

Dispersal Barrier Advisory Panel 6/23/05
U.S. Army Corps of Engineers
111 N. Canal St. Chicago, IL

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Darren Melvin, IRCA
Gary Johnston, USACE
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Barrier I

Barrier I is beginning to near the end of design life; Jeff estimates there is about 1 year until we lose another cable.

Barge Safety Study

Scope of Work developed with Coast Guard & American Water Operators, and the River Carriers. The Champaign Corps lab did the study, the IL River Carriers Assoc. helped with barges.

The study assessed voltage at several depths and found uniform voltage throughout. Some voltage is detectable 350' up & downstream of the barrier.

Measured voltage between barges, tow & fence

0.1 - 0.2 volts between barges with steel cable

200 - 250 volts with ropes

Used fully loaded barges

There was voltage difference with fences, too.

Barges in parallel showed similar low voltage (2-3 v) with steel lines

Passing

When passing a stationary barge the voltage difference of 200+ volts drops as barges near each other.

In the event of a collision or when forming a tow over the barrier the study observed sparking and a 30-40 volt difference

There was a question about the effect of the field on a person in the water. Jeff Smith replied that the barrier could cause temporary paralysis (an inability to control one's muscles) of a person in water. Smith-Root has about 30 to 40 barriers in U.S., animals & people have passed through without deaths.

Will the field affect pacemakers? The field could affect pacemakers if the person was in the water.

The study tested the field with a life ring to 6' deep. They found the peak voltage was 7-8 volts; but it is the current that has the greatest effect. The electrical current could be high in the worst scenario.

The Coast Guard has suggested using Underwriters Labs to assess the barrier effect on a person in the water. UL may not have the experience to do the work. The Navy has published data on divers working with electricity underwater that suggests the current associated with the barrier is OK. We need to address what is not known about the effect on a person. The Corps will ultimately determine who will help review and interpret the data.

USCG approval is needed for the barge safety. Currently the crew has to wear a Type 1 PFD. More fencing will be used around the barriers. Wire ropes are required for barges passing through the barrier site; no passing is allowed; no making tows or breaking tows. Sparking within a boat is not a problem

Barrier II

Construction

All underwater work on the barrier is done. Barrier IIA is coming along well. The pulsators were constructed in Washington at the Smith-Root plant. They will have their first full test this week.

The electrodes for barrier II are 5" x 5" steel bars. Corrosion at the connections was a concern that has been addressed.

Schedule: Expect IIA to be done late July – early August. The funding for IIB is in place. Expect to sign an amended Project Cooperation Agreement soon which will activate the option for IIB.

The Corps will keep Barrier I operating until IIB is running, then will shut off Barrier I. We expect Barrier II to be fully operational by the end of the year.

What is the effective length of field? 350' for Barrier II; each field is 130' long, 480' total length. Field extends 20 – 30' up and down stream
Are fish repelled fully? Can they jump? The fish may get paralyzed – stunned, then pushed back. Need 2 volts/in to stop small fish.

What is the future of Barrier I?

House & Senate Water Resource Development Act (WRDA) authorizes Barrier I to be permanent but needs appropriations. Are two electric barriers best for duplication? We need to discuss the future of Barrier I.

Please contact legislators re WRDA

There was a question about barges ballasting. Barges don't use ballast water. How do you level barges? Each barge holds 1400-1500 tons; the barges are leveled with the load. Tows sometimes take on water to get under a bridge on the Cal Sag. They uptake & pump off at LeMont above the barrier.

Traci Barkley – Barge ballasting is rare. She is testing barge ballast & water.

Barges do leak; it's an operational issue. Leaking barges move water. Most common organisms in ballast water are diatoms & rotifers. Recreational boats pose a small risk too.

When barges are brought in for repair a hole is cut in the barge; the water drains into canal.

Barge ballasting is a USCG responsibility. The USCG recommends exchange of water on same side of barrier.

Phil suggested the panel could develop an educational fact sheet for IRCA on the barrier. Darren Melvin stated the water operators are following the USCG Regulations for operation at the barrier and for ballasting operations and ballasting plans.

Dan Injerd mentioned we need WRDA & appropriations to operate Barrier II; IL doesn't want to operate BII, it should be a Federal project Dan noted it is remarkable that eight jurisdictions contributed to barrier funding.

If WRDA doesn't pass what will IL do? There are some dollars in 2006 budget in case

Monitoring – Traci Barkley

There are 118 tagged fish in the canal. Each transmitter has a 400-day service life; 23 live transmitters now. There are fixed stations & manual tracking. The fish were tracked in Nov. & 2 times in May. No fish have crossed the barrier since April 2002. She observed common carp lined up again this year on June 2nd. She plans to release more tagged fish once BII is online.

Do the fish challenge the barrier? From 1-2 weeks after release, then dissipate

What about high flow at the barrier? The barrier is designed to handle a 100-year flood event

Habitat quality may be a limiting factor. There's not a lot of habitat for Asian Carp in the canal

When Asian Carp approach barrier, what numbers will we see? Don't know. If there's a high density of Asian Carp – some management action may be taken too.

Asian Carp Monitoring – Irwin Polls

Sampling stations in the Sanitary Ship Canal at River Miles: 300.0, 295.2, 292.4 and in the DesPlaines at 290.0, 288.9, 286.0

Electro fishing only performed at RM 308 and 295

No Asian Carp observed or captured

Dresden & Marsailles Pools – No Asian Carp collected by EA technologies

A Big Head & Silver Carp were reportedly caught by anglers in the Brandon Road Pool – need confirmation of location.

