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The Murky Waters of Non-Human Colonization: Carp, Bass and the Shifting Sands of Lake Andes, South Dakota

By

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As I prepared my remarks for today, the character of Oscar the Grouch entered my thoughts. For those of you without small children at home, Oscar is a resident of Sesame Street and a self-proclaimed lover "of anything dirty, or dingy, or dusty." And for those of you not familiar with carp, one result of carp dominance, especially in small or shallow lakes, is a lack of vegetation and cloudy, turbid water. As I thought about their ability to thrive in – and even create – dirty and dingy water, the image of Oscar kept appearing. In many respects, carp are the grouches of the fish world – at least in this country.

In Japan, China and the Philippines, carp are revered as beautiful, ornamental centerpieces to well-maintained gardens.[1] In Austria and the Czech Republic, their meat is served as the traditional Christmas meal.[2] In Romania, they are sold fresh and frozen in shops and in public squares.[3] In my own hometown of Lincoln, Nebraska, a 2007 newspaper article featured a recent Ukrainian immigrant who is a master carp fisherman. Despite the best efforts of the Nebraska Game and Fish Department to raise the profile and appeal of carp fishing through a Carp-O-Rama event, Vadim Divizinskiy is no danger of

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[1] "No carping from Philippine 'koi' lovers," *Asian Economic News* online, 22 February 1999, http://findarticles.com/p/articles/ mi_m0WDP/is_1999_Feb_22/ai_54026686, accessed 6 March 2008.

[2] "Christmas dinner: the healthy option?" BBC News online, 25 December 1998, http://news. bbc.co.uk/1/hi/special_report/1998/12/98/christmas_and_new_year/238066.stm, accessed 3/1/2008.

[3] Personal communication w/ Brenden Rensink, 2/21/2008; "Fishing Lake Ratuda in Romania," Catsn Carp website, http://catsncarp.blogspot.com /2006/11/fishing-lake-raduta-in-romania.html, accessed 3/1/2008; "Santilliana and Romanian Fish Killers," Fish Madrid website, http://fishmadrid.blogspot.com/ 2006/05/santilliana-and-romanian-fish-killers.html, accessed 3/1/2008.

losing his spot on the shore.[4] Carp are generally considered one of the least desirable fish by American anglers.

While the relative value and utilization of carp shifts as one travels geographically, the same is equally true in the United States if the journey occurs through time. One hundred and eighty years ago the first carp arrived in American streams, placed in the Hudson River by a Captain Robinson. Under Robinson's encouragement, the New York State Legislature extended legal protection in the form a fifty-dollar fine levied against anyone who destroyed the prized and invited immigrant. In an effort to increase the food supply, the U.S. Fish Commission began shipping carp hatchlings in 1877 and within five years the number of requests grew to seven thousand. By 1896 the stocking program was discontinued when any further introductions were deemed unnecessary. It did not take long for the fish to overspread the continent, moving from the ranks of coveted transplant to invasive menace by the 1920s.[5] From the first application in 1934, an active campaign of carp poisoning was underway in lakes and stream across the country by the 1950s.[6] Given their proliferation long after humans deemed them desirable, I pose a question now that we will revisit shortly: Do carp have agency?

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[4] Joe Dugan, "Anglers use Different techniques to catch carp," *Lincoln Journal Star*, 15 July 2007, http://www.journalstar.com/articles/2007/08/02/sports/outdoors/ doc469941 d3bf2aa729282674.txt, accessed 6 March 2008.

[5] The U.S. Fish Commission was established in 1871 under the direction of Spencer Fullerton Baird. W. M. Smallwood & Mary L. Smallwood, "The German Carp, an Invited Immigrant," *The Scientific Monthly*, 29(Nov., 1929), 394.

[6] Louis A. Krumholz, "Some Practical Considerations in the Use of Rotenone in Fisheries Research," *The Journal of Wildlife Management*, 14 (Oct. 1950): 413.

