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Cacophony of carp—clarifying the unintelligible noise of the carp debate

Abstract

The carp as an icon of political ecology's major themes of the 19th through 21st centuries traces the fish's identity as a "subpar" species-turned American enemy. Images of the carp, beginning from its introduction in 1877 provide a unique and widely disregarded profile of the development of the carp's position within American ecology, namely as an economic resource. The legacy of conservation that characterizes the late 19th and early 20th century transition demonstrates a shift in attitudes toward nature. The purpose of this research is to construct an historical narrative of the carp's introduction and the change in American perceptions of the fish.

Introduction

The Midwest is currently fighting the spread of carp and Asian carp, for the purpose of protecting our current ecology. In the past there has been a lack of distinction between the Common carp and Asian carp, both of which are regarded capable of disrupting present water systems. Media, debates and action often use one term to encompass a variety of carp species, which actually have divergent histories of introduction to the United States, though "invasive" is more discursively designated to the Asian carp. In order to understand the overall political, ecological, and social aspects of carp in the United States we must acknowledge the past and future of carp in order to answer the question: how have the perceptions of carp changed over time in southern Wisconsin?

It is imperative to develop an historical narrative to trace the introduction and progression of Asian carp in the U.S. in order to build an understanding of the social benefits, ecological science, and politics that have shaped the current stances today. The Asian carp scenario must be

situated in terms of a political ecological framework, given the intersections of social, economic, political and national action and attitudes, and thereby calls for a more complete consideration of stakeholders at all levels. This not only reveals how "native preservation" and economic benefit drive current policies, but also profiles the social effects an aversive attitude has upon those who still fish for carp as a food source.

To tackle these issues, we will research the differing effects of the introduction of the common carp and the Asian carp, particularly the reasons for the species introductions as well as their spread throughout the Mississippi River valley. We will also investigate the differing perceptions among the affected government institutions and those with economic investments in fishing markets. Also important is how the policies created to stop the Asian carp impact the economic well-being of fishing operations in the region.

Literature Review

Invasive Species

Invasive species is a term that carries a lot of baggage. These species affect many people and their environments. Obviously a definition for invasive species is critical; however, this can be kind of ambiguous. According to Executive Order 13112 signed by President William Clinton on February 3, 1999, an invasive species "means an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health." An alien species "means, with respect to a particular ecosystem, any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem." This definition is not just ecological, but it has social and cultural elements as well.

Robbins (2004) offers some insight into this with his investigation into the cultural and political conditions in which certain species become successful invaders, and the specific impact species invasion has on human culture and politics. He found that a human altered environment, such as the Mississippi River valley, is more susceptible to invasion. In contrast, an environment with well-established native species and biodiversity is more resistant to invasion (Robbins 2004, 142). Further, the power-laden structure of networks tends to create the momentum for invasion, while human responses can accelerate the incidence of invasion (Robbins 2004, 140).

The main legislation used to combat invasive species is the Lacey Act. Originally signed by President William McKinley in 1900, it aimed at the preservation of game and wild birds by making it a federal crime to poach game in a particular state with the purpose of selling the bounty in another state (Wisch 2003). Today the legislation is primarily used to prevent the importation or spread of potentially dangerous non-native species (Wisch 2003).

Common Carp

The German, or common, carp is native to Asia like the rest of the carp family. They were brought to Europe before the 16th century (Hoffmann 1995, 75) and became abundant across the low-elevation nations, especially Germany. The carp was brought to the United States on May 26, 1877 by the U.S. Fish Commission because they thought it would be a consistent and abundant food source (Smiley 1883, 460). Its introduction to Wisconsin is similar to its beginnings in many areas around the country. A German immigrant named August Specht stocked his pond in Gibson near the Mishicot River with carp (The Manitowoc News 1908). The fish lacked proper attention, and eventually a flood washed the carp into the river allowing them to quickly populate the waterways (The Manitowoc News 1908). This story occurred all over the country and allowed the carp to reproduce in rivers and lakes around the nation.

While the carp was originally introduced to provide a source of food, most people quickly found the fish's meat to be coarse and undesirable (The Manitowoc News 1908). Not only did the fish not provide an appetizing food source, it became a nuisance and a pest to many. According to upstate New Yorkers living on the Chemung River, the carp eat the spawn of young fish far more than other species do (Elmira Gazette 1896). The name "water hogs" had been given to them by some, but enemies of the carp insisted that was an insult to hogs (Elmira Gazette 1896).

Some of the concern about the carp has to do with their ecological impact. The fish stir up the bottoms of ponds and rivers in search of food which leaves the water muddy and the riverbanks ruined. They are also very rapid reproducers and can overwhelm other fish populations. A key issue and potential cause for the carp's negative perception is that they are a very difficult fish to catch because they are actually a very shy and intelligent fish. The carp will, if they feel the hook at all, immediately release the bait (Henshall 1903, 239). The carp's local environment can also be detrimental to fishing efforts. The tendency to appear in shallow, weedy waters makes it difficult to reel in a carp once it bites (Henshall 1903, 240). Also, the tendency for the fish to keep the water muddy by rooting on the bottom doesn't allow it to see the bait, but if the water is clear, the carp will see the fisherman and not go near the bait (Henshall 1903, 241). American fisherman generally do not have the patience to fish for carp when they have many other game fish that are much more easily attainable.

There are other views on the quality of the meat that the carp provide other than those who find it inedible. Smiley (1883, 459) states that the flavor of the carp will be affected by its food and environment. If the water is polluted, as carp tend to thrive in, the meat will taste like it (Smiley 1883, 459). Also, during and for a time after spawning, the carp like all other fish is soft

and unsuitable to eat (Smiley 1883, 459). Because the spawning environment of the carp tends to be shallower water, these unsuitable fish are the ones that people are catching.

While much of the general public views the carp negatively, the U.S. Bureau of Fisheries from 1908 had another take on the fish. They viewed the carp as one of the most common food fishes in the country and they are regularly taken to market in 35 states (Smith 1908). "The introduction of the carp into the United States will remain the leading achievement in fish acclimation in recent times, and, with the exception of the original introduction of the same fish into Europe from Asia, the most important the world has known." (Smith 1908)

The carp's perception in their native Asia is obviously very different than it is the United States. In China, carp is considered before any other fish food and is emblematic of strength and vigor (Henshall 1903, 240). In Japan, carp represent courage and perseverance and are so highly regarded that the name of a professional baseball team is the Hiroshima Toyo Carp. They even have a holiday where the carp is the central figure. Children's Day, held on May 5th, is celebrated by families hanging a carp flag for every male child which symbolize the hope that the boy grows up to be brave and strong like the carp.

Asian Carp

Asian carp originated in China where they are used in aquaculture and are a significant food source. These fish were introduced to the United States in the 1970s and used in aquaculture as fish food and as a biological control for excessive plants, algae, nutrients, and snails. The term Asian carp refers to not one species but to four individual species of carp: Black carp (mylopharyngodon piceus), Bighead carp (hypophthalmichthys nobilis), Grass carp (Ctenopharyngodon idella), and Silver carp (H. molitrix) (Pillay and Kutty 2005, 7). In the 1980s the Black carp, Bighead carp, and Silver carp escaped captivity after flooding and by 2006, all

three had established populations in the Mississippi River Basin. Gradually, these populations migrated north to Illinois. Figs. 1-4 show the distribution of the four Asian carp species throughout the continental U.S.

