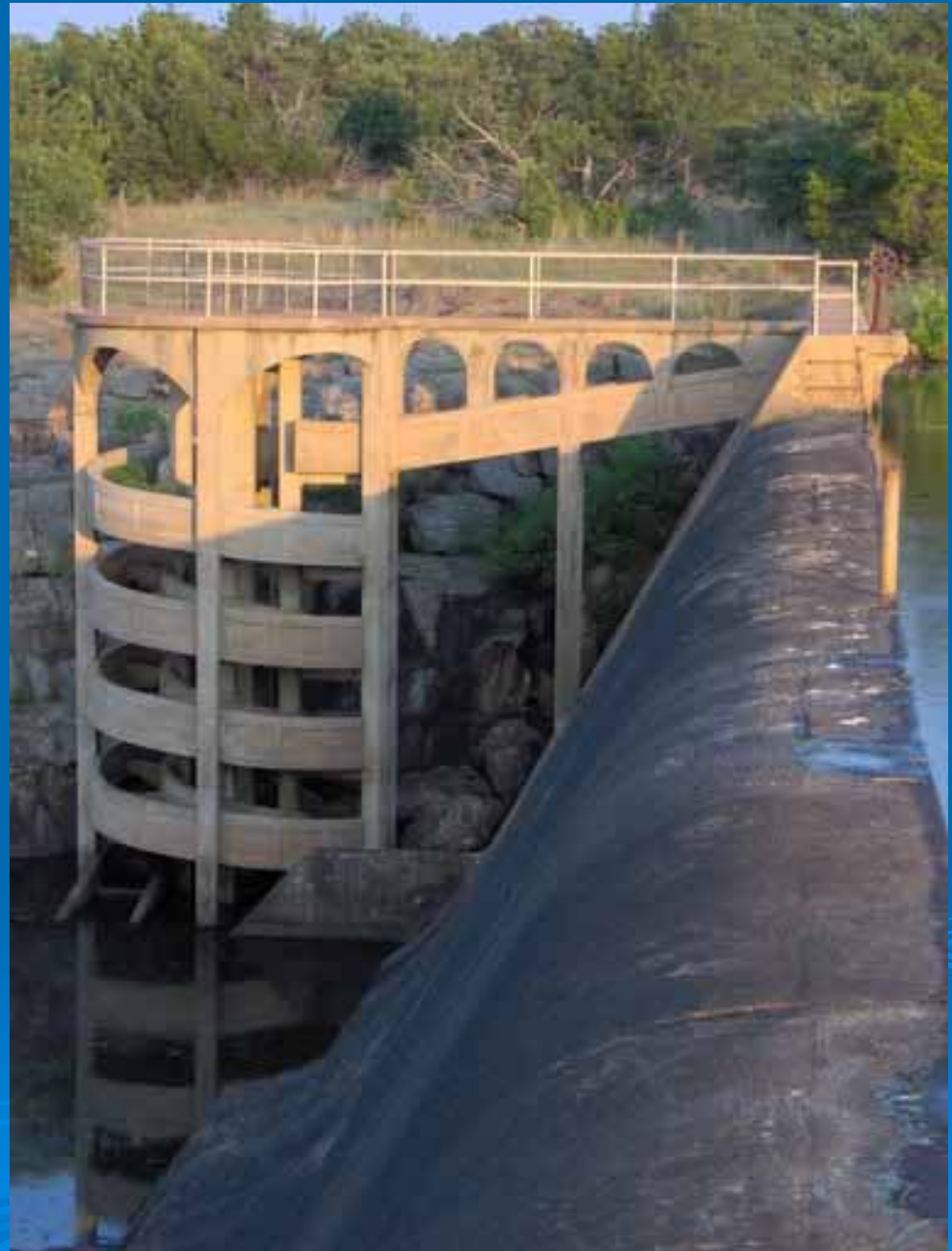
FRENCH LAKE

FISH LADDER

Built in the 1930's after the lake was dammed, this fish ladder was built to allow native fish to return to French Lake to spawn.

Sadly, when it was finished, the fish ladder didn't work.

The Government spent about \$30,000 to build it.



MIDWEST FISH SPECIES		SWIMMING SPEEDS feet/second				
Common Name	Scientific Name	Cruising	Adult		Juvenile	
			Sustained	Darting	Sustained	Darting
Quillback	<i>Cariodes cyprinus</i>	0 to 3	3 to 5	5 to 10		
River carpsucker	<i>Cariodes carpio</i>	0 to 3	3 to 5	5 to 10		
Highfin carpsucker	<i>Cariodes vellfer</i>	0 to 3	3 to 5	5 to 10		
White sucker	<i>Catostomus commersoni</i>	0 to 3	3 to 5	5 to 10		
White sucker (7-16")	<i>Catostomus commersoni</i>	0 to 3	3 to 5	5 to 10	1 to 3.5	
Northern hog sucker	<i>Hypentelium nigricans</i>	0 to 3	3 to 5	5 to 10		
River redhorse*	<i>Moxostoma carinatum</i>	0 to 3	3 to 5	5 to 10		
Greater redhorse**	<i>Moxostoma valenciennesi</i>	0 to 3	3 to 5	5 to 10		
Shorthead redhorse	<i>Moxostoma macrolepidotum</i>	0 to 3	3 to 5	5 to 10		
Golden redhorse	<i>Moxostoma erythrurum</i>	0 to 3	3 to 5	5 to 10		
Silver redhorse	<i>Moxostoma anisurum</i>	0 to 3	3 to 5	5 to 10		
Goldfish	<i>Carassius auratus</i>		1 to 3.5	3.5 to 6	1 to 2	
Trout Perch	<i>Percopsis omiscomaycus</i>			3	1.5 to 2	
Emerald shiner (2.5")	<i>Notropis atherinoides</i>			4	1 to 3.5	
Green Sunfish	<i>Lepomis cyanellus</i>			6 to 10		
Bluegill Sunfish	<i>Lepomis machrochirus</i>			2.5 to 4.3		
Crappie	<i>Pomoxis annularis</i>			1.1		
Yellow Walleye (9-16")	<i>Stizostedion vitreum</i>				1 to 3	
Smallmouth Bass	<i>Micropterus dolomieu</i>					
Channel Catfish	<i>Ictalurus punctatus</i>		1.5			
Largemouth Bass	<i>Micropterus salmoides</i>					
Muskellunge	<i>Essox masquinongy</i>			3		
Pike (14")	<i>Essox lucius</i>			11	1 to 4	4 to 8
Pike (15")	<i>Essox lucius</i>			13		
Flathead minnow (2.5")	<i>Pimepales promelas</i>			2.6		
Yellow Perch (6")	<i>Perca flavescens</i>			3.7		
Longnose sucker (4-16")	<i>Catostomus catostomus</i>			7	1 to 3	
Goideye (9")	<i>Hiodon alosoides</i>			4	1 to 2.5	