In 1958, the U.S. Fish and Wildlife Service brought the poison campaign against carp to Lake Andes, a large lake in south-central South Dakota on the Yankton Sioux Reservation. Over the course of the twentieth century, the lake has been home to several bass fishing resorts, a state fish hatchery, and a federal wildlife refuge. Today, only the National Wildlife Refuge remains. The town of Lake Andes still holds its annual Fish Days celebration, a holdover from the "bass bonanza" of the early twentieth century, though Lake Francis Case on the Missouri River has long since ascended to prominence as the area's sport fishery of choice. Despite the central role played by fish in the first half of the twentieth century, for most of its existence Lake Andes likely contained no fish.[7]

Dating to the Wisconsin glaciation, an advancing ice sheet carved the bed of Lake Andes some 18,000 to 20,000 years ago – the lake has existed intermittently ever since. When full it forms a rough crescent shape covering 4,700 acres stretching from twelve to fifteen miles, though only a mile and a half wide at its greatest extent with a maximum depth of about fifteen feet. Prior to 1896, the lake relied completely on rainfall and runoff for all of its water from a watershed also determined largely by glacial action. Like other aquatic features of the prairie pothole region – the term used to describe much of the area impacted by the Wisconsin ice sheets – Lake Andes periodically dries up in times of drought. Between 1890 and 1960, this occurred on three separate occasions. Each occasioned significant governmental intervention involving networks of interested parties that fluctuated from the local to the national.

In 1896, the Bureau of Indian Affairs commissioned two artesian wells for the purpose of filling Lake Andes and restoring its capacity to furnish water for Yankton

[7] "Not the First Time our Lake was Waterless," *Lake Andes Wave*, 2 August 1934.

agriculture, stock raising and domestic supply. The BIA contracted with Swan Brothers, a well-drilling company based in nearby Armour. At that time artesian wells were prevalent in the region, with over four hundred completed since 1882. The Dakota artesian basin resulted from the Laramide orogeny, the geological process responsible for the uplift much of the Rocky Mountains and the Black Hills. This igneous eruption raised the layer of Dakota Sandstone in the west and the water trapped further east in essence became pressurized. Artesian wells flowed to the surface without the aid of pumps or windmills, and in many cases actually shot water far into the air. Not only did the water readily rise to the surface, it did so in prodigious amounts. The two wells at Lake Andes combined to produce 3,000 gallons per minute.[8]

As a sidebar, I should point out that geologists employ the term agency to describe the action of glaciers, and presumably the Laramide uplift. The geological agency responsible for the lake's contour and the artesian pressure utilized in its augmentation present an interesting backdrop for considering fish as agents of change. Typical definitions of historical agency as applied to humans include some aspect of intentionality. In order to really have agency, so the logic goes, one must plan or at least be able to envision the outcome. Strictly speaking, such a reading casts events resulting from unintended consequences as outside the bounds of agency. This exclusion could be very troubling for Clio's disciples, as most historians' stock in trade is investigating unintended consequences. Furthermore, every action results in instances of unplanned results, if for no

[8] John Paul Gries, *Roadside Geology of South Dakota* (Missoula, MT: Mountain Press Publishing Company, 1996), 3, 7-9; Kathleen M. Neitzert, *Records of Wells and Chemical Analysis of Ground Water in Charles Mix and Douglas Counties, South Dakota* (Rapid City, SD: U.S. Geological Survey, 1995), 34; Nelson H. Darton, *New Developments in Well Boring and Irrigation in Eastern South Dakota, 1896* (18 Geol, Pt 4-36), 570-71.

other reason than omniscience is simply not one of the human species' attributes. Prior planning cannot be a prerequisite for agency. I'll discuss agency a bit more in my conclusion, so let's return to fish…

The first fish arriving at Lake Andes in the late 1890s came by way of a fish hatchery. The U.S. Fish Commission stocked the lake with 7,000 fish in 1898.[9] Local tradition maintains that bass were introduced at this time under the initiative of private citizens.[10] Whatever their source, the introduced bass thrived. Until 1915, when the state of South Dakota imposed a daily limit of 25 fish a day, a "bass bonanza" existed. Prior to the limit, one fish story has three men catching 300 bass during daylight hours and returning that evening to add 78 more to their daily total. By the mid 1920s, sixteen resorts of varying degrees of luxury lined the shores catering to the needs of sportsmen and sportswomen.[11]

The great success achieved at developing the fishery brought potentially devastating results at the same time. One addition to the lake in 1923 – a South Dakota Fish Hatchery – indicated both trends. Deputy Game Warden Harry Piner promised that in additional to supplying fish locally, the hatchery would eventually supply other Dakota lakes with game fish thereby improving the general satisfaction of the "sporting fellow" while adding

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[9] John W. Harding, "Report of Yankton Agency," in *Annual Report of the Commissioner of Indian Affairs to the Secretary of the Interior, 1898* (Washington DC: Government Printing Office, 1898), 289.

[10] "Delegates from Many Cities at Lake Meeting," *Lake Andes Wave*, 15 June 1933, 1.

