

THE NEW YORKER

A REPORTER AT LARGE

FISH OUT OF WATER

The Asian-carp invasion.

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OCTOBER 25, 2010

In the Shedd Aquarium, on the lakefront in downtown Chicago, there's a video display that makes visitors laugh until they're falling down. The video is in an area of the aquarium devoted to invasive species, and it shows silver carp (*Hypophthalmichthys molitrix*), a fish originally from China and eastern Siberia, jumping in the Illinois River near Peoria. A peculiarity of silver carp is that when they are alarmed by potential predators they leap from the water, sometimes rocketing fifteen feet into the air. In the video, several people are cruising in a small motorboat below the spillway of a lock or a dam while fish fly all around. The people get hit in the arms, the back, the sides. They're ducking, they're yelling, the silver carp are flying, the boat is swerving. Aquarium visitors whoop and wipe the tears away and watch the video again.

The invasion of Asian carp into the waters of the South and the Midwest differs from other ongoing environmental problems in that it slaps you in the head. Videos like the one in the Shedd are the reason a lot of people know about Asian carp. Not only are the newcomers upsetting the balance in mid-country ecosystems; they are knocking boaters' glasses off and breaking their noses and chipping their teeth and leaving body bruises in the shape of fish. So far, apparently, there have been no fatalities. And while threats to the environment tend to be ignorable (if only in the short run), this one is not, because millions of people go boating and the novelty of being hit by a fish wears off fast.

Right now there are actually two kinds of Asian carp to worry about: silver carp and their non-



From the commercial catfish ponds of Arkansas and Mississippi, the carp have swum—and leaped—nearly to Lake Michigan.

jumping companions, bighead carp (*Hypophthalmichthys nobilis*). Bigheads, which can grow to a hundred pounds, are bigger than silvers. Neither really has the appearance of a carp, because their mouths are not the downward-pointing mouths of bottom-feeding fish. Unlike the common carp, which we think of as an American fish although it was introduced here in the eighteen-eighties, silver carp and bighead carp feed not on the bottom but in the top few feet of the water column. These carp eat only plankton, which they filter from the water with rakers in their gills. They are highly efficient feeders, outconsuming other fish and leaving less for the fry of such game fish as bass, crappies, and walleyes. The fear is that when they get in a lake or a river you will soon have nothing else.

In the U.S., the Asian carp started their journey from a place of formerly ominous reputation: Down the River. As long ago as the nineteen-seventies, bigheads and silvers escaped into the lower Mississippi River from waste-treatment plants and commercial catfish ponds in Arkansas and Mississippi. Down South they were worker fish, imported to clean up enclosed areas by eating algae. Presumably, Mississippi River floods gave them the chance to get away. Once at large, the carp headed north, eventually turning up in the Missouri, the Tennessee, the Ohio, the Des Moines, the Wabash, the Illinois. For the long term, they seem to have their sights set on Canada. Today, just a few decades after their escape, they are almost there.

Not to get too sentimental about it, but the Mississippi River is us, and vice versa. It's our bloodstream. Last summer I was driving along the river in western Illinois thinking how horrible the Mississippi had been lately, with its outsized floods and its destruction of New Orleans, and I noted the recent flooding still in progress along the Illinois shore—the miles of roads and fields submerged, and the ferry landing at Golden Eagle, Illinois, now separated from dry land by seventy feet of mud and water, and low-lying parking lots full of river mud cracked like pieces of a jigsaw puzzle curling in the sun. In the sprawl of standing water over parts of the landscape no actual river could be found. Then the road I was on descended from a ridge to the mostly unflooded river town of Hamburg, Illinois, and the Mississippi itself was running fast beside the main street, and just across the shining expanse were the houses and church steeples on the Missouri side. An old and powerful emotion hit me; my blood leaned with the current and I let the recriminations go by.

The fact that Asian carp are now in this river and many others, sucking in plankton and growing big and reproducing and waiting to smack a Jet Skier's face, is really not good. Possibly, these carp will change large parts of our national watersheds forever. We may be infected with a virus for which there is no cure.