Typical Project Design Considerations

- Target species for fish passage?
- Safety issues associated with the dam?
- Structural issues associated with the dam?
- Improve the water quality / habitat quality?
- Recreational boating in the dam pool?
- Community reactions to potential physical changes to the dam environment?
- If you build it, will they come?
- Regulatory permitting issues > floodplain / floodway / wetland, etc.
- Total Project Cost and Potential Funding Sources



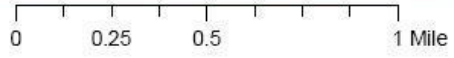
Krape Park Dam

Yellow Creek - Freeport



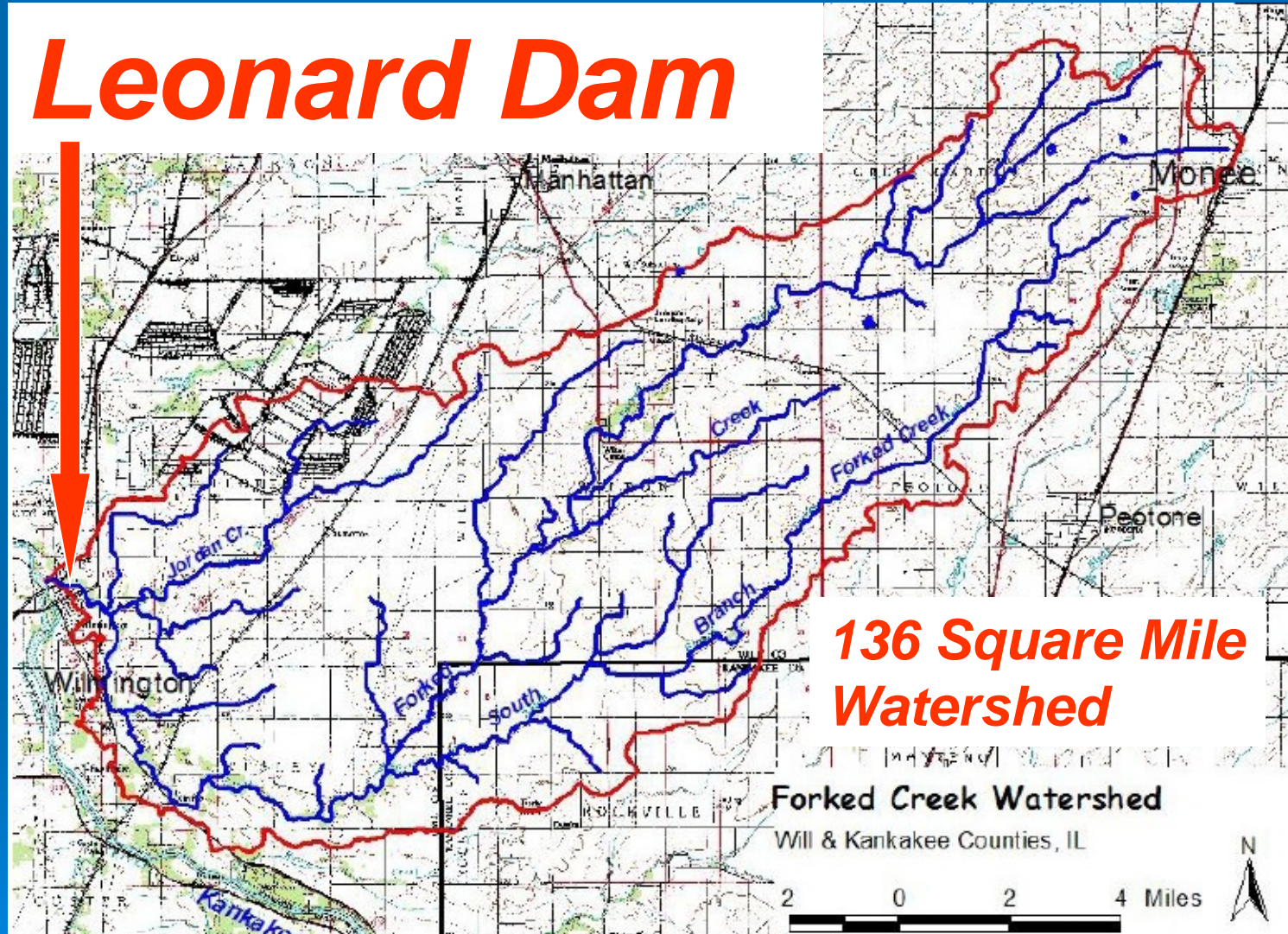


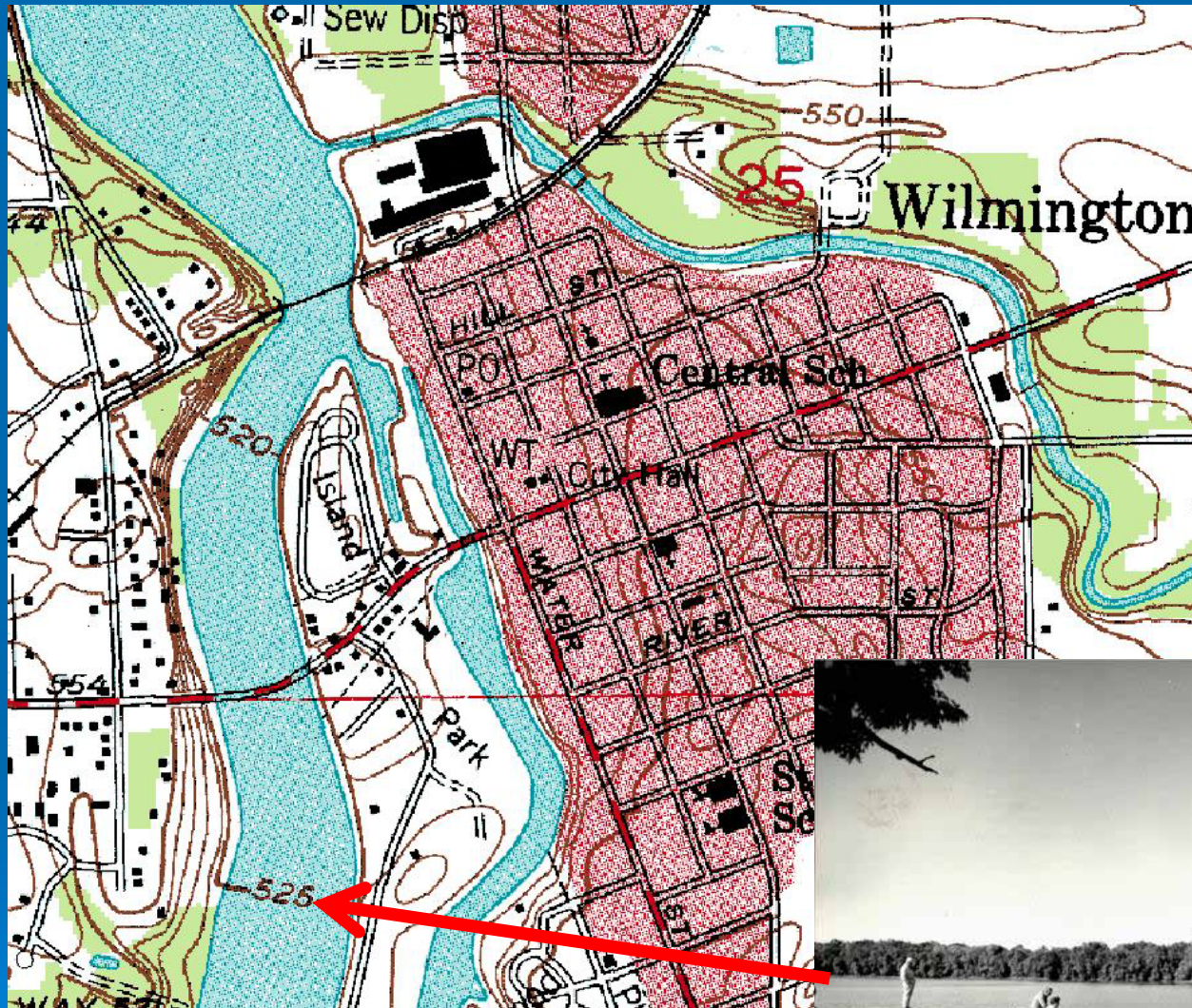
Site Map
Brookdale



Leonard Dam on Forked Creek, Wilmington, IL

Leonard Dam





Project Partners:

- USFWS

- IDNR

Open Lands Project

City of Wilmington





Bedrock
bottom

Plunge Pool
(4ft - 6ft deep)