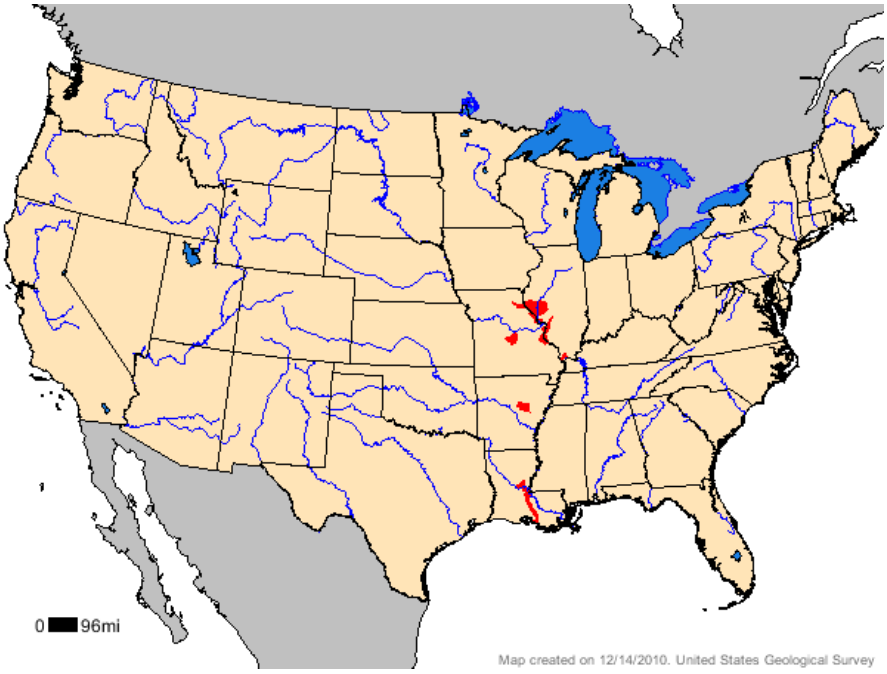

Figure 1: Map showing the distribution of Black carp in the U.S. Red indicates where the species is established. Note how less abundant they are compared to the other Asian carp species (USGS 2009).

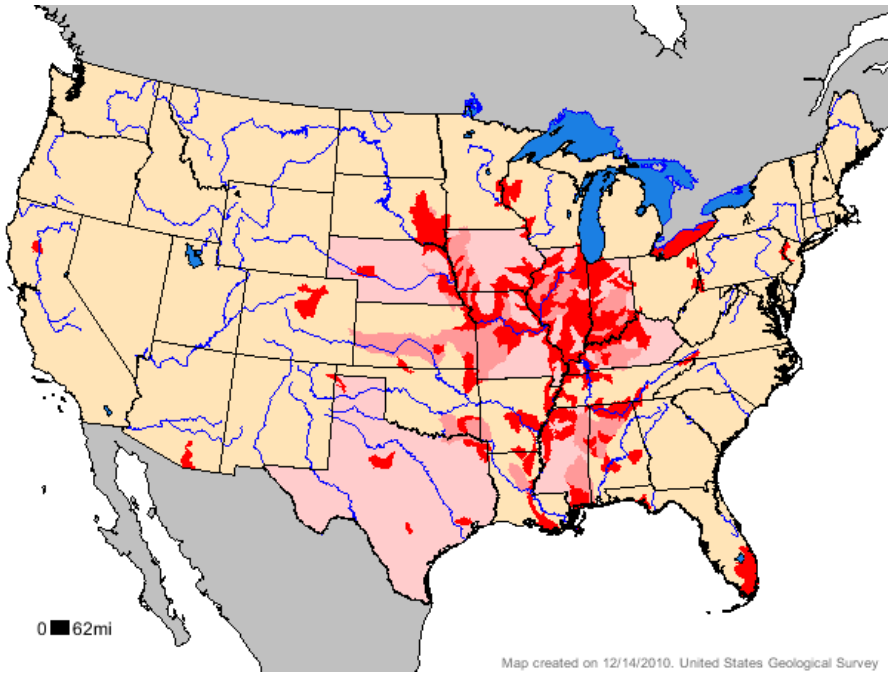

Figure 2: Map showing the distribution of Bighead carp in the U.S. Red indicates where the species is established, dark pink indicates where the species has been found, but is not established, light pink indicates undocumented findings (USGS 2009).

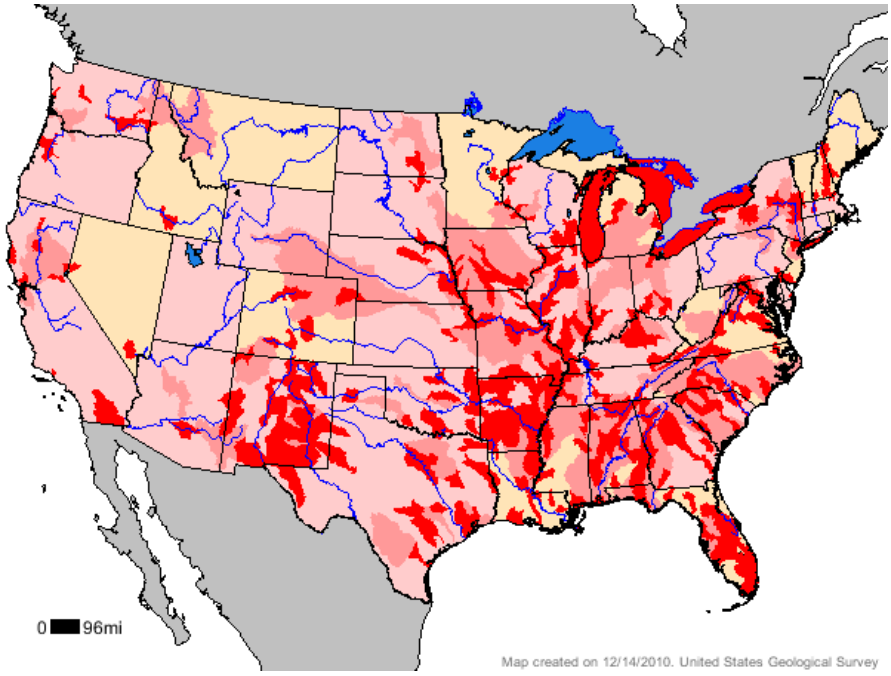

Figure 3: Map showing the distribution of Grass carp in the U.S. Red indicates where the species is established, dark pink indicates where the species has been found, but is not established, light pink indicates undocumented findings. Note how abundant they are compared to the other Asian carp species (USGS 2009).