Among Asian-carp-infested rivers, the Illinois has it worst of all. This river is formed by the junction of the Kankakee and the Des Plaines about fifty miles southwest of downtown Chicago. It runs at a diagonal partway across the state and then turns due south, meeting the Mississippi north of

St. Louis. Via the Des Plaines, most of the treated wastewater of Chicago flows south into the Illinois. It's the main industrial river of the state. The fields of corn and soybeans through which it passes are the factory floor, the river is the conveyor. If there's any stretch of this river that doesn't hum and throb—with barges, tugs, grain elevators, power plants, coal depots, refineries—I didn't see it.

One morning in August I was fishing in the Illinois by the boat-launch ramp in a riverfront park in Havana, Illinois, a town whose full name is pleasant to say. Not much water traffic was passing at this early hour. A light breeze interfered with the deep-green reflection of the trees on the far shore, and the echoes of car tires rolling on the brick ramp bounced off some barges parked over there. Fish were rising near the bank in the brown current. I cast to them with a dry fly, but they wouldn't bite. Later, a guy in a sporting-goods store explained that these were Asian carp feeding on grain dust from the elevators upstream. In fact, because of the tininess of what they eat, Asian carp are almost impossible to catch with hook and line.

I quit fishing as the sun rose above the trees and the day became stifling. Two fishermen came to the boat launch from upriver in an eighteen-foot bass boat with a twenty-five-horsepower outboard. They had on camo hats and bluejean bib overalls. As they were winching their boat onto the trailer one of them fanned himself with his hat and yelled to me, "Hey, turn down the heat!" I went over and said hello and asked how they had done. They opened their cooler and showed me a beautiful catch of crappies and a medium-sized striped bass. I expressed surprise at their success and said I had heard that the Asian carp had depleted this fishery. Not necessarily, the guys said, adding that there were so many little Asian carp now that the other fish had more prey to feed on. I asked if they thought Asian carp were a serious problem.

"Oh, hell yes, they're a problem," the smaller of the two guys said. "They jump up and hit you all the time, and they get slime on you, and they shit all over your boat. And bleed—oh, they bleed like no sonsabitches you've ever seen. Yesterday, a carp hit Junior in the chest—I thought it would go into his bib—and it left a trail of shit and slime and blood all down the front of him."

"Hey, look—there's my nephew!" Junior interrupted. A blue-and-white striped tugboat was going by with a young fellow in jeans and a T-shirt standing in the wheelhouse at the top. "My nephew's the youngest pilot on the river—became a pilot right out of high school," Junior said. He and the other guy waved and the pilot waved back, the happiest man in Illinois. A large American flag fluttered at the tug's stern. All around the boat, from the roiled wake and from the curls of foam at the bow, carp of mint-bright silver were leaping in the sun.

In the parking lot of the local field station of the Illinois Natural History Survey, just up from the boat launch, two big outboards with twin motors sat dripping on their trailers. After a thorough

hosing down, the boats still smelled of disinfectant, and a few fish scales clung to the aluminum structures in their bows. At a desk in the field-station office, Matt O'Hara, a tall, broad-shouldered fish biologist who had just come in from the river, sat and talked with me, while at an adjoining desk a colleague talked to a film crew from an outdoor channel. Another reporter and a film crew from ESPN were expected shortly. During a recent fish survey, Matt O'Hara said, so many fish jumped out of the river at the first jolt of electroshocking that a camera filming from the nearby shore was unable to see the boat. In fact, the visual craziness of the leaping-carp phenomenon, propagated in Internet videos, had been drawing TV crews from all over. Dealing with crews from every major channel, from cable shows, and from Canada, Russia, England, France, and Japan had become part of these biologists' job.