Irwin recommended Asian Carp monitoring downstream in the Marsailles & Starved Rock pools.

Round Goby Round – Up – Irwin Polls for Pam Thiel

No gobies further downstream

No Asian Carp further upstream

In 2002 an Asian Carp was caught at about RM 274. In Nov. 2004 an Asian Carp was found dead in Sanitary Ship Canal.

Asian carp are abundant at Starved Rock.

Audiograms – Jeremy Nedwell

To test the effectiveness of the acoustic barrier on fish we need to know about fish hearing. Testing started with 50% hearing threshold in first trials at 20hz – 500hz. Later we found 20 hz – 2 kilohz created maximum repelling effectiveness of 95%. The barrier is unbearable loudness to fish

90 decibels above the hearing threshold deters fish.

Usually we assess hearing behaviorally, through a response in some way. When fish respond the frequency is subsequently reduced until till the fish doesn't respond.

Auditory Brainstem Response relies on the brain activity for a response; it is a more sensitive method.

Big Head & Silver carp show a similar response to sound to up to 3 KHz – they are hearing specialists. Jeremy recommends increasing the frequency to 2 to 3 KHz to achieve 97% effectiveness. Increase sound density from 750 hz → 2KHz for Silver, 1.5 KHz for Big Head.

Specializing the frequency for Asian carp could allow native species to move through.

Is the jumping related to water noise? Maybe. Could depth be a factor? No, but water currents can deflect the bubble stream.

Increasing effectiveness to 100% is possible – especially in concert with other barriers or in use as a trap

What about propwash? Tugs have 500 to 1500 hp, some are 2500 hp. They disrupt the water 100 feet behind the boat. It could diffuse the bubble field but would not affect the acoustic effect.

The frequency of a big propeller is about 10Hz – 100 Hz

Bass boats are noisy but do not repel the fish

Diet Overlap Study – John Chick

John commented that Asian carp jump in response to canoes, too.

The electric barrier will have a great effect; it will stop a lot of fish.

In John's study, backwaters were sampled in the spring flood to assess zooplankton abundance & composition and abundance of Asian Carp. They looked at dietary overlap of Asian Carp with gizzard shad, big mouth buffalo, and paddle fish. Asian Carp compete with larval fish & adult bigmouth buffalo, gizzard shad and paddle fish

The IL River is a very productive system; ranging from eutrophic to hypereutrophic. The zooplankton is rotifer dominated with few large zooplankton species.

The study sampled 300 stomachs; they contained primarily rotifers but also algae & detritus. The greatest diet overlap (80%) was with gizzard shad, primarily rotifers. There was less overlap with Big Mouth Buffalo & paddle fish – large zooplankton.

At high Big Head abundance could large zooplankton affected? Maybe.

At high Silver Carp abundance could large zooplankton affected? Maybe.

Irwin: Chlorophyll a in the Sanitary and Ship Canal is about like the lake, it could be limiting.

Does diet change with size? - Don't know yet.

Movement of Asian Carp – Jim Garvey

The lower IL River is a conduit for the upper IL, Missouri, Missouri, Des Moines rivers. This study looked at milestones in life history; aggregations; vulnerabilities and life stage threats like the gizzard shad impact. Adult Habitat was assessed thru tagging work.

Asian carp feed on algae behind wing dikes

Spawning primarily occurs in the river and occurs in response to migratory cues such as floods. The fish form spawning aggregations.

Offspring Success: larval development occurs in the river; juvenile development occurs in backwaters.

Adult Movement: They looked at the La Grange to Grafton region using ultrasonic tags. They tagged 50 of each species. The study examined local movement including intensive habitat use and seasonal movements. Other variables measured included Temperature, dissolved oxygen, depth, turbidity and velocity. The study used 35 stationary tracking receivers in addition to manual tracking.

The fish moved upstream as far as Havana, IL. Silver Carp primarily used the channel border, main channel and backwaters. In the late summer the fish moved to sand bars.

Big Head behave differently than Silver Carp, using less backwater habitat in the summer.

The fish move with flood waters – one moved 140 km (at least) in 7 months. This could be related to reproductive events. The fish swim upstream to spawn – larvae & eggs float downstream & hatch.

Could conductivity affect habitat use? Maybe

Ecological Separation of River and Lake – Scudder Mackey

Scudder is working with a team to study ecological separation of Lake Michigan from the San-Ship Canal to prevent inter-basin transfer of Aquatic Invasive Species

There are several options to consider over a range of time scales:

Short term – Barrier

Interim – Kill zone or management

Long term – Ecological separation

Great Lakes Fishery Commission is funding the work which will start in the next 30 days. The project will explore options and assemble information on geographic & physical attributes, economic uses, and habitat & biological resources. The study will identify a range of options & scenarios and determine whether ecological separation can occur. Where possible they will begin to assess feasibility.

They will identify next steps; hopefully to narrow down the list of possibilities to a few good options that are realistic solutions.

Dan Injerd was “mystified” as to how the objectives can be accomplished in short time & low dollars. He suggested the project would identify a scope of work, that it may not really be a “study”.

Time ran out for discussion of further topics. Phil will work with Kristin on development of a barrier fact sheet for IRCA and per Col. Johnston’s suggestion, will assemble a small work group to discuss Barrier I options.

The meeting adjourned at 3:30 pm.