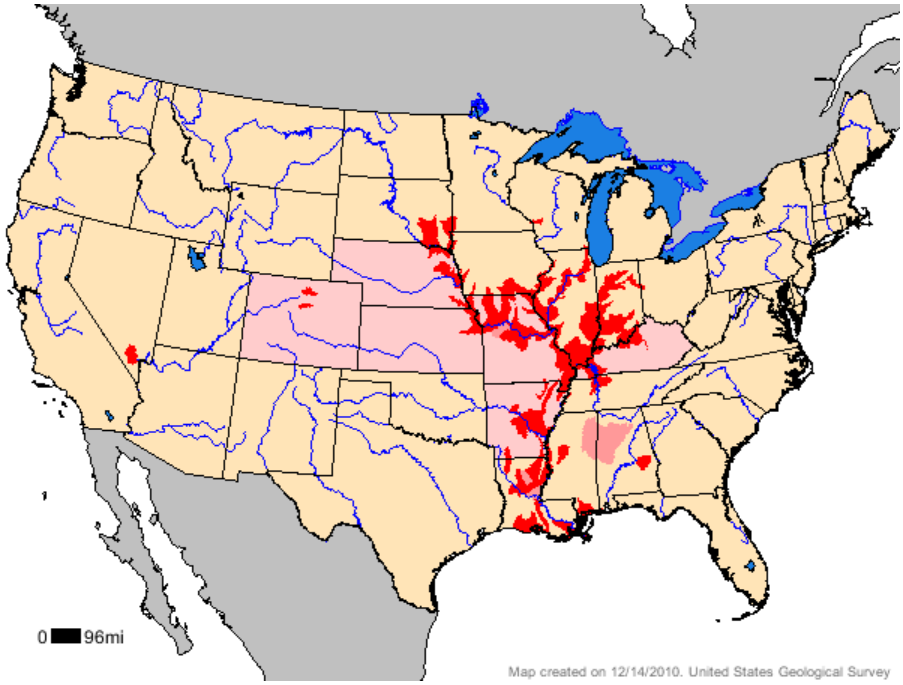

Figure 4: Map showing the distribution of Silver carp in the U.S. Red indicates where the species is established, dark pink indicates where the species has been found, but is not established, light pink indicates undocumented findings. Note how this species has spread to the Illinois-Wisconsin border, but is not seen in the Great Lakes (USGS 2009).

The introduction of Asian Carp has many ecological, economic, and cultural effects on the United States' river systems. The threat of Asian carp invading the Great Lakes creates the possibility of further consequences, as well. As a result, the fish were listed as injurious species, "species that are harmful to the interests of human beings, agriculture, horticulture, forestry, wildlife or wildlife resources." (Sensenbrenner 2006, 2). Unique characteristics such as their reproduction abilities—frequent spawning, dense populations, high-volume feeding at the bottom of the food chain, broad climate tolerance, mobility, and longevity are responsible for the ecological consequences experienced (Conover, Simmonds, and. Whalen 2007, v). In response, Asian carp are seen as a threat to other aquatic organisms because of their potential to monopolize the bottom of the food chain. The scale at which these fish will be able to infiltrate and proliferate in the Great Lakes is under debate, however.

Building upon the fears of Asian carp excluding other organisms from food sources such as plankton, some people worry that the fish's migration into the Great Lakes will result in economic consequences as well. If these ecological consequences are to include mass extinctions of fish that are currently being caught in commercial fishing industries, this industry, which has a value of four to seven billion dollars, could be lost (Sensenbrenner 2006, 2). Despite the existing controversy over economic losses due to Asian carp's introduction to the Great Lakes, some are trying to make a profit from their existence. A local chef in Chicago, Phillip Foss, is serving Asian carp as a delicacy at Lockwood restaurant, and praises the fish for their low levels of Polychlorinated biphenyls, an organic pollutant, and mercury (Vettel 2010, 1).

Asian carp's migration to the Great Lakes and the potential loss of current fish populations has to potential for cultural effects, as well. Recreational fishermen using nets are often overwhelmed by Asian carp, especially if they are larger than the type of fish they are trying to catch. Fishermen are also affected by the Silver carp because of its jumping abilities. At the sound of a boat motor, Silver carp jump out of the water. This can be dangerous to boaters as the large fish sometimes hit them, resulting in injuries (Graham 2010, 1).

Legal reactions to the threat posed by Asian Carp are readily available on both a federal and state scale, becoming more frantic as the species move nearer to the Great Lakes. On the national level, certain species of the Asian Carp were added to the Lacey Act, under the amendment: Asian Carp Prevention and Control Act. The addition of black, silver, and bighead carp to the act "would make it a Federal crime to import or ship…unless the importer has obtained permission from the U.S. Fish and Wildlife Service." (Sensenbrenner 2006, 3) Drastic measures to limit the spread of Asian carp are also prevalent on the state level, evidenced by five states filing suit demanding the closure of locks to separate the Mississippi River basin from the

Great Lakes. Inconsistencies and unsupported claims appear on both sides of the case, and the effectiveness of the current devices in place is nearly impossible to distinguish from the suit. (Lyderson 2010, 29A) Defenders of keeping the lock open claim effectiveness of their electric barriers, even after tests for presence of Asian carp DNA and a live Asian carp were found above the barriers: "There is no place for knee-jerk reactions, unfounded fear of implausible migrations or demonization of regulators who appropriately take a common-sense approach to a complex issue." (Biel 2010) On the other side of the issue, officials range from stating their case on scientific findings, to a blind review of the economic impact of the Great Lakes without even mentioning the likelihood of an invasion. (Egan 2009)

The major solutions to the Asian carp invasion fall under two overlapping categories of management: reducing the number and impact of Asian carp, and preventing their spread to regions such as the Great Lakes. Though not mutually exclusive, most literature regarding solutions to the Asian carp invasion addresses only prevention, while reduction in numbers and impact lacks scientific data for validation. Other solutions such as elimination of the carp and conversion into beneficial products exist, but lack major literature defending their possibilities and impact. The most extensive management plan is proposed by the Asian Carp Working Group, for the Aquatic Nuisance Species task force. This proposal outlines a step-by-step process for management of the Asian carp, including prevention of unauthorized introductions, cooperation at federal and state levels, reduction of current populations and their impacts, education of the dangers of Asian carp, and continued research and implementation of well-informed plans to continue management of the population. (Conover, Simmonds, Whalen 2007) Though the literature is extensive and covers a wide range of solution practices, the piece lacks practical methods for implementation of their goals. The group discusses encouraging the states

to cooperate to manage the populations, but as shown by suits against Chicago, individual state economic interests wholly outweigh such cooperation. Also, the group's goal: "Extirpate, or reduce to levels of insignificant effect, feral populations of bighead, black, grass, and silver carps in the United States," has no scientific evidence to aid in the plan's implementation.

In contrast to the far-reaching yet unfeasible plan put forth by the Asian Carp Working Group, the creation of a carp tsar by the Federal Government makes results possible. Under his oversight and a budget of seventy-nine million dollars, measures to prevent the spread of Asian carp into Lake Michigan have been enacted. "The past year has seen a torrent of measures to keep the Great Lakes free of them…The new carp [czar] should ensure better co-ordination. The Army Corps of Engineers is building fences to contain fish during floods. A new electrical barrier-two already exist-will soon be finished." (Economist 396 2010, 44) Even though greater effectiveness in the battle is shown in this article, the piece is not without flaws. Not only does this piece entirely lack data to suggest the effectiveness of preventative measures, it vacillates on which plan works best, greatly decreasing its credibility.