[11] Adeline S. Gnirk, *Epic of Papineau's Domain* (Gregory SD: Plains Printing Company, 1986), 204, 210.

considerably to "the food value of the state."[12] Piner would not have forecast the next major development, the near elimination of bass from the lake. During the May opening weekend of the 1926 fishing season, there was fishing for pike, crappies and bluegill though bass did not make the list. An official survey made a month later confirmed what the local paper could not bring itself to print.

Two professors from the University of South Dakota confirmed that overzealous anglers had "largely fished out" the bass by the end of June 1926. They offered an equally dire forecast for the rest of the lake, estimating that within another five years the same fate would befall crappie and bluegill. According to Warden Piner, the professors believed that a shorter fishing season with lower catch limits – in conjunction with the new hatchery – could offer the "salvation of the lake as a fishing resort."[13] Despite enacting some of these recommendations, the lake faced greater challenges with the return of drought.

The future of Lake Andes as a premier recreation destination took a catastrophic turn as drought and carp combined to eliminate sport fishing. By the start of the 1933 fishing season, the local newspaper reported that no fishing whatsoever occurred at what editor G.F. Kane called "a mud-hole full of carp." He blamed "double-crossing" politicians from both parties for the calamity and despaired that the artesian wells should be capped and the lakebed turned over to "farmers, squatters, or homesteaders." Kane averred that at least then the land could generate some tax revenue. The dismal status of the lake and neglect from politicians was more egregious because of the estimated $10,000 added annually to state coffers from fishing licenses sold for Lake Andes. Furthermore, the lake

[12] "Fish Hatchery Started," *Charles Mix County Courier*, 4 October 1923, 1.

[13] "Completes Lake Andes Survey," *Lake Andes Courier*, 24 June 1926, 1.

attracted visitors from surrounding counties and states, bolstering the local economy with their tourist dollars.[14]

As the drought continued, the carp prospered even under low water conditions. In the winter of 1932-33 nearly 600 tons of carp were removed by seining and an equal number were estimated to have died during a cold snap in February.[15] In April, South Dakota Deputy Game Warden O.J. Bailey oversaw the transfer of 500 crappies from Lake Andes to Beaver Lake as the shallow water at the former threatened fish life.[16] Yet in the middle of May thousands of carp remained, a fact more threatening to local fisherman as the spawning season was about to begin.[17] Despite the fishermen's fears, the drought and heat resulted in an ever-shrinking lake causing the death of thousands of fish and creating "a veritable stink hole."[18]

Disgusted by a lack of governmental response, despite urgent and repeated requests, the local citizens of the town organized a regional meeting. In preparation, G.F. Buche, a Lake Andes businessman and civic leader, visited the state capital at Pierre to plead for assistance. He returned with assurances of action; in the meantime the local Issak Walton League sent out a call to eighty cities and towns for a lake restoration meeting to be held on June 13 at Rest Haven, a prominent bass resort. Federal officials also received

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[14] "Some More Double Crossers," *Lake Andes Wave*, 11 May 1933, 1.

[15] "Wild Ducks and Geese Here, Carp Not Gone," *Lake Andes Wave*, 23 March 1933, 1.

[16] "Crappies Taken from Lake Andes to Beaver Lake," *Lake Andes Wave*, 13 April 1933, 1.

[17] "Lake Still Infected with Myriads of Carp," *Lake Andes Wave*, 18 May 1933, 2.

[18] "Dead Fish and Low Water Make Mess of Lake" *Lake Andes Wave*, 8 June 1933, 1.

telegrams asking for a share of the impending public works programs.[19] 170 individuals representing twenty towns attended the meeting, where H.Z. Miller, Rest Haven's owner, outlined a plan to divide the lake into four sections by building three dykes across narrow stretches of the lake. The lake level could thereby be regulated with pumps and any future carp eruptions controlled by draining the offending section.[20] Miller's plan was bold and far-reaching, but the immediate assistance provided by South Dakota proved less transformative.

South Dakota Game Department officials devised a plan to eradicate the carp by manipulating the artesian water flow. By November, the lake had dropped to its lowest level of the past two years, barely three feet deep at its maximum. As the lake decreased, the two wells supplying water to the lake remained at some distance from the shore. Under the plan, the north well, also known as the Spotis well, would be diverted away from the remaining lake bed into a depression formerly within the main lake. In preparation for the plan, during the fall of 1933 the water at the state fish hatchery was kept below normal levels. The other well, adjacent to the fish hatchery, would be diverted into the hatchery reservoir where it could be stored without adding to the remaining area still occupied by carp. A similar method had previously brought success in controlling a carp population at Lake Madison, another South Dakota lake. It was hoped that over the winter months, "cold weather would seal the lake tight and the nefarious carp would smother."[21]

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[19] "Will Hold Big Meeting to Get Aid for Lake," *Lake Andes Wave*, 8 June 1933, 1.