Their actual and more important job is keeping track of what's in the river. North America's two largest watersheds, the Mississippi and the Great Lakes, connect in one place, Chicago. Boats travel from the Atlantic Ocean into the St. Lawrence Seaway, go through the lakes, turn into the Chicago Sanitary and Ship Canal, continue through the canal into the Des Plaines River, enter the Illinois, and head onward from there to the Mississippi and the Gulf of Mexico. This means, of course, that invasive species can travel the same route in either direction. All of them must pass by the Havana field station's door, and Matt O'Hara and others at the station check the river continually to see if they do. These days, the watchers' eyes are on the Asian carp, whose dense population in the Illinois—eight thousand or more silver carp per river mile—exerts a seemingly inexorable pressure northward, toward Chicago and the huge, Asian-carp-free (probably) watershed beyond.

Like other scientists who grasp the threat, Matt O'Hara becomes severe when he talks about it, though in a quiet and Midwestern way. "I don't know if silver carp and bighead carp would necessarily thrive in the Great Lakes," he told me. "Lake Erie is one of the biggest fisheries in the world—the lakes together are a seven-to-ten-billion-dollar fishery annually, and most of that catch is from Lake Erie—and it does look as if the carp would do well in that particular lake, and probably trash it. What I'm even more concerned about in the shorter run is the rivers. The Illinois became seriously infested just in the last seven years. A study has identified twenty-two rivers in the Great Lakes system that might be as vulnerable as the Illinois. Some of these are major rivers with important salmon runs, like the Pere Marquette and the Manistee, in Michigan. Asian carp in those rivers could become a disaster really fast.

"You can eat Asian carp, and they're good. Score the fillets crossways with a sharp knife and cook them in hot oil, and it dissolves a lot of the bones. But given what they do to an ecosystem I can't say I see any advantage at all with these fish, definitely not if they get in the lakes. They're terrible for the aesthetics and they certainly make people leery of going out in a boat. Even today, it is still legal to import bighead carp, although silvers are now illegal. And there's another kind of carp, the black carp,

that's also in Southern catfish ponds and is legal to import and could be an additional disaster if it moved north. Black carp eat snails and mussels and would probably strip our native mollusk and shellfish populations, with all kinds of consequences. That's a danger people should think about, too. We knew fifteen years ago the silvers and the bigheads were going to be a problem, but nothing was done about them. Until recently, nobody paid attention to carp."

Well, O.K.—let's eat them. This solution has already occurred to the state of Illinois. Americans in general are not keen on eating carp, so, looking elsewhere, the governor of Illinois recently announced an agreement to sell local carp to the Chinese. Big River Fish Corporation, of Pearl, Illinois, would harvest, package, and ship carp to the Beijing Zhouchen Animal Husbandry Company, while the state would invest two million dollars in Big River to improve its facilities and processing capacity. The Chinese had already inspected the product and announced their complete satisfaction with "the wild Asian carp" of Illinois. Zhouchen said it would buy thirty million pounds, and possibly more, by the end of 2011.

Pearl, Illinois, by the Illinois River in the west-central part of the state, is on Route 100 and has a hundred and eighty-seven residents. A small post office makes up about a quarter of its downtown. Big River Fish, around a bend on Route 100, announces itself with two hand-painted wooden signs, one facing north and one south, against the trunk of a maple tree. The signs show the profile of a long-whiskered catfish done all in black and shades of gray except for the hypnotic yellow eye. Rick Smith, Big River's president, was not in his office the morning I drove the eighty-some miles down from Havana. He had just left for the big motorcycle rally in Sturgis, South Dakota, towing his fried-fish cook shack. Rick Smith belongs to the very small number of motorcycle-rally food vendors who also ink multimillion-dollar deals with the Chinese.