Yet another problem with the literature written about preventing the spread of Asian carp into the Great Lakes is their assumption without evidence that the lakes can sustain the species. In a piece examining whether or not Asian carp would thrive or even survive in Lake Michigan, research suggested that "low concentrations of plankton in many open-water regions of the Laurentian Great Lakes cannot support growth of silver and bighead carp." (Cooke, Hill 2010, 2150). This study, as the authors admit, contains flaws where data points either were not available, or not applicable to the Great Lakes, and best guesses had to be made. Although the missing data pieces weaken the argument, they are acknowledged and the substitutions defended by the researchers have quantitative evidence themselves. Another weakness in their argument is

that the researchers threw out a probability value that failed their model, simply stating that it was likely just a random error, and not a factor. Despite the problems associated with some of their data, however, this piece is the most thorough in quantitatively determining whether or not the costly preventative measures being taken are even necessary.

Methods

Our project is motivated by some assumptions which we will either prove or disprove through our research. While the issue explored is clearly social, evidence from scientific and economic studies are crucial in tracing the complexity of the carp debate. There are, no doubt, many reasons for the conflation of common carp and "Asian" carp, though we will focus on how compelling the swiftness of this conflation has taken place. Based on inevitable subjectivity of any research project, we are acknowledging our assumptions that, despite ecological certainty as to the detrimental effects of Asian carp in the Great Lakes, planning and attitudes have developed and continue to pervade according to "subtle"(Acheson 2006, 129), yet embedded social factors, such as racial, national and class positionality. Utilizing both poststructuralist and critical realist geographies, we will explore how carp exemplify the processes that determine social positionality, outsiders, native and foreign bodies, and how these are embedded in larger structures of capitalism and ecological mechanization for desired resource extraction (Gomez and Jones III 2010, 18-21).

For the purpose of organizing our research, we have divided information into three sections through which we will collect data from archival research, interviews and data plot comparisons.

The first section of our methodology will involve extensive archival research to construct an historical narrative of the common carp, beginning from its introduction to the United States as a valued commodity that eventually became decommodified through overabundance (Gomez and Jones III 2010, 18), growing distaste and negative social and ecological perceptions. In addition, the Wisconsin Historical Society's image archive can enrich our understanding of cultural values and practices pertaining to carp, and their shift over time—through images we can analyse the connotative themes that produce and reinforce public attitudes.

Conclusive studies on the ecological impact of carp have been difficult to find. As geographers, we must seek first-hand knowledge of the issue, rather than simply rely on media and statements of others, regardless of their reliability. It is our duty to relentlessly pursue the primary sources of information. As it is imperative to compile primary data in one's research for credibility, we are applying the same standard to the carp scenario (Gomez and Jones III 2010). We are concerned that this has been violated throughout the current carp discussion in order to more swiftly put policies into place, perhaps for benefits truly other than the "preservation" of native ecology—a notion that in itself is subject to divergent views and problematic implications for environmental management.

Our second portion of research will construct, as accurately as possible, a scientific progression of carp throughout the centuries. Studies and experiments available in the archives will both help to distinguish differences among common carp and the Asian carp species, and detail changes in ecological approach throughout the time span studied. Interpreting the events that lead up to the "invasive species" designation of carp can also be found through archives that might aid in our deconstruction of the complex motivations found throughout our initial research. Uniting this prelude to the carp's invasive label with discussions with the Wisconsin and Illinois

DNR will take place in order to contrast the carp's ecological position. In addition, we aim to incorporate GIS analyses of the spread of the common carp and silver carp species, introduction to U.S. up to the present. Should we not encounter information, we will attempt to form our own visualization, either to clarify patterns and processes, or to illustrate our research findings.

Carp's position within economics is a central motivation for action in the current invasion hype. The overabundance and competition with more desired game fish help to distinguish the carp in terms of valuation. We will investigate fisheries, commercial fishing ventures and business initiatives through interviews and surveys. In order to further understand the economic dynamics at play, archival research demonstrating the historical shifts in the commodity of the carp can, in addition, construct an economic narrative. While market concerns predominate the discussion on carp, at a social level people have valued, and still value, the fish as a means of subsistence. Archives revealing fishing trends and communities, as well as interviews with local carp fishers will piece together the more inconspicuous valuation of carp, revealing an overshadowed class factor that further complicates the perception of carp (Gomez and Jones III 2010).

Social impacts, perception and discourse pertaining to carp are the least quantifiable features of the carp situation. We must be constantly mindful of the particularity of qualitative findings, and not lapse into generalizations, such as claiming trends in behavior, thereby putting forth biased statements in our final analysis, should we only have a handful of interviewees (Gomez and Jones III 2010). Interviews with local fishers (both carp-seeking and non), while not providing a large pool of data to quantify, can instead situate carp in relation to individuals' social positions within society, revealing a dichotomy that demands attention. Perception can further be identified by the attitudes of fishing organizations and recreational clubs. Participation

and interviews will be geared toward understanding the recreational and eradication mandates of carp fishing and hunting. It will be particularly interesting to hear, first-hand, the justification for aggressive carp eradication and whether how much, if any, state or national pride plays a driving force. This curiosity, of course, must be tempered so as to not guide interviewees' answers or topics of discussion (Gomez and Jones III 2010).

Results

We begin our investigation into the history of the Common carp in the Wisconsin State Historical Society archives. Leon J. Cole known in the field of ornithology undertook some of the first studies into carp culture in 1901, as commissioned by the United States Commission on Fish and Fisheries. The following results are divided according to his correspondence with fishing experts, businesses and local carp observers, as well as his own research on German carp from 1901 to 1903. Cole's correspondence raises questions pertaining to the negative attitudes toward carp despite conclusive ecological assessments, as well as exclusion of carp within the fishing market. Cole's studies were discontinued, and until the emergence of invasion biology mid-century, scientific studies of the carp's ecological effects appear to be sparse, if not absent. In all the literature and resources encountered throughout this research thus far, we have yet to be introduced to this character, however he appears to be the first to undertake field observation specific to the carp under official government commission and from an academic background.

Leon J. Cole was hired in 1901 as a "temporary assistant" by the United States Commission of Fish and Fisheries to study the Common carp's relation to whitefish in Lake Erie. Under direction of Professor H. S. Jennings, Cole sought the counsel of Midwestern academic and business interests in order to garner initial impressions of carp—their patterns of behavior

and the relationship between locals and the fish. His correspondence from 1901-1902 reveals a pivotal moment in the history of attitudes involving the Common carp. It appears the attitude towards the Common carp transitions from an originally favorable perception to one that is more contested.

Only months into beginning his biological survey of the Great Lakes, Cole gained little headway in scientific background on carp. In response to Cole's inquiries, George M. Bowers of the U.S. Commission replied that there was "nothing on carp culture for distribution" in a 24 September, 1901 letter to Cole.

Further unable to find information on carp's food habits, in a 25 June, 1901 response from Stephen A. Forbes of the State Laboratory of Natural History, Urbana, Illinois: "I suppose that your inquiry refers to our biological station operations, but if so I regret that I have nothing to report… the material has not been examined, however, and it is not likely to be before next winter." Forbes response, detailing a lack of information regarding carp, exemplifies the lack of information pertaining to carp at this time.