[20] "Delegates from Many Cities at Lake Meeting," *Lake Andes Wave*, 15 June 1933, 1.

[21] "Game Dep't Suggests Way to Dispatch Carp," *Lake Andes Wave*, 16 November 1933, 1.

Despite the diversion plan, continued drought finally dispatched the "last vestige of these (sic) unwanted carp." By the end of July 1934, an extremely hot period brought the lake to a depth of four inches. It seems the diversion plan never materialized, as the *Lake Andes Wave* reported that if the wells near the hatchery could be diverted for two days the water would evaporate completely, thereby destroying any remaining carp eggs and securing a carp-free future.[22] A few weeks later the heat remained so intense that water from the north well flowed onto the sun-baked earth and evaporated. Two other wells previously drilled to augment the lake had stopped flowing, either by the malicious intent of a human or by artesian pressure dislodging sand and other aggregate from below the surface clogging the bore. Two remaining wells near the hatchery continued to produce water, but none flowed into the main body of the lake.[23]

The long awaited government intervention for the main lake occurred when the Civilian Conservation Corp (CCC) began work in August of 1934. Implementing a scaled down version of Miller's partition plan, the CCC built a dyke across the north end of the lake bed, connecting Bass Beach, another large resort, with a gravel road leading into the town of Lake Andes. The dam was designed to be eighteen feet high and thirty feet across with a water gate in the middle to allow overflow into the rest of the lake. The north end would be filed by runoff from Andes Creek as well as water from the Spotis artesian well.[24] Another dyke was constructed soon thereafter, dividing the lake into three units.[25]

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[22] "Carp From Our Lake Have Completely Disappeared," *Lake Andes Wave*, 26 July 1934, 1.

[23] "Not First Time Our Lake Was Waterless," *Lake Andes Wave*, 2 August 1934.

[24] "Building a Dyke and Road Across the Lake," *Lake Andes Wave*, 23 August 1934.

[25] Gnirk, Papineau's Domain, 219.

Months later, a migratory waterfowl refuge provided a new management imperative for the lake. Congressional approval of the Migratory Bird Hunting and Conservation Act of 1934 provided a source of revenue for large-scale wetland preservation.[26] Startling decreases in the overall population of North America birds, to a low of 27 million, provided one powerful justification for the legislation.[27] In January of 1935, John N. Ball, South Dakota director of the U.S. Biological Survey, announced that Lake Andes would be selected as a migratory waterfowl refuge.[28] In May of that year, a new well was drilled to water the refuge and soon a dike was constructed between Owen's Bay, the site of the refuge, and the rest of the lake.[29] The new physical arrangement for the lake foreshadowed a changing legal landscape.

In 1939, the federal government entered into an easement agreement with the state of South Dakota that allowed manipulation of the water level on the main body of the lake while keeping a closed preserve for migratory waterfowl at Owen's Bay. This agreement also allowed hunting on the center section of the main lake, managed by the South Dakota

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[26] David Salvesen, *Wetlands: Mitigating and Regulating Development Impacts* (Washington, DC: The Urban Land Institute, 1994), 39.

[27] Nancy Langston, *Where Land and Water Meet: A Western Landscape Transformed (*Seattle: University of Washington Press, 2003), *92.*

[28] "To Establish Migratory Water-Fowl Refuge," *Lake Andes Wave*, 10 January 1935. Franklin Delano Roosevelt officially signed the order in January of 1936, see Beth R. Ritter, *Dispossession to Diminishment: The Yankton Sioux Reservation*, *1858-1998* (Ph.D. Diss., University of Nebraska –Lincoln, 1999), 156.

[29] "Started to Drill Well," *Lake Andes Wave*, *30 May 1935*, *1;* Gary L. Pearson & Delmar R. Cassidy, "Perspectives on the Diagnosis, Epizootiology, and Control of the 1973 Duck plague Epizootic in Wild Waterfowl at Lake Andes, South Dakota," *Journal of Wildlife Diseases* 33(4): 682.