Mike Houston, a Big River employee, was locking up as I arrived. The company would close for about a week, until the boss returned, he said. Mike Houston had a red ponytail, gray hair at the temples, blue eyes, a ginger-colored beard, a red Ohio State baseball cap, and a T-shirt with a saying about beer. Accompanying him was another employee, a wiry bald man with tattoos and a walrus mustache. "Yeah, we've already sold our first load of Asian carp to the Chinese," Mike Houston said. "They're also buyin' yellow carp, grass carp, catfish. Thirty million pounds is a lot of fish, but they say it will feed one city. We get the fish in the round—that means whole—and then we gut 'em and power-wash the cavity. That cavity's got to be completely clean before you can ship 'em. The Chinese want the carp with the tails, heads, and scales still on. We flash-freeze 'em in our forty-below-zero freezing chamber and then bag 'em individually and put 'em in big plastic shipping bags that hold twelve or fifteen hundred pounds of fish.

"We're expanding our operation, but right now we can move a hell of a lot of fish out of here. We

can operate year-round, because there's no restrictions and nobody cares how many carp you catch. Guttin' these fish is hard work. Some of the Asian carp go fifty, sixty pounds. Just liftin' 'em is hard. I used to be a chef, I can work a knife, and I've had days when I've gutted and washed twenty thousand pounds of fish. These Asian carp, what they eat, basically, is muck. You'd be surprised, though—their meat is all white meat, and it's good. I've eaten it. People say it's difficult to find Asian carp in China because they're all fished out. I like to think, sellin' silver carp and bighead carp to the Chinese, that we're sendin' their own product back to 'em. And I'll tell you, even with all the fish we move, we ain't makin' a dent in the Asian carp that's out there. There's commercial fishermen in Havana and in Beardstown that we can call up and say we need a hundred thousand pounds of fish right away, and those boys can get a hundred thousand pounds to us in a day or two. And a day or two later they can have a hundred thousand more. No, we ain't makin' a dent."

The town of Bath, nine miles south of Havana on a long slough of the Illinois, takes a sporting approach to the problem. Every year in August, the Boat Tavern, a waterfront bar in Bath, holds a fishing tournament in which teams of anglers catch silver carp. It's called the Redneck Fishing Tournament; the first was in 2004. Prizes are given for the most fish and the best costumes. This year, a hundred and five boats (at a fifty-dollar entry fee apiece) competed before a crowd of about two thousand in the event's two days. The method of fishing was straightforward: flush the carp from the water with boat engines and snatch them from the air with nets. There was also barbecuing, beer drinking, karaoke singing, games for children and teen-agers, bluegrass bands, booths selling T-shirts, etc. Among the crowd, T-shirt adages were on the order of "Friends Don't Let Friends Fish Sober" and "What Happens in the Barn Stays in the Barn."

From the top of the boat ramp leading to the event, the Redneck Fishing Tournament smelled like ketchup and mud. This was on Saturday afternoon, the event's peak. Spectators milled, media swarmed. At occurrences of even slight interest, a forest of boom mikes converged, while video cameras pointed here and there promiscuously. A notice on a telephone pole announced that just by entering the premises you were granting a production company called Left/Right the permission to use your voice, words, and image in a project temporarily called "Untitled Carp" anywhere on earth or in the universe in perpetuity.

Tall cottonwoods, ash trees, and maples shaded the shore, which was rutted black mud firmed up in places with heaps of new sand. Crushed blue-and-white Busch beer cans disappeared into the mud, crinkling underfoot. Aluminum johnboats, some camo, some not, lined the riverfront in fleets. Fishing costumes involved headgear: Army helmets, football helmets with face guards or antlers or buffalo horns, octopus-tentacle hats, pirate bandannas, Viking helmets with horns and fur, devil hats with upward-pointing horns, a hat like a giant red-and-white fishing bobber, a Burger King crown.

Competitors had their faces painted camo colors or gold or red or zebra-striped. Bath, Illinois, was first surveyed by Abraham Lincoln, and on August 16, 1858, while campaigning against Stephen Douglas in the race for the U.S. Senate, Lincoln delivered his famous “House Divided” speech to a large crowd in Bath. He took as his text the New Testament verse “A house divided against itself cannot stand.” A hundred and fifty-two years later, the Confederate-flag halter tops mingling with the American flags among the tournament crowd would have puzzled him; likewise, the pirate flags.