Forbes' previous statement comes after his 1887 *The Lake as a Microcosm* in which he indexed "the worthless carp" among other species of the floodplain lakes he more factually defined. "The suckers, also, are much less abundant in this region than farther south, the buffalo fishes not appearing at all in our collections. Their family is represented by the worthless carp…" As the paper indexes the "organic complex" of Illinois lake life, detailing species' functions as integral units of a whole community, the "lowly carp" receives no further attention beyond its worthlessness. It is the only species whose functional effect on the whole is left out in Forbes' analysis, leading one to wonder how it therein must disrupt the balanced whole. Forbes' statement about carp is an exception to the otherwise scientific rhetoric of the lakes analysis.

There may be reason for Forbes' replacement of the carp's ecological condition with a value-attribute of "worthless" if we are to take heed of his 1901 reply to Cole indicating the absence of evidence on food habits. As Schneider (2000) points out, Forbes' relies heavily on the local knowledge of fishermen when forming his field techniques and species insight. Forbes' moral assessment of carp without offering conclusive scientific evidence of carp's culture may indicate a response to local opinions.

The absence of research supporting Forbes' statement suggests that the view of carp may have been a widely accepted opinion in these local areas. However, sentiments are not widespread beyond the micro-local. Over in Illinois, J. P. Bartlett of the Quincy, Illinois U.S. Commission expresses surprise at deterrent attitudes in his 10 December, 1901 letter to Cole: "The adverse criticisms astonished me but gradually they came into use as a market fish until to-day I am safe in saying that of all of the fish produced in our inland waters and rivers the carp will bring the fishermen more money than all of their other catch." Cole's correspondence gradually indicates a strong market incentive linked to attitudes toward carp.

In August of 1902, Cole receives letters from Chas E. Bird of the Little Giant Manufacturing Company of Sangatuk, Michigan, and C. J. Dregman of the Holland Business College and School of Stenography acknowledging local distaste of the carp's "plentiful nature." Though Dregman writes of boys killing the carp with pitchforks, that the fish is not the American palate as "our own" game fishes are preferred over the "foreign interloper," he acknowledges that there is no reliable information on the carp's destructiveness on wild celery (on the question of carp's effects on local vegetation). Further, Dregman states his concern that the carp "trespasses on breeding ground," doing them (native fish) no good and possibly much harm. The vagueness of this statement is highlighted again by the lack of conclusive studies on carp

culture. In Cole's initial research on carp in his 1901 "Notes on Cyprinus carpio," he considers that people would raise carp for the market "if it were only allowed."

The language encountered in Cole's correspondence and Forbes' *The Lake as a Microcosm* tends to categorize the carp as a lowly, scavenging and somewhat pathetic species. Forbes' lack of interest for the carp in the lakes analysis reveals the carp's position as hardly warranting of attention in this late 19th century context. His aversion is not a result of the carp's threat to the food chain, which is a suspicion that arises during Cole's investigation and progresses, shaping the modern day carp hype. The perception here falls into an aesthetic reaction to what parts of nature are deemed valuable. In Forbes' lakes analyses, the carp elicits notions of laziness and scavenging—a specimen hardly strong or predacious to be admired as the species Forbes favors in his descriptions (Forbes 1887, 545).

Lending to our understanding of the carp's exclusion from the aesthetic preference of nature during this time, we might invoke John Muir, whose surveys of American landscapes were instrumental in forming appreciation of nature apart from its resource and economic value. Muir's poetic tactics (1901, 3) create an affinity between humans and nature by granting a humanistic agency to nature:

> New plants and animals are enriching woods and gardens, and many landscapes wholly new, with divine sculpture and architecture, are just now coming to the light of day as the mantling folds of creative glaciers are being withdrawn, and life in a thousand cheerful, beautiful forms is pushing into them, and newborn rivers are beginning to sing and shine in them.

Muir hails nature as a sort of conscious being exercising the power to carve out sublime spaces, which is constructed through anthropomorphic language such as "architecture," "creative," "cheerful," "new-born," and "sing." Nature's valuation mirrors standards of human qualities and power. The new moral assessment that arises in ecology during this time accounts for the formation of attitudes unshaped by economic incentives. What this means for the carp is that it

does not have to be considered a non-resource, or a threat to other aquatic resources, to take a low position in the American view of the nature hierarchy. The power of anthropomorphic language then holds that those species within nature that reflect human standards for lowly, undesirable and offensive receive an equally moral judgment.

Forbes contrasts the carp with the alluring virility of other predators, made out to be impressive through his description of their skill (Forbes 1887). The carp's food acquiring habits are framed as unorthodox by human cultural standards—they don't "work" for their earnings. Scavenging, doing the dirty work of cleaning out the muck of the waters, and doing such a good job in the process earns them the title of "water hogs;"(Elmira Gazette 1896) not a respectable means of livelihood. This perception urges one to consider the carp's role in the American palate and its history as a food source.

Evidence from the Bureau of Fisheries, published in articles of the Economic circular throughout the 1900's also provide valuable insight into the changing perception of Common carp within the context of United States' food markets. The first article in which Common carp are specifically mentioned in 1917, for example, shows the beginning of a divergence of opinions regarding the fish, and also evidence of cultural bias against a fish beginning to be seen as "worthless." The Bureau of Fisheries, as one could expect, shows attempts to promote the fish, saying: "Carp are the most abundant, most widely distributed, and most valuable fish in the fresh waters of the United States. The last fishery census gives 43,000,000 pounds as the amount of carp sold in one year." (Economic circular 1917, 1) Statements promoting the sale and consumption of the fish are then juxtaposed with comments showing a negative portrayal based strictly on bias: "Sentiment went characteristically to an extreme in unreserved condemnation of the carp as a food fish, and what might have been indifference became a prejudice" (Economic

circular 1917, 1). With such different depictions of the carp, it is clear that by this time the carp were both widely dispersed and highly subjected to opinions by fishermen throughout the country.

The greatest reason for the dislike of the Common carp seen in the available literature is their bad taste and crowding out of other more valuable species. The Economic circular, in the same issue, demonstrated in their evaluation of a case study from 1902 that the dislike of the taste of carp was both unfounded and purely a social construction: "224 men of the North American Fish and Game Protective Association and representatives of the Fishery Department of 3 Canadian provinces were given carp while being told it was Red Snapper. No one eating the dinner noticed the difference" (Economic circular 1917, 2). Examples such as this are vital in showing that early on in the history of carp in the United States, there was a clear bias against the species, largely based on unfounded reasons.

More evidence was also given from the Bureau of the Fisheries of the options for consumption of carp, from the same article: "Impartial scientific investigation…has shown that the carp is of high food value, is acceptable and palatable when properly prepared, is not particularly harmful to other fishes, is one of the fish freest from parasites, is easily handled and shipped, and is one of the most prolific fishes found in America" (Economic circular 1917, 2). Following this quotation, a list of possible recipes for the cooking of carp encompassing a wide range of preparation techniques including baked, stewed, fried, boiled, among many others, shows the diverse options for consumption that carp provide. Additionally, the clear promotion of the carp also shows the prevalence of negative opinions of the fish, as the Bureau appears to need to "sell" the fact that carp are beneficial and provide a multitude of options.