Game, Fish and Parks commission.[30] The north and south units fell within the management of the U.S. Fish and Wildlife Service. The water still flowed between the sections when the gates were down, though the physical separation was nearly as complete as the legal boundary. The project did not bring an absolute transformation. As federal funds dried up, the dykes across the main lake never met the eighteen-foot height design and the refuge waited years for a full-time manager. Following the appointment of a full-time manager to the Lake Andes Refuge in 1953, the dikes were refurbished and brought within specifications of the original design.[31]

As the waterfowl refuge at Lake Andes gained ascendance, the completion of Fort Randall Dam on the Missouri River offered anglers a compelling alternative.[32] During the first month of legal fishing there in May 1954, 7,500 individuals fished on the newly created reservoir and an estimated 3,700 more fished below the dam.[33] While a larger body of water threatened the viability of Lake Andes from without, drought and carp returned in the late 1950s.

The return of drought again caused the lake to shrink and coincided with a period of carp dominance, but the changing political landscape complicated the options for mediation. The position of the National Wildlife Refuge as a major stakeholder in any management decision, a restriction on artesian well development imposed by the state of

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[30] U.S. Fish and Wildlife Service, "Lake Andes National Wildlife Refuge and Wetland Management District" Pamphlet (Washington, DC: GPO, 1990).

[31] Dick Koback, "First Full-Time Manager on Job for Lake Andes Game Refuge's Needed Face-Lifting," *Lake Andes Wave*, 11 June 1953.

[32] Fort Randall Dam was authorized under the Flood Control Act of 1944, commonly known as the Pick-Sloan Program.

[33] "7500 Fishermen Try Fort Randall Reservoir in May," *Lake Andes Wave*, 24 June 1954, 1.

South Dakota, and pending discussions for creating irrigation districts using water from the Fort Randall reservoir all combined to lessen the power of the Lake Andes fishery lobby. However, Lake Andes commanded attention as an historic fishery and major contributor to the local economy. In September of 1958, Harry Woodward, Director of the South Dakota Department of Game, Fish and Parks, addressed a joint meeting of the Lake Andes Chamber of Commerce and the Laker's Club regarding the low water level.[34]

Unlike the meeting in 1933, governmental officials and scientists attended and contributed to the discussion. In addition to the director of the South Dakota Game, Fish and Parks Department, Ed Johnson, the Federal Aid Coordinator based in Pierre, and Ted Shields, the Missouri River Impoundment Biologist, attended the meeting. The group requested that the state commission an engineering study of the feasibility of enlarging the watershed of the lake in conjunction with adding water from any future irrigation project.[35] The results of the study were not encouraging for the fishing lobby.

A study by the Soil Conservation Service offered little hope for maintaining Lake Andes without irrigation development. According to the report, rainfall supplied adequate precipitation to maintain the lake only five to ten years out of twenty, a conclusion supported by the last sixty years of the lake's history. Artesian water was thought best reserved for domestic supply, while increasing the size of the watershed through diversion ditches or pumping water from the Fort Randall Reservoir were deemed too expensive. Only irrigation development was recommended as a possible solution to the low water

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[34] "Game Director Addresses Lake Andes Group Wed. Evening," *Lake Andes Wave*, 2 October 1958, 1.

[35] Ibid.

levels – a decision that would await protracted negotiations between citizens and the US Bureau of Reclamation.[36] The issue of carp control met with more immediate action.

Over thirty thousand dead carp and bullheads washed to shore of Lake Andes in late September 1958. The US Fish and Wildlife service instigated the carnage by contracting with Duane Sly of Chamberlain to spray toxaphene over 2,000 acres of the south unit of the lake, the only area with water at that time. Toxaphene was originally developed as an agricultural insecticide, though it soon proved deadly to a host of organisms, including fish, birds and human children. Oddly enough, the local citizens were encouraged to collect the dead fish and feed them to hogs and chickens. It was even suggested that when properly cooked, humans could eat the fish. This rather bizarre suggestion is made slightly less perverse by the recognition that the year before the Department of Agriculture had approved toxaphene for use in protecting cattle from insect pests.[37] Though the carp were powerless in the face of a chemical assault, let us return to the agency of carp.

Do carp have historical agency? I have to admit that based on the case of Lake Andes, one could make a case for recognizing or dismissing the fishes' ability to influence events. The fact that they were never formally introduced into the lake makes a compelling argument for carp as active agents of change. In all likelihood, anglers at the end of the day

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[36] "SCS Study Made on Lake Andes," *Lake Andes Wave*, 4 September 1958, 1.