The competition took place in heats that lasted two hours. Before each start, boats put off from shore with their engines idling and waited for Betty DeFord, of the Boat Tavern, to give the signal. This honor belonged to her as the inventor and organizer of the tournament. At the air-horn blast, the boats raced off, net-men and women holding extra-large dip nets at the ready. Soon you could see people plucking fish out of the air. Most of the boats then careered away and out of sight. Two hours later, they eased back to the riverbank, many of them heavily loaded. Grinning competitors carried big, heavy-duty plastic barrels of silver carp, a man on each side, to the counting station, where festival officials counted the fish one by one and threw them into the tarpaulin-lined bed of a pickup truck. Among participants and onlookers, a cheerful giddiness prevailed. I had never seen so many fish. It was like an old-time dream of frontier bounty.

Randy Stockham, of Havana, won first prize, fourteen hundred dollars. He and his team caught a hundred and eighty-eight fish. Second prize of eleven hundred dollars went to Ron St. Germain, of Michigan, with a hundred and eighty-six. Mike Mamer and his Sushi Slayers, of Washington, Illinois, were third, at a hundred and fifty-three fish (eight hundred dollars). Top prizes for costumes were awarded to devils from Greenview, Illinois, and cavemen from Michigan. The tournament also donated fifteen hundred dollars to help local children suffering from developmental disorders and cancer. A total of 3,239 fish were caught, all of them silver carp. They ended up as fertilizer on Betty DeFord’s thirty-acre farm.

“I’m just a grandmother and a bartender,” Betty DeFord said when I called her at the Boat Tavern a week later for a final recap. “I don’t even own this bar. I started the Redneck Fishing Tournament because I want to warn other parts of the country about what these carp will do. I remember when this water had no Asian carp, and you could go frog gigging with a flashlight and a trolling motor on a summer night. The way these fish attack, that’s impossible now. We just finished our tournament, and the carp are jumping more out there than they ever were. I want everybody to know: these fish need to be gone.”

As you proceed northward toward Chicago on the Illinois, the industrial noise along its banks increases. Turning into the Des Plaines River south of Joliet, you might feel you’re in the

clanking, racketing final ascent of a roller coaster's highest hill. After Joliet, the machinery of greater Chicago multiplies along the riverbank until, in the municipality of Romeoville, white refinery towers in ranks send white clouds spiralling skyward, and a mesa of coal like a geological feature stretches for a third of a mile, and empty semi-trucks make hollow, drumlike sounds as they cross railroad tracks, and other vehicles beep, backing up. The place is a no man's land. Here the channellized Des Plaines and the Chicago Sanitary and Ship Canal, which have already met up some miles to the south, run parallel, about three hundred yards apart. The water in both of them is the color of old lead.

Romeoville is where the Army Corps of Engineers and the state of Illinois think they can stop the carp. At two locations on the Ship Canal, electric barriers zap the water. The canal, a rectilinear rock-wall ditch a hundred and sixty feet wide and about twenty-five feet deep, passes through Romeoville behind chain-link fences topped with barbed wire and hung with signs: "Danger: Electric Fish Barrier" and "Electric Charge in Water/ Do Not Stop, Anchor, or Fish" and "Caution: This water is not suitable for wading, swimming, jet skiing, water skiing/tubing, or any body contact." At the fish barriers, steel cables or bars on the bottom of the canal pulse low-voltage direct current. The electric charge—according to the Navy, whose divers tested it, somehow—is strong enough, under some circumstances, to cause muscle paralysis, inability to breathe, and ventricular fibrillation in human beings.