Interestingly, the next article from the Bureau of Fisheries published only one year later is void of any mention of negative attitudes towards the carp. This, coupled with mentions of shortage due to the war, suggest that bias against the fish can be set aside when an overriding factor plays a role. In this case, attempts at rationing and home-growing food supplies to save ordinarily commercial products for soldiers causes a surge in carp production and distribution. This change is shown in the detailed discussion of how to raise and prepare carp in ponds, giving step-by-step details from the preparation of the pond to distribution of the prepared fish in a local market. Though other fish certainly could have aided in filling the void from the war, the Bureau chose to promote the carp for one clear reason: "Of all the fishes suited to pond culture, the carp is the one most likely to produce results…" (Economic circular 1918, 1) In the next year, another article was published which again showed no negative opinions of carp, which described process for catching carp in open waters. Though this was less descriptive, as it involved a less complicated process, it is important to note that it was published well after the Armistice which ended World War I, showing a possible surge in positive attitude toward carp following their promotion during the war.

The latest historic mention of the carp written by the Bureau of the Fisheries was found in the Fishery Circular from 1935. This piece fails to mention negative attitudes towards carp, but like in the earlier articles tries to promote the fish and give new recipes for their consumption, showing the possible need to generate more support for the species which was no longer needed to support a food shortage. Another possibility for this piece is that it was written in response to the growing economic depression, which would have likely caused a need for production and consumption of cheap foods for unemployed or poverty-stricken families. The particular cause

for publication of the article is irrelevant, however, as they both would be driven by a diminished importance of a fish that surged in production during the time of World War I.

Through inspection of the Economic and Fishery Circulars throughout the early 20th Century, it is clear that the perception of carp was driven by specific causes. Early in their history, a clear bias against the taste of fish was present, which was proven to be unfounded by the case study conducted in which fishing officials could not distinguish a difference in taste between carp and the more highly regarded red snapper. As time progressed, however, other factors proved to be more important than the bias against the Common carp, as food shortage and rationing attempts during World War I created a need for the promotion of production of the fish at a small-scale local and private level. Additionally, the publishing of more recipes for carp in 1935 perhaps shows another period of need for cheap and available foodstuffs, as the Great Depression caused high unemployment and severe poverty.

From our interview with a Wisconsin DNR Ichthyologist and Fisheries Research Biologist, attempts at eradicating common carp throughout the latter half of the 1900s were shown, along with their motives and level of success. Three major attempts have been undertaken to either eliminate or limit common carp in Wisconsin, by both official DNR actions and by private organizations. The most widely implemented attempt at limiting the populations of Common carp are the DNR's contracting of commercial fishermen to catch mass quantities of the fish, which they are both paid for and allowed to sell for further gains. This management plan, implemented most between the 1930's and the 1960's, is still in effect and is used as an exception to the limits of commercial fishermen to operate in inland waters. In the Madison area, especially Lake Wingra, fishing operations are encouraged and paid to catch Common carp and to sell the product to fisheries or other markets. Another means of controlling the population of

the carp, though used more as a last-resort attempt, is the poisoning of bodies of water to eliminate all species, and the replacing of desired species into those areas. Though this has occurred in Wisconsin, according to the official, such action is both drastic and sometimes fails, as Common carp are among the most resistant to poison and can at times survive the attack. The third attempt at limiting the population of Common carp in Wisconsin is the use of barriers to control movement. Although the extent of the species is all over the state, the selective blocking of specific spawning areas, according to our interviewee, using barriers such as dams and electrified spots, greatly limit's the growth of populations throughout the state.

In terms of positive attitudes towards Common carp, there is a small following with regards to fishing for the species, by traditional techniques or bow and spear fishing, but these fishermen represent a relatively small portion of the total, and other game fish such as walleye are much more popular. Though commercial fishing is not allowed except by contract in inland waters, it is allowed both on the Great Lakes and on the Mississippi River. In the Great Lakes, no fisheries are dedicated to the catching and selling of Common carp due to their relatively small population in the lakes. On the Mississippi River, however, a large fishery is present which processes and sells carp for profit. Though this fishery takes in large amounts of fish, the small profit margin of carp compared to other fish species causes decreased productivity.

Because of their absence from Wisconsin, Asian carp are more difficult to discuss in the same manner as Common carp. The methods of prevention and risks associated with the spread of Asian carp into the Great Lakes and Wisconsin rivers are a much discussed issue. As the fish are present in areas as near to Wisconsin as rivers near Chicago, much is being done to prevent their spread into the Great Lakes. According to the DNR representative, the reasons for Asian carp being the top priority are simple: "We prioritize based on two simple factors, analysis of

the likelihood of their spread into Wisconsin waterways, and potential damage that their spread would cause. Due to the high probability of both damage and survival in the Great Lakes, Asian carp must be a priority." With this in mind, along with the simple fact that Asian carp are so close to entering Wisconsin waters, it can be seen that factors other than unfounded bias against the species act in determining the preventative actions taken.

Additionally, according to the experience and information gathered by the interviewee, there is evidence that the barriers at the locks which connect the Mississippi River Basin and the Great Lakes are insufficient to hold the fish out. As evidenced by both DNA from the fish found on multiple occasions past the barriers between Chicago waterways and the Great Lakes, as well as the fish themselves, the DNR considers that without further action, the current preventative measures will be inadequate to keep Asian carp from entering Lake Michigan. When discussing the economic cost of shutting down the lock compared to the economic loss associated with the possible crowding out of game fish in Wisconsin from expansion of Asian carp, the official discussed that it was clear that all parties except Chicago, who use the lock for transportation between the two bodies of water, would benefit greatly from the closing of the lock, and that the net benefit would likely be positive even with increased transportation costs.

While discussing the educational information available to the general public regarding Asian carp, the DNR official stated that Wisconsin has not posted flyers related to the fish yet due to their official absence, but that Illinois has materials posted in major fishing locations as well as on their website.

A further method of primary data collection focuses on the field of invasion biology which emerged rapidly in the mid-twentieth century. We conducted a search using the Web of

Science and JSTOR to illustrate the rise in literature on “invasive species” through the decades, beginning in 1960 (Figs. 1 and 2). The data is displayed on a logarithmic scale, with the x-axes representing decade and the y-axes representing the number of search hits.

