Rulemaking to list Black Carp under the Lacey Act

Draft Economic Analysis

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Executive Summary

The U.S. Fish and Wildlife Service published a proposed rule to add live black carp, gametes and viable eggs to the list of injurious wildlife under the Lacey Act. If finalized, the rulemaking would prohibit the importation and interstate transport of all forms of live black carp (both diploid and triploid). An alternative to the proposed rule is to add only diploid black carp to the list of injurious wildlife. Black carp are not marketed as a foodfish nor are they exported by United States (U.S.) farmers. However, they are used by the aquaculture industry to control the yellow grub and *Bolbophorus confusus* in aquaculture ponds. Because sources of domestic black carp broodstock are adequate, the aquaculture industry does not currently import black carp from sources outside the U.S. and most likely will not resume imports. An injurious wildlife listing would not prohibit intrastate transport or any use of black carp within State lines, nor would it prevent the potential for escape in those States where black carp are currently used. Any regulations adhering to the use of black carp within individual States is the responsibility of each State. This report addresses the economic impacts due to prohibiting the interstate transport of live diploid and triploid black carp, gametes and viable eggs.

A variety of data sources are used for this report. Data for aquaculture production and sales are from the 1998 Census of Aquaculture and the National Agricultural Statistics Service which was the only census data available when this report was prepared. Detailed nationwide data for the use and impacts of black carp were not provided or were not unavailable when this report was prepared. Therefore, black carp data are from the USDA Catfish 2003 study (henceforth, referred to as "Catfish 2003") which surveyed 739 catfish operations in the major catfish producing States: Alabama, Arkansas, Louisiana, and Mississippi. These data are extrapolated to catfish producers nationwide.

The discounted 10-year cost for the preferred alternative (listing diploids and triploids) would be approximately $356,000 (2003 dollars, discounted at 7 percent). This cost represents the expected mortality to catfish aquaculture farms that permit black carp and do not have an in-state source for black carp. Detailed data regarding the impact of the yellow grub on the baitfish and hybrid striped bass aquaculture industries were not provided or were not unavailable when this report was prepared. These industries may be more susceptible to yellow grub outbreaks. If black carp no longer reduce snail populations in aquaculture ponds, the yellow grub lifecycle would not be broken and yellow grub occurrences may increase. Furthermore, this estimate does not account for the possible increased costs to use alternative measures to control trematodes. Alternative biological and chemical control methods may have different levels of effectiveness and costs. Alternative biological and chemical control costs were not provided or were not unavailable when this report was prepared. Therefore, the cost estimate likely underestimates the impact of this proposed rulemaking.

This analysis does not calculate the benefits for the 10-year period, as with total industry costs. By prohibiting interstate transportation, this rule would reduce the possibility of the purposeful or accidental introduction and subsequent presence or establishment of black carp populations into ecosystems of the U.S. In addition to native snails, at

particular risk are freshwater mussel populations, which provide educational benefits, improved water quality and ecological benefits, recreational harvests, and mussel shell revenue. The National Native Mussel Conservation Committee has reported that the U.S. mussel shell industry is approximately $40 to $50 million. Mollusk populations in temperate climates nationwide may be at risk from black carp predation based on the availability of food and suitable habitats.

Background

In February 2000, the U.S. Fish and Wildlife Service received a petition from the Mississippi Interstate Cooperative Resources Association to list the black carp under the injurious Wildlife Provision of the Lacey Act. The petition was based on Mississippi River Basin State concerns about the potential impacts of black carp on native freshwater mussels and snails. On October 23, 2002, the U.S. Fish and Wildlife Service received a petition signed by 25 members of Congress representing the Great Lakes region to add bighead carp, silver carp and black carp to the list of injurious wildlife under the Lacey Act.

The Service has the responsibility of prohibiting the importation and interstate movement of those species found to be injurious under the Lacey Act. The regulations contained in 50 CFR part 16 implement the Lacey Act (18 U.S.C. § 42) as amended. Under the terms of the law, the Secretary of the Interior is authorized to prescribe by regulation those wild mammals, wild birds, fish (including mollusks and crustaceans), amphibians, reptiles, and the offspring or eggs of any of the aforementioned, which are injurious to human beings, to the interests of agriculture, horticulture, or forestry, or to the wildlife or wildlife resources of the U.S. Wild mammals, wild birds, fish, mollusks, crustaceans, amphibians, and reptiles are the only organisms that can be added to the injurious wildlife list. The lists of injurious wildlife species are at 50 CFR 16.11-15.

If live black carp are determined to be injurious, then as with all listed injurious animals, their importation into, or transportation between, States, the District of Columbia, the Commonwealth of Puerto Rico, or any territory or possession of the U.S. by any means whatsoever would be prohibited, except by permit for zoological, educational, medical, or scientific purposes (in accordance with permit regulations at 50 CFR 16.22), or by Federal agencies without a permit solely for their own use, upon filing a written declaration with the District Director of Customs and the U.S. Fish and Wildlife Service Inspector at the port of entry. In addition, no live black carp, gametes or eggs imported or transported under permit could be sold, donated, traded, loaned, or transferred to any other person or institution unless such person or institution has a permit issued by the Director of the U.S. Fish and Wildlife Service. The interstate transportation of any live black carp, gametes or eggs currently held in the U.S. for any purposes not permitted would be prohibited. The proposed rule would not prohibit intrastate transport or possession of black carp within States, where not prohibited by the State. Any regulation pertaining to the use of black carp within States would continue to be the responsibility of each State.

The Service published a Notice/Review of Information in the Federal Register on June 2, 2000 as the first step in the rulemaking process. The Service received 124 responses during the public comment period that closed August 1, 2000. A Proposed Rule to add black carp to the list of injurious fishes under the Lacey Act was published in the Federal Register on July 30, 2002 (Volume 67, pages 49280-49284). The Service received 81 comments on the Proposed Rule. In an effort to gather additional economic and ecological information, a notice was published in the Federal Register reopening the public comment period on the proposed rule on June 4, 2003 (Volume 68, pages 33431-33432). The Service received 22 responses during the comment period that closed August 4, 2003.

The aquaculture industry uses a variety of chemical and biological methods to protect farm-raised fish from disease and wildlife. In 1997, the National Animal Health Monitoring System (NAHMS) reported that in regards to sales, disease (49 percent) is the number one cause of loss, followed by wildlife predation (33 percent), at catfish ponds.

Primarily, black carp are used as a biological control for the yellow grub (*Clinostomum spp*.) in the baitfish and hybrid striped bass industries. Yellow grub infect baitfish and hybrid striped bass by infecting the muscle of the fish. As a result, the fish are more susceptible to disease, may have lower growth rates, and mortality may possibly occur if severely infected (Gray 2004). Black carp aid in controlling yellow grub