[37] "Carp and Bullheads Killed in Lake Andes," 2 October 1958, 5; George Post, "Effects of Toxaphene and Chlordane on Certain Game Birds," *The Journal of Wildlife Management* 15 (Oct. 1951) 381-386; William R. Hanson, "Effects of Some Herbicides and Insecticides on Biota of North Dakota Marshes," *The Journal of Wildlife Management* 16 (July 1952): 299-308; "Alert on Insecticides," *The Science News-Letter*, 62 (Jul. 26, 1952), 63; "Fish Streams Poisoned by Drained-off Insecticide," *The Science News-Letter*, 64 (Aug. 1, 1953), 69; Richard E. Genelly and Robert L. Rudd "Effects of DDT, Toxaphene, and Dieldrin on Pheasant Reproduction," *The Auk*, 73 (Oct. 1956): 529-539; "News and Notes," *Journal of Range Management*, 10 (Nov. 1957): 292-294.

threw left over minnows from the carp family into the lake. The ability of the fish to outcompete other fish and eventually denude the lake of vegetation from such an inauspicious origin had manifold impacts. Apart from curtailing bass fishing, carp dominance contributed to the construction of two dams across the lake, which directly led to its subsequent partitioning into a bifurcated legal space, controlled by federal and state authorities. Ultimately, however, the same federal government regained the biological upper hand through the application of a versatile insecticide.

If one moves beyond the local space of lake Andes and considers the success of carp on the national level, an unequivocal affirmative is the answer to the question of carp agency. Although toxaphene was the agent of destruction used at Lake Andes, another poison, rotenone, was also developed to deal with carp. Between 1930 and 1950, a staggering number of scientific studies addressed the issues of carp dominance, their effect on vegetation, and impacts on other fish, while the general commitment to poison as a carp eradication measure resulted in several studies which investigated the proper application, efficacy and advisability of rotenone use. The scientific community responded to carp success with an active campaign of research. Indeed, some individual's academic careers were based at least in part on carp studies.[38]

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[38] Despite its length, the following list is far from comprehensive. Alvin R. Cahn, "The Effect of Carp on a Small Lake: the Carp as a Dominant," *Ecology* 10(July 1929) 271-274; "Carp Eat Other Fish Out,"*The Science News-Letter* 16(Oct. 19, 1929): 240; E. P. Clark, "The Occurrence of Rotenone in the Peruvian Fish Poison 'Cube','' *Science*, New Series, 70(Nov. 15, 1929): 478-479; "Peru Restricts Exports of Rotenone Plants," *The Science News-Letter* 26(Nov. 10, 1934): 292; T. H. Langlois, "Survival Value of Aggregational Behavior of Bass under Adverse Conditions," *Ecology* 17(Jan., 1936): 177-178; A. S. Pearse, "Ecology of Lake Fishes," *Ecological Monographs* 4(Oct. 1934): 475-480; John M. Anderson, "Some Aquatic Vegetation Changes Following Fish Removal," *The Journal of Wildlife Management* 14(Apr. 1950): 206-209; J. LeRoy Weier and Donald F. Starr, "The Use of Rotenone to Remove Rough Fish for the Purpose of Improving Migratory Waterfowl Refuge Areas," *The Journal*

In the final analysis, the story of Lake Andes cannot be told without including carp. And a full retelling requires recognition of the ways that carp forced humans to consider and frequently reconsider their priorities. Private citizens, local civic organizations, state and federal government officials, biologists and other members of the scientific community all responded to the presence of carp. The networks extending from their profusion in streams, rivers and lakes across America remain connected by the action of fish. Agency works as well as any other term to define that phenomenon. So, yes, carp have agency.

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of Wildlife Management 14(Apr. 1950): 203-205; Louis A. Krumholz "Some Practical Considerations in the Use of Rotenone in Fisheries Research," *The Journal of Wildlife Management* 14(Oct., 1950): 413-424; C. W. Threinen and Wm. T. Helm, "Experiments and Observations Designed to Show Carp Destruction of Aquatic Vegetation," *The Journal of Wildlife Management* 18(Apr. 1954): 247-251; Donald Mraz and Edwin L. Cooper, "Natural Reproduction and Survival of Carp in Small Ponds," *The Journal of Wildlife Management* 21(Jan. 1957): 66-69; Richard A. Parker, "Some Effects of Thinning on a Population of Fishes," *Ecology* 39(Apr., 1958): 304-317.