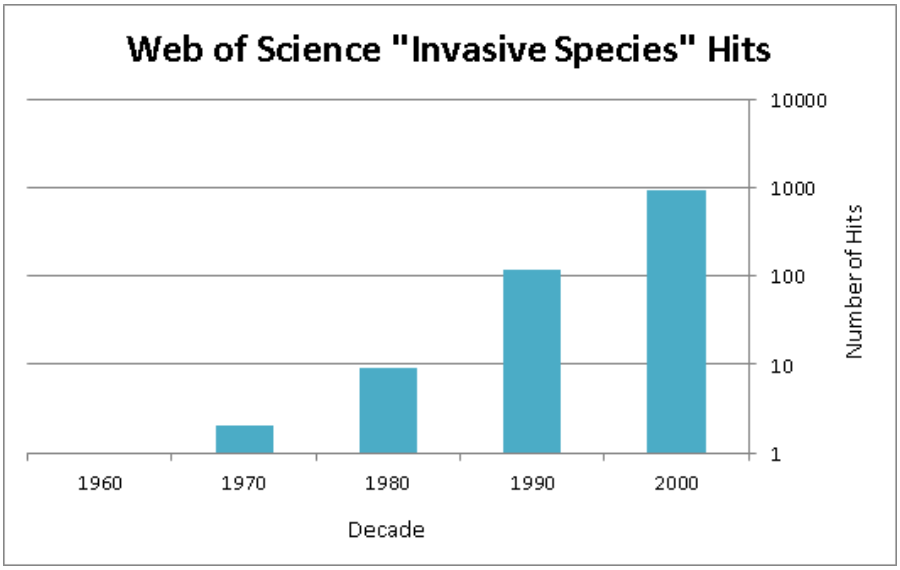

Figure 1: Number of hits when searching “Invasive Species” in Web of Science by decade. This shows how the term has increased in use exponentially.

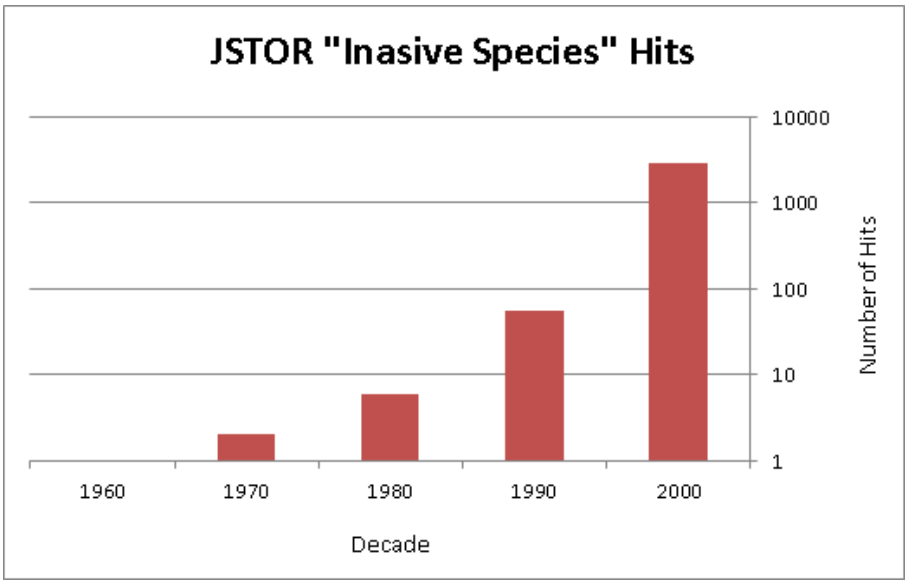

Figure 2: Number of hits when searching “Invasive Species” in JSTOR. This shows the same trend as Figure 1.

These graphs show how the term “invasive species” has garnered increased attention throughout the years. Both graphs display the same general trend, showing that the number of

hits has exponentially increased during the past 40 years. This is relevant to the changing perceptions of carp throughout the last century because there would presumably be a correlation between people's perceptions of carp, which is listed as an invasive species, and the attention invasive species in general are gaining from the academic world. While these graphs do not directly identify a shift in perceptions regarding carp, they emphasize the idea that invasive species concerns are a new area of research

Future Research

There were many limitations to our project because it was an undergraduate assignment and we had no funding and only one semester to complete our research. If this was not the case and future research was pursued, there are other research approaches we would take to get a better understanding of the changing perceptions of carp.

One approach we would like to take is using GIS to map out the spread of Asian carp and Common carp and track their infiltration into U.S. waterways and particularly Wisconsin waterways, as well. From this type of visual, we would hope to have a better understanding, and in turn relate a better understanding to our reader, of the spread of the two types of carp throughout history in the United States. Through GIS we hope we could also provide a model of future spread of Asian carp in Wisconsin waterways given different management techniques and policies. This would provide us and our reader with a better understanding of how current perceptions and policies affect the future of Asian carp in Wisconsin and could offer insight into the future perceptions of carp as well.

Another research approach we would be interested in pursuing if we had funding available and more time would be to compare the changing perceptions of carp in Wisconsin to

changing perceptions of carp, and invasive species in general, in the greater United States and on other continents as well. Our hope is that by comparing these changing perceptions in Wisconsin with the changes in other areas, we would be able to garner a greater understanding of the possible causes and cultural values that have contributed to the formation of previous, current, and future perceptions of both the Common carp and Asian carp in Wisconsin.

We would also interview more state agencies from other states such as the Illinois DNR. This agency would presumably be the one of the few states who is opposed to closing the barriers between Chicago canals and the Great Lakes given their economic dependence on these waterways. An interview with this agency may provide us with a better understanding of the way economics influence perceptions on carp and other invasive species. We would also interview the other Great Lakes states' DNRs as well to see if their views differed from Wisconsin's at all and try to understand the influencing factors behind these differences. It would also be helpful to interview a DNR from a non-Great Lakes state to see what they are concerned about as well. Another good interview would be an organization such as the Canadian Wildlife Service. Since Canadian waters would also be impacted by the Asian carp's proliferation into the Great Lakes, they may offer a unique insight to the issue given possible cultural and national values. Another good interview source, especially in regard to the Chicago canals, would be the U.S. Army Corps of Engineers because they are the ones that built the canals. Also, groups such as the Environmental Protection Agency, state governments, and the federal government could be helpful to see if they held the same general views as the DNR's, or if there were some differences. Interviews from the state agencies listed in this paragraph may offer more details and provide a better understanding for the changing perceptions of carp and the variables that affect these changes.

Another large interview source for us would be the general public. We would attempt to understand general perceptions through the distribution of surveys. First of all, we would look at how many are aware of the issues surrounding Asian carp. It would be interesting to see what kind of perceptions of carp they held and whether they got them from the media, personal experience, or some other education. We could also travel to the Mississippi River and interview people who might be dealing with the Asian carp already. This would be a very good source of information in regard to what the perceptions of Asian carp are with the everyday people that have them in their waters and how their presence has altered, or not changed, their perceptions of carp.

Fishing clubs and other recreational fishermen could be another target interview group. Since they would generally have more expertise on the subject than the general public, we would see if they had the same views as the general public, or if they were different due to more knowledge about the topic. Recreational fishermen would presumably have alternate motives for preventing (or not preventing) the spread of Asian carp to the Great Lakes, and these motives may tell us something about their perceptions as well. Another interview source would be bow fishers. Bow fishers fish for Asian carp for different reasons, such as money, sport, or satisfaction in killing the fish. It would be very interesting to see what the different reasons are for why the bow fishers go after Asian carp, and their perceptions and opinions regarding the spread of this species.

Another set of interviews that would prove useful would be with people who are trying to make carp commercially viable. Phillip Foss serves carp at a restaurant in Chicago and Philippe Parola is a world-renowned chef who wants to create a carp processing plant in Illinois. We could ask them why they think the carp can be commercially successful and what might be some

difficulties in trying to do this. Each may have had unique experiences with the fish that have shaped their ideas and opinions regarding the spread of the species as well.