Impoundment

Dam Crest - 109 ft Span

Existing Conditions

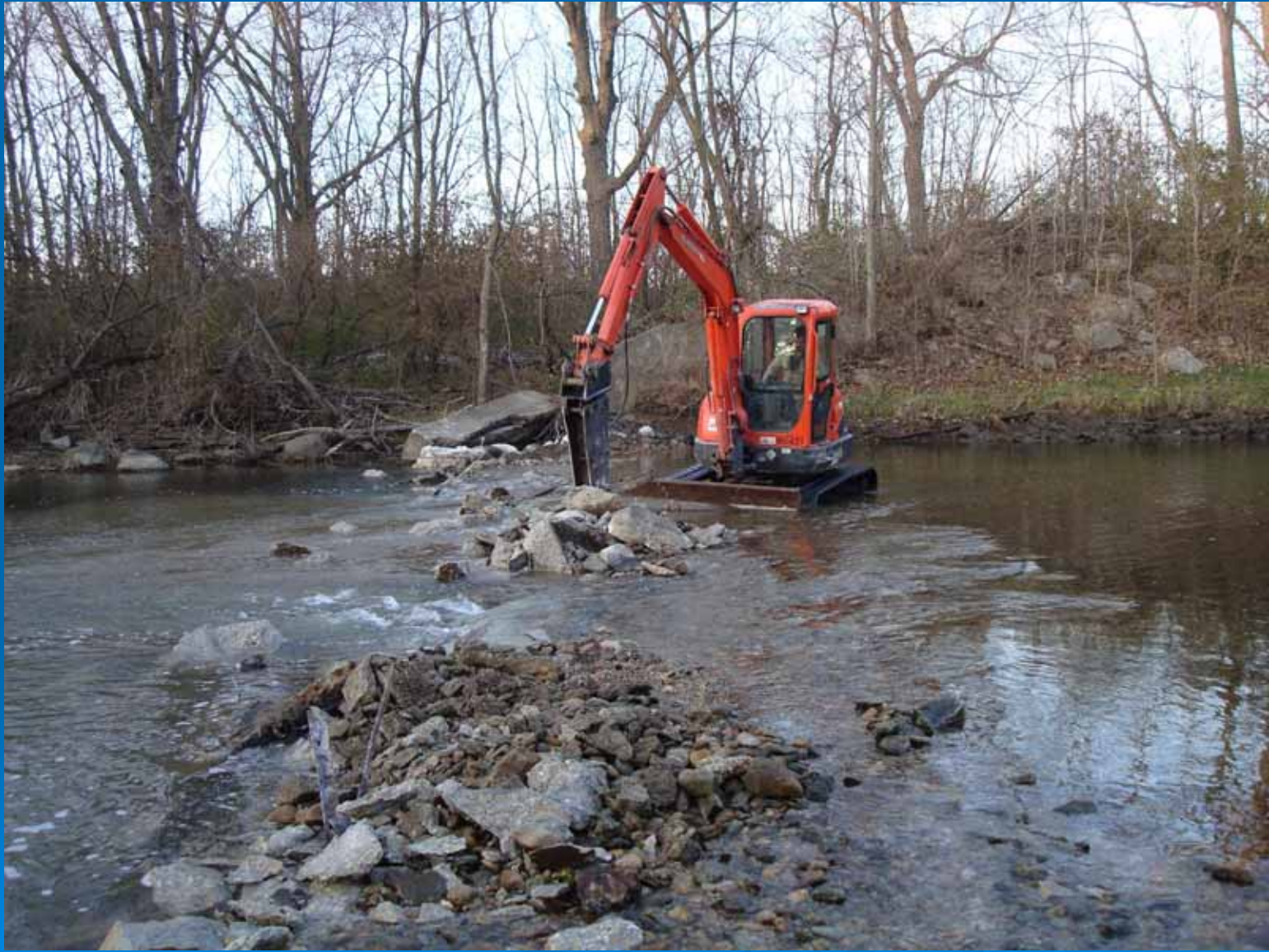