What it does to fish is less clear. Entering Chicago, the plucky Asian carp swims into a whole cityful of complications, and it continues to swim single-mindedly while questions of politics, bureaucracy, urban hydrology, and interstate commerce work themselves out. To put it another way: Chicago is a swamp. Various watercourses, only temporarily subdued, thread throughout the metro area. The engineers who caused local rivers to run backward a hundred years ago so as to send Chicago sewage south to the Mississippi rather than into the city's front yard—Lake Michigan—did not have too hard a job, because the underlying swamp could do the same thing itself when in flood. Given enough rainfall, the waters of swampy Chicago become one. The Des Plaines River needs no electric barrier because its Chicago section does not connect to the lake; however, when the Des Plaines floods it sloshes into the Ship Canal at points above the canal's electric barriers. And the Des Plaines is very likely to have Asian carp.

Meditating on the complications of the carp's presence in Chicago can disable the brain. Do the electric barriers actually stop all the carp, or are the little ones able to get through? Do stunned fish sometimes wash through in the occasional reverses of flow in the canal? Does the electric charge remain strong and uniform when ships and barges go by? (Probably; instruments in toll-booth-like buildings beside the canal adjust the charge when necessary.) Does the electric field have weak spots where fish can pass? Does a wintertime influx of road salt in the water cause the charge to fluctuate? What about when the current must be turned off for maintenance of the bars or cables? Is the rotenone

chemical fish killer administered when the current is off effective without fail?

The Chicago waterway system has several locks—why not simply close these and be done with it? Would closing the locks have a negligible effect on the economy of Illinois, as a study commissioned by the state of Michigan has claimed, or damage its economy irreparably, as demonstrated in a study preferred by Illinois? Would closing the locks risk flooding thousands of Chicago basements, as local officials say? How about the part of the waterway where there is no lock at all? Wouldn't the carp simply go that way? Will the new thirteen-mile barricade of concrete and special wire mesh designed to keep carp from swerving out of the Des Plaines and into the Ship Canal during flood times actually work? Will uninformed anglers introduce Asian-carp minnows while using them for bait? And what about immigrant communities from Asia who are known to perform ritual releases of fish and other animals during certain religious ceremonies? Might they have performed such rituals involving Asian carp already? Might they do so in the future? Will all this bring prevention to naught?

The Illinois Department of Natural Resources addresses itself to many of these questions, as does the U.S. Army Corps of Engineers (Great Lakes and Ohio River Division), the Metropolitan Water Reclamation District of Greater Chicago, the U.S. Fish and Wildlife Service, the Senate Great Lakes Task Force, the Congressional Great Lakes Task Force, the White House Council on Environmental Quality, the interagency Asian Carp Rapid Response Team, and the interagency Asian Carp Regional Coordinating Committee's Asian Carp Control Framework. The Illinois Chamber of Commerce, the American Waterways Operators, and the Chemical Industry Council of Illinois put in a word for industry, while the Natural Resources Defense Council, Freshwater Future, the Sierra Club, Healing Our Waters Great Lakes Coalition, and the Alliance for the Great Lakes offer perspective from the environmental side. The Chicago Department of the Environment, the Great Lakes Fishery Commission, the Great Lakes and St. Lawrence Cities Initiative, and the University of Toledo's Lake Erie Center are heard from as well. For legal guidance, concerned parties refer to the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (revised as the National Invasive Species Act of 1996, revised as the National Aquatic Invasive Species Act of 2007); also, to the Asian Carp Prevention and Control Act of 2006.

Man proposes, carp disposes. Through waving weedbeds of bureaucracy and human cross-purposes, the fish swims. Starting in 2009, tests for Asian-carp DNA in Chicago waters indicated that the fish might have moved beyond the barriers. In February of 2010, the state of Illinois, hoping to calm its neighbors, began an intensive program of fishing for actual fish with electroshocking and nets, while the DNA tests continued. These efforts turned up more DNA but no fish. In March, the Illinois D.N.R. announced that six weeks of searching had found no Asian carp throughout the entire Chicago Area Waterway System. Then, on June 22nd, a commercial fisherman working for the D.N.R. netted a

nineteen-pound-six-ounce bighead carp in Lake Calumet, thirty miles beyond the electric barrier and six miles from Lake Michigan. Between this well-fed, healthy male Asian carp and the Great Lakes no obstacle intervened.