Research into the complex position of this fish reveals numerous routes for further investigation. It is curious to note the rise of invasive biology rhetoric that refers to species with militaristic language that grants them greater agency as threats, and elicits emotional reactions for the audience of the resource. The swiftness of invasion biology emerges in close proximity with World War II, during a time that forest fire prevention became associated with the protection of the nations natural resources from foreign threats. Further historical research into these events to reveal either a correlation or causation scenario will enhance the understanding of the position of carp in the American mindset.

Conclusion

Delving into the origins of American perceptions of carp contrast current attitudes; since the late 19th century, the carp has moved from the status as a lowly, undesirable occupant in American waters—a passive menace— to a threatening, exotic species. Each species of carp, from the common to the collective Asian carp, is perceived as disruptive to a more desired aquaculture. Through our research we have identified numerous economic justifications for preemptive control of carp. Though these economic platforms are posed under the mandate to protect our native ecology, the focus on preserving such ecology for its intrinsic value is actually not at the forefront of discussion. Furthermore, we find that the current discourse is void of the discussion of what this term means and how it is a vaguely understood, yet powerful driving factor put forth in public opinion, policies and recreation. Without unpacking the term, measures taken within the upper Mississippi waterways are subject to differing definitions of how the

ecology is "supposed" to function. Through our research we have realized that the history of changing perceptions of carp in Wisconsin is complex and not universally agreed upon.

Works Cited

Acheson, James M. 2006. Institutional Failure in Resource Management. *Annual Review of Anthropology*. Annual Reviews. Page 129. http://www.annualreviews.org/doi/pdf/10.1146/annurev.anthro.35.081705.123238 (Last accessed 26 October 2010)

Biel, Mark. Quoted in State Joins in Asian Carp Suit, by Egan, Dan. 2010. *Milwaukee Journal.* http://www.jsonline.com/news/wisconsin/98753699.html (Last accessed 26 October 2010)

Camp, David L. 2010. Until You Beat Them, Eat Them. US Federal News Service, Washington D.C. 10 September 2010. http://proquest.umi.com.ezproxy.library.wisc.edu (Last accessed 26 October 2010)

The Carp Tsar's Struggle. *Economist* 396, no. 8701. 25 September 2010: Page 44. *Academic Search Premier,* EBSCO*host* (Last accessed 26 October 2010)

Cole, Leon J. "Correspondence (1901-1902)," Wisconsin State Historical Society Archives.

Cole, Leon J. "Research on German Carp (1901-1903)," Wisconsin State Historical Society Archives.

Conover, G., R. Simmonds, and M. Whalen, editors. 2007. *Management and control plan for bighead, black, grass, and silver carps in the United States*. Asian Carp Working Group, Aquatic Nuisance Species Task Force, Washington, D.C. http://www.anstaskforce.gov/Documents/Carps_Management_Plan.pdf (Last accessed 26 October 2010)

Cooke, S. L. and Hill, W. R. 2010. Can filter-feeding Asian carp invade the Laurentian Great Lakes? A bioenergetic modelling exercise. *Freshwater Biology* 55: 2138–2152 http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2427.2010.02474.x/abstract (Last accessed 26 October 2010)

Clinton, William J. 1999. Executive Order 13112. *Invasive Species.* Federal Register, Vol. 64, No. 25. 3 February 1999. http://www.archives.gov/federal-register/executive-orders/1999.html (Last accessed 26 October 2010)

Economic circular no. 31, 26 September 1917

Economic circular no. 39, 18 January 1918

Elmira Gazette, 1896. *German Carp in the Chemung River*. Elmira, NY, 30 July 1896. http://query.nytimes.com/mem/archive-free/pdf?res=FA0612FB395F1B738DDDA90B94DF405B8685F0D3 (Last accessed 26 October 2010)

Forbes, Stephen A. "The Lake as a Microcosm," Bulletin of the Peoria Scientific Association 87 (1887), pp. 77-87; reprinted in Leslie A. Real and James H. Brown (eds.), Foundations of Ecology: Classic Papers with Commentaries (Chicago: University of Chicago Press, 1991), pp. 14-27.

Gomez, Basil and John Paul Jones III, eds. 2010. *Research Methods in Geography*. New York: Wiley-Blackwell.

Graham, Bill 2010. Anglers asked to help half hazardous fish. Missouri Department of Conservation. 12 October 2010. http://mdc.mo.gov/newsroom/anglers-asked-help-halt-hazardous-fish (Last Accessed 26 October 2010)

Henshall, James A., M. D. 1903. *Bass, Pike, Perch and others*. New York The MacMillan Company. http://books.google.com/books (Last accessed 26 October 2010)

Hoffmann, Richard C. 1995. Environmental change and the culture of common carp in medieval Europe. York University. http://www.criticalimprov.com/index.php/gir/article/viewFile/26/67 (Last accessed 26 October 2010)

Lyderson, K. 2010. Carp Invasion May Prompt Changes to Waterways. *New York Times*, 17 October 2010. Page 29A. *Academic Search Premier*, EBSCO*host* (Last accessed 26 October 2010)

The Manitowoc News, 1908. *[Brot] the First German Carp.* Manitowoc WI, 16 September 1908. http://www.wisconsinhistory.org/wlhba/articleView.asp?pg=1&id=10236&key=carp&cy (Last accessed 26 October 2010)

Pillay, T .V .R., and Kutty, M. N. 2005. *Aquaculture: Principles and Practices*. Blackwell Publishing. (Last accessed 26 October 2010)

Robbins, P. 2004. Comparing Invasive Networks: Cultural and Political Biographies of Invasive Species. *Geographical Review* 94(2): 139-156. http://onlinelibrary.wiley.com/doi/10.1111/j.1931-0846.2004.tb00164.x/pdf (Last accessed 26 October 2010)

Schneider, Daniel W. 'Local Knowledge, Environmental Politics, and the Founding of Ecology in the United States: Stephen Forbes and "The Lake as a Microcosm,"' Isis 91 (2000), pp. 681-705.

Sensenbrenner 2006. *Asian Carp Prevention and Control Act.* 109th Congress, 2nd Session. 20 July 2006. http://frwebgate.access.gpo.gov (Last accessed 26 October 2010)

Smiley, Chas. W. 1883. The German Carp and its Introduction into the United States. *Proceedings of the American Association for the Advancement of Science.* http://books.google.com/books (Last accessed 26 October 2010)

USGS 19 August 2009. *Nonindigenous Aquatic Species*. http://nas.er.usgs.gov/queries/ (Last accessed 14 December 2010)

Vettel, Phil 2010. That Pesky Asian Carp: It's what's for dinner. *Chicago Tribune*, Chicago, IL. 22 April 2010. http://articles.chicagotribune.com/2010-04-22/entertainment/ct-play-0422-vettel-asian-carp-taste-20100421_1_carp-sea-bass-fish (Last accessed 26 October 2010)

Wisch, Rebecca F. 2003. *Overview of the Lacey Act.* Animal Legal & Historical Center, Michigan State University College of Law. http://www.animallaw.info/articles/ovuslaceyact.htm (Last accessed 26 October 2010)

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