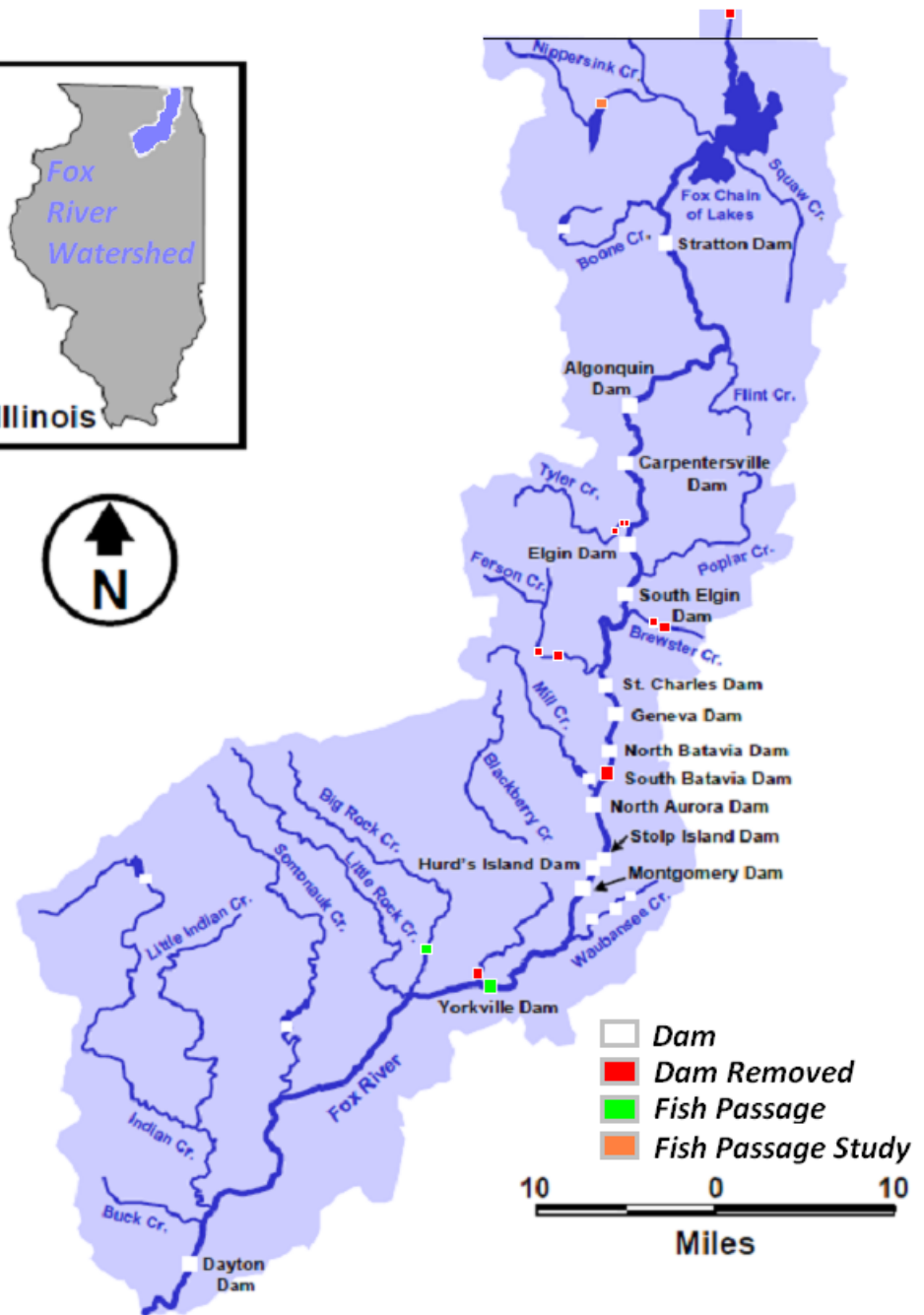
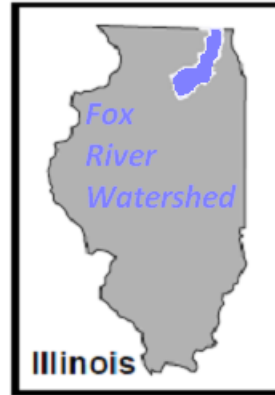
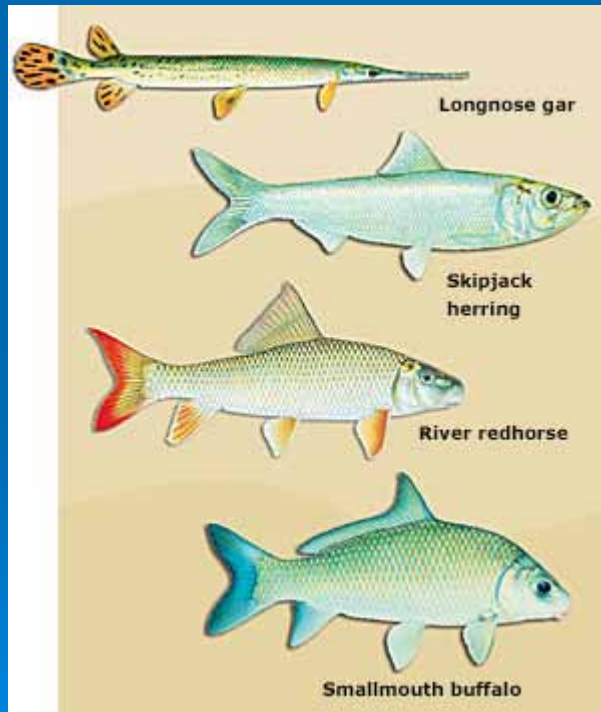