If the neighbors had been worried before, they began to sweat and hyperventilate now. Outcries of alarm came from officialdom in Minnesota, Wisconsin, Michigan, Ohio, Pennsylvania, and New York, as well as from Canada. Michigan's attorney general, Mike Cox, brought suit in federal district court to force the Corps of Engineers and the city of Chicago to close the locks immediately. Four other Great Lakes states, but not New York, joined on Michigan's side; two previous lawsuits for the same purpose had already failed. The Senate Energy and Natural Resources Subcommittee on Water and Power held hearings on the federal response to Asian carp. The governor and the attorney general of Ohio called on the President to convene a White House Asian Carp Emergency Summit. Dave Camp, a congressman from Michigan, proposed a piece of legislation he called the CARP ACT, for Close All Routes and Prevent Asian Carp Today.

Senator Dick Durbin, of Illinois, announced that he had asked the President to appoint a Coordinated Response Commander for Asian Carp, and the President had agreed. This so-called "carp czar" was to be chosen within thirty days. The President made clear that he had a "zero tolerance" policy for invasive species. Senator Kirsten Gillibrand, of New York, announced her support for another anti-carp bill, the Permanent Prevention of Asian Carp Act. Michigan's Mike Cox accused Obama of not doing enough about the problem because he sympathized with his own state of Illinois. (Cox, a Republican, is running for governor.) Senator Carl Levin, Democrat of Michigan, sent Obama a letter asking him to act quickly to protect the Great Lakes from Asian carp, and thirty-two representatives and fourteen senators added their names.

Unlike Romeoville, the place where the apocalyptic bighead was caught is quiet. To some, it might even be paradise. The part of Lake Calumet in which the commercial fisherman netted this carp doubles as the water hazard beside the concluding holes of a luxury golf course called Harborside, rated by Golfweek as the third-best municipal golf course in the country. One afternoon, I walked some of the course. To play eighteen at Harborside on a Saturday or a Sunday costs ninety-five dollars; new S.U.V.s filled the parking lot. Several of the raised tees provided a panoramic view of the Chicago skyline, while the surrounding Rust Belt ruins and ghetto neighborhoods of south Chicago just beyond the fence seemed far away. I asked employees at the clubhouse golf shop, waiters in the restaurant, a bartender, and a man tending the greens, but none had heard of the nation-shaking carp netted here two months before.

The reason the fisherman happened to be fishing there in the first place was that a team of scientists from Notre Dame had already found bighead carp DNA in the water. Working for the Corps of

Engineers, the university's Center for Aquatic Conservation has been doing DNA tests for more than a year. As part of the increased tracking of Asian carp, the Notre Dame scientists collected samples from bodies of water all over Chicago. David M. Lodge, a professor of biology, heads the center. I stopped by South Bend to see him on my way back from Illinois.

Professor Lodge is a tall and genial man in his fifties, with a Southern accent, blue eyes, and a D.Phil. in zoology from Oxford University, which he attended on a Rhodes. He wore a yellow tennis shirt with his ballpoint pen and mechanical pencil stuck neatly in the button part of the neck, an innovation I admired, because I was wearing the same kind of shirt and had compensated for its lack of breast pocket by putting my pens in my pants pockets, always an awkward deal. He asked if I was writing something funny on carp. I said I probably was. "I know you can't not laugh when you see the silver carp jumping all over the place, but it's really not funny," he said. "It's a tragic thing, and people are wrong to trivialize it. We should focus on these fish's potential environmental and economic impact. In the Great Lakes—just as we're seeing now in south Louisiana—the environment is the economy. Look how the degrading of Lake Erie in the sixties and seventies contributed to the decline of Detroit and Cleveland and Buffalo. To people who say this is a question of jobs versus the environment, I say it's not either-or.

"The bigger issue is how we as a country protect ourselves against invasive species. At the moment, we are not very good at preventing invasions. We're constantly reacting after it's too late. Most invasions, if detected early, can be stopped, because establishing an organism so it's viable in a new environment is not automatic. Our current approach is more or less open-door. Right now, the canal-and-river passage across Illinois from the lake to the Mississippi is a highway for the dispersal of organisms. The Great Lakes is a hot spot for aquatic invasions. In the lakes there are a hundred and six species non-native to North America that are not in the Mississippi, while there are only fifty in the Mississippi that are not in the Great Lakes. An even greater threat, really, is of invasions going in the opposite direction from the carp's—that is, going from the lakes to the Mississippi. The Mississippi system holds the richest heritage of biodiversity in North America. The electric barrier at Romeoville was built originally to stop a small invasive fish called the round goby from coming south—too late, as it turned out, because today the round gobies are established in the Illinois. A later invasive, the tubenose goby, does appear to have been stopped. So the barrier may have helped. But over time it will not be able to stop everything.

"As for the Asian carp and the lakes, worst case is they're already established there. We wouldn't necessarily know. Usually, the first sign we have that organisms are invading is that members of the public see them. But people aren't underwater, and netting and electroshocking are not good tools for finding out what's going on in a body of water, especially not in one as big as Lake Michigan."

To explain more about how DNA testing for Asian carp works, David Lodge led me to the office of his colleague Christopher Jerde, a brown-haired South Dakotan who helped develop the technique. I did not follow all the science of it. Essentially, the technique uses DNA found in water samples to determine what species might have been present, just as DNA evidence can suggest that a person was at a crime scene. The DNA sequences in water samples are not followed to the point where individual fish are singled out, but that could be done, too. Christopher Jerde said that people who wanted to ignore the carp problem kept pooh-poohing Notre Dame's DNA findings before the confirming bighead carp was caught. They argued that the DNA could have been carried in on a duck's feathers, or something. But in places where his team got multiple positive hits he knew the fish had to be there. When he was proved right, he took no pleasure. The carp invasion only makes him mourn.

Some planners who take a long view believe that the Midwest's invasive-species problem requires a bold solution: the complete separation, or re-separation, of the Great Lakes from the Mississippi at Chicago. This huge infrastructure project would consist of concrete dikes, new shipping terminals, new water-treatment facilities, maybe barge lifts to transfer freight, maybe the re-reversing of Chicago's wastewater flow so that it no longer goes south. Business interests tend to hate this idea. I asked Jerde about it, and he said, "Right here is where you could put something like that," and called up a Google Earth photo of Chicago's South Side on his computer. "This empty area here is a Rust Belt nowhere left over from old Chicago," he said. "The main hub of a new shipping and hydrological arrangement for Chicago could go right here." As it happened, the brown and empty region he indicated on the satellite photo was not far from the green oases of the Harborside golf course.

"Well, we don't have opinions on policy," he continued. "We just provide the data. We give it to the Corps or the D.N.R., and they present it to the people who make the decisions, and it's out of our hands. When people were coming up with all those supposed rebuttals to our findings, we couldn't defend ourselves. It's frustrating. People either say we're wrong or exaggerating, so there's no problem and there's nothing we need to do, or else they turn around and say it's too late, the carp are already here, so there's nothing we can do. I don't know whether we can stop these fish, but if we do nothing I can guarantee this problem and plenty of others will get worse.

"Now, let me just show you a few of the places where we've had positive DNA hits for Asian carp." He touched a button on his computer and little yellow thumbtack-like circles appeared on the Google Earth photo. They followed the Ship Canal, they appeared in the Grand Calumet and Little Calumet Rivers, they clustered at the south end of the Romeoville electric barrier—proof that it was stopping fish, he said. "Last summer, we had a positive hit here, in Calumet Harbor, which is separated from the lake only by a breakwater," he said. Then he moved in to a closer view of Chicago's downtown. "We also got a positive right here." He pointed to a yellow thumbtack at the Chicago River

Lock and Dam, under Lake Shore Drive, about a mile and a half north of the Shedd Aquarium. ♦

ILLUSTRATION: RALPH STEADMAN

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