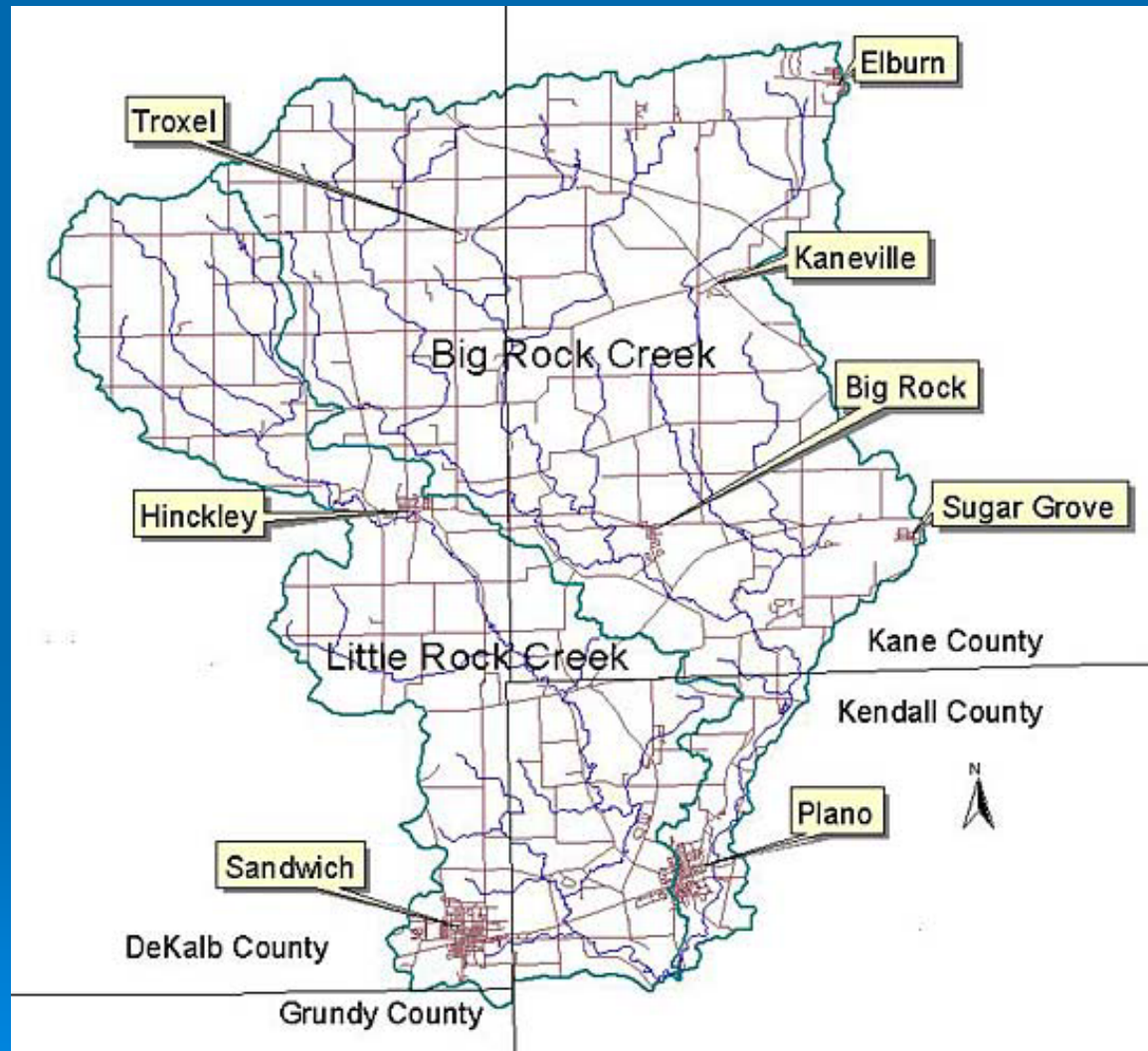




Fox River Watershed Dams



Plano Dam on Big Rock Creek, Plano, IL



Project Partners:

Steve Pescitelli
- IDNR

Ken Anderson
- KCDEM

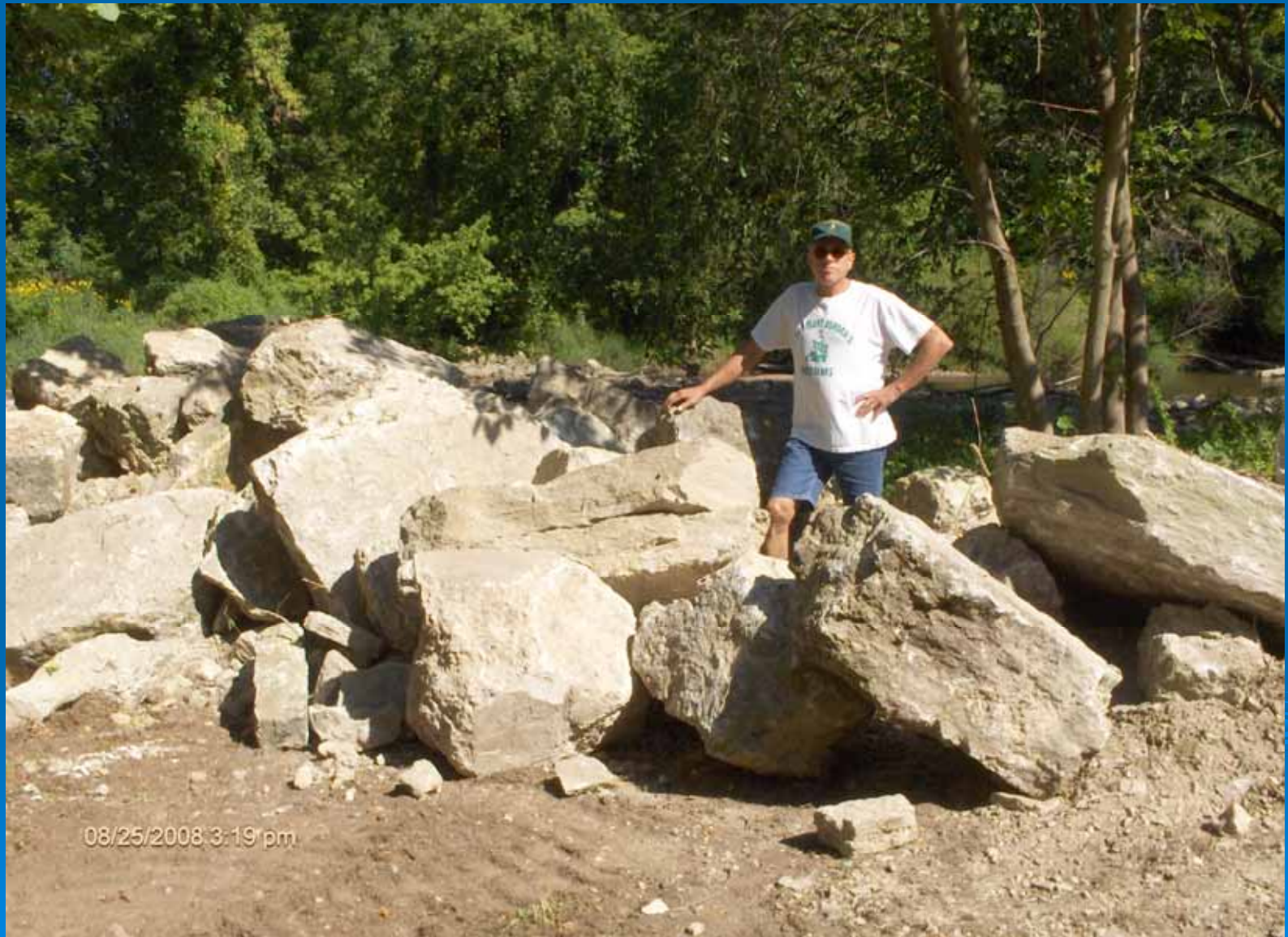
City of Plano

Watershed area
above the dam:

190 square miles +/-

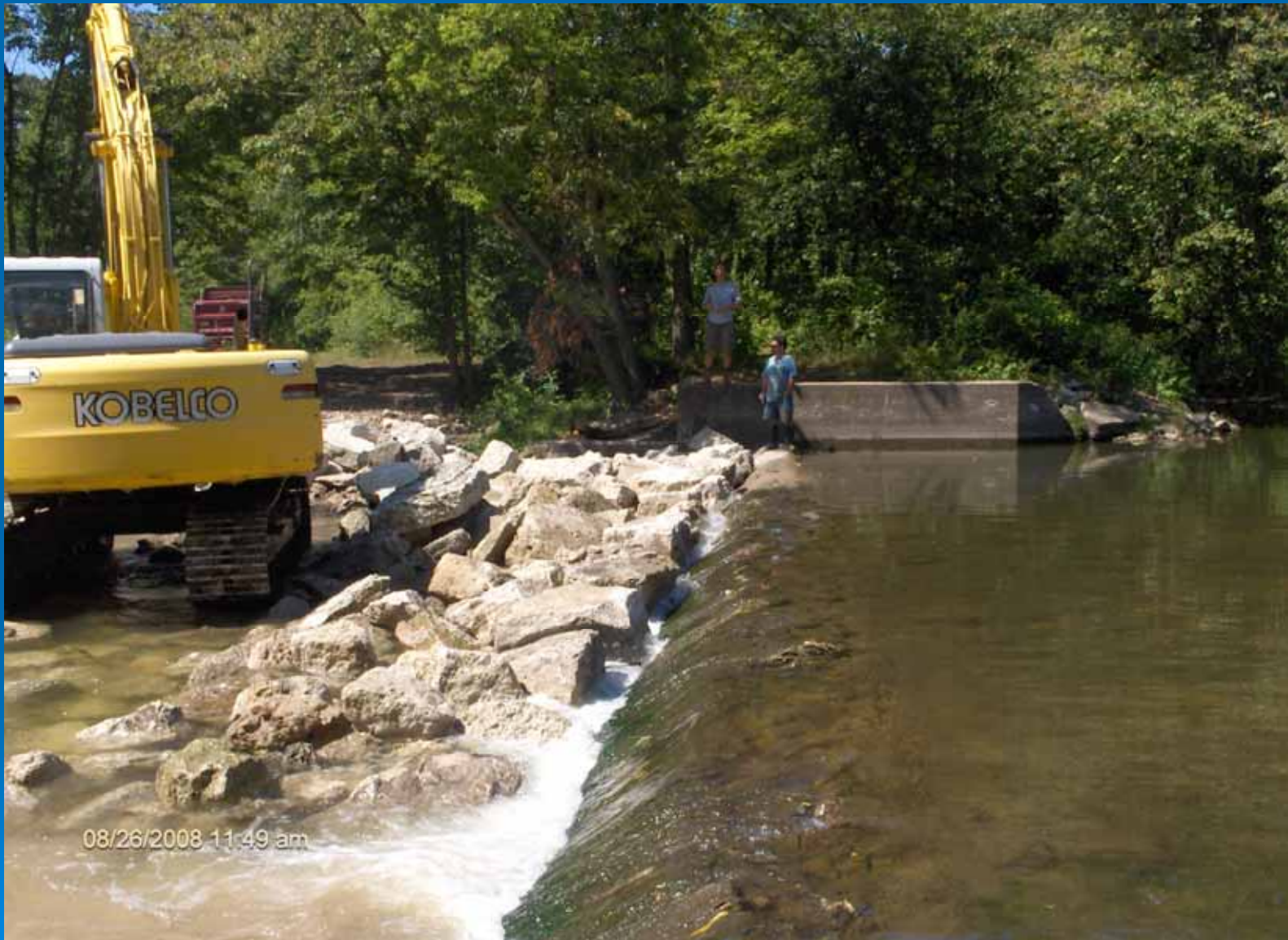






08/25/2008 3:19 pm









08/27/2008 11:22 am







Wing Park Dam

Tyler Creek - Elgin - 2012



*Judson University Dams
Tyler Creek Elgin - 2012*



Creekbend Dam

Ferson Creek – St. Charles -
2012



Wonder Lake Dam

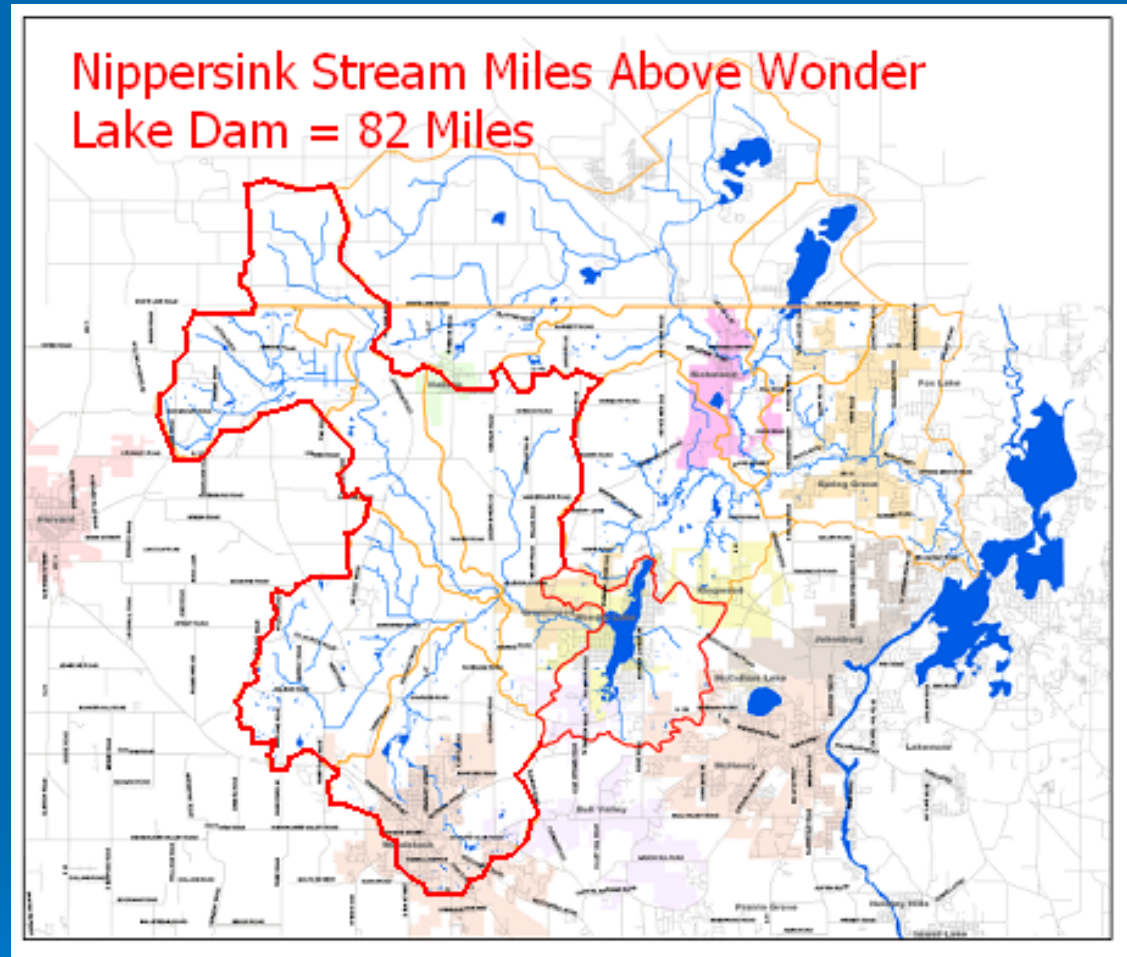
830 acre surface area

10 miles of perimeter shoreline



WONDER LAKE
Created in 1929
22 foot high earthen dam

- From a fish passage standpoint, approximately 82 miles of upstream tributary stream channels are “disconnected” from the lower Nippersink and Fox River by the Wonder Lake Dam.



- Fisheries surveys conducted by the Illinois Department of Natural Resources and the McHenry County Conservation District for the period of 1982 – 2007, identified the presence of 51 species of fish downstream of Wonder Lake Dam, and only 29 species upstream of the dam.
- A planned Rotenone fish-kill in the 1970's upstream of Wonder Lake reduced diversity.
- Given the fact that a lake community with an appraised value of roughly 750 million dollars has developed around Wonder Lake since 1929, dam removal is obviously not an option.

**Species occurrence and abundance downstream vs. upstream of Wonder Lake
IDNR fish collections 1982 - 2007.**

Common Name	Scientific name	Downstream	Upstream
Central mudminnow	<i>Umbra limi</i>	7	1
Grass pickerel	<i>Esox americanus</i>	2	
Northern pike	<i>Esox lucius</i>	2	
Carp	<i>Cyprinus carpio</i>	174	61
Golden shiner	<i>Notemigonus crysoleucas</i>	18	
Creek chub	<i>Semotilus atromaculatus</i>	69	302
Hornyhead chub	<i>Nocomis biguttatus</i>	406	
Central stoneroller	<i>Campostoma anomalum</i>	12	307
Blacknose dace	<i>Rhinichthys atratulus</i>		40
Striped shiner	<i>Luxilus chrysocephalus</i>	22	
Common shiner	<i>Luxilus cornutus</i>	195	5
Spotfin shiner	<i>Cyprinella spiloptera</i>	1,451	60
Fathead minnow	<i>Pimephales promelas</i>	56	57
Bluntnose minnow	<i>Pimephales notatus</i>	802	577
Bullhead minnow	<i>Pimephales vigilax</i>	23	
Emerald shiner	<i>Notropis atherinoides</i>	75	1
Rosyface shiner	<i>Notropis rubellus</i>	1	
Bigmouth shiner	<i>Notropis dorsalis</i>	19	257
Blackchin shiner	<i>Notropis heterodon</i>	3	
Sand shiner	<i>Notropis ludibundus</i>	1,242	4
Quillback	<i>Cariodes cyprinus</i>	48	1
White sucker	<i>Catostomus commersoni</i>	880	1,619
Northern hog sucker	<i>Hypentelium nigricans</i>	40	
Shorthead redhorse	<i>Moxostoma macrolepidotum</i>	61	
Golden redhorse	<i>Moxostoma erythrurum</i>	37	5
Channel catfish	<i>Ictalurus punctatus</i>	60	27
Yellow bullhead	<i>Ameiurus natalis</i>	30	2

**Species occurrence and abundance downstream vs. upstream of Wonder Lake
IDNR fish collections 1982 - 2007.**

Common Name	Scientific name	Downstream	Upstream
Black bullhead	<i>Ameiurus melas</i>	15	
Stonecat	<i>Noturus flavus</i>	19	
Tadpole madtom	<i>Noturus gyrinus</i>	1	2
Starhead topminnow	<i>Fundulus notti</i>	21	
Blackstripe topminnow	<i>Fundulus notatus</i>	224	
Brook silverside	<i>Labidesthes sicculus</i>	46	3
Brook stickleback	<i>Culaea inconstans</i>		36
White bass	<i>Morone chrysops</i>	10	
Yellow bass	<i>Morone mississippiensis</i>	8	
Black crappie	<i>Pomoxis nigromaculatus</i>	6	1
White crappie	<i>Pomoxis annularis</i>	1	
Rock bass	<i>Ambloplites rupestris</i>	16	
Largemouth bass	<i>Micropterus salmoides</i>	133	27
Smallmouth bass	<i>Micropterus dolomieu</i>	40	47
Green sunfish	<i>Lepomis cyanellus</i>	57	103
Bluegill	<i>Lepomis macrochirus</i>	239	37
Pumpkinseed	<i>Lepomis gibbosus</i>	5	
Orangespotted sunfish	<i>Lepomis humilis</i>	19	
Walleye	<i>Stizostedion vitreum</i>	15	
Yellow perch	<i>Perca flavescens</i>	62	
Blackside darter	<i>Percina maculata</i>	2	
Logperch	<i>Percina caprodes</i>	24	
Johnny darter	<i>Etheostoma nigrum</i>	64	87
Banded darter	<i>Etheostoma zonale</i>	293	324
Fantail darter	<i>Etheostoma flabellare</i>	23	42
Freshwater drum	<i>Aplodinotus grunniens</i>	61	
Total fish		7,143	4,213
Total species		51	29



Former Location Of Fish Ladder
Originally Constructed on
West Wingwall When Dam Was
Constructed; Later Destroyed By Large
Flood And Not Replaced.

Shocking in the Nippersink Creek below the Wonder Lake Dam September 21, 2011

Total number of fish translocated into Wonder Lake = 506

Northern Pike = 6 Largest = 35 3/4 inches

Walleye = 7 Largest = 18 3/4

Crappie = 12 Largest = 10 1/2

Striper = 1 = 9 1/2

Perch = 7

White Bass = 21 Largest = 13

LM Bass = 37 Largest = 17 1/2 inches

SM Bass = 8 Largest = 14

Flat Head Catfish = 1 = 21

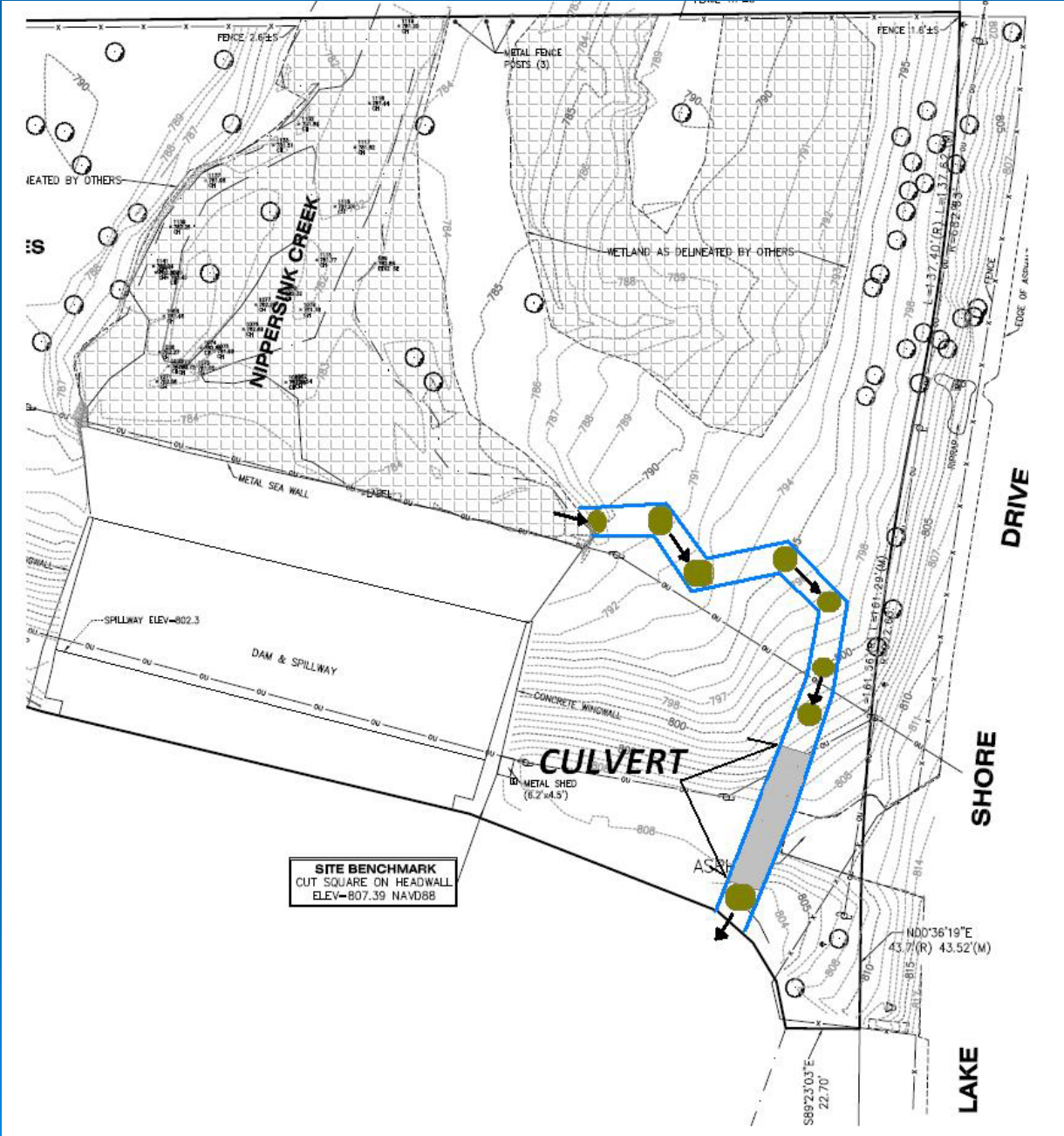
War Mouth = 2 Largest = 5

Quillback = 3 Largest = 13 1/2

Blue Gill = 145 Largest = 9

Channel Catfish = 200 Largest = 23 3/4





Lessons Learned

1. Many dams in northeastern Illinois no longer provide useful functions, and can adversely impact water quality, safety, and fisheries.
2. Wherever possible, dams should be removed to restore the waterway to a free-flowing condition.
3. Dam removal should be the preferred alternative, as dam modification projects, while still desirable, can be more complex, more expensive, and can require on-going maintenance.
4. While agency cooperation has been good, more inter-agency cooperation / discussion is needed to create a more expedited dam removal permitting process.

Lessons Learned

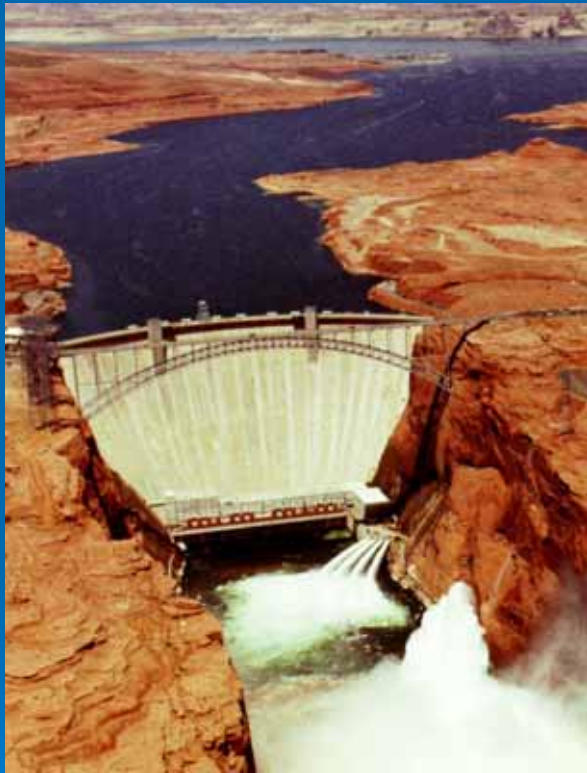
5. Generally speaking, the material that accumulates upstream of a dam tends to be heavier “washed” materials, such as sand gravel and rock, rather than organic.
6. Unless there is a known potential sediment impairment, the material accumulated upstream of a dam should be looked upon as “interrupted bedload transport” rather than a pollutant that has to be intensively managed.
7. The benefits of using turbidity curtains downstream of a dam modification project are highly questionable, and generally not worth the expense.





Set Your Goals High!

1. Look for potential projects



2. Consider Alternatives



Okay, maybe not quite that high,

but we have to start somewhere!!

Yet, sometimes, the Wile E. Coyote approach

is a lot more fun!!!



Marmot Dam Removal, Sandy River, Oregon

Questions?



Randy Stowe

Natural Areas & Biotechnical Erosion Control Ltd.

10015 Wright Road

(815) 648-2252

Harvard, IL 60033

(815) 648-2253

rjstowe@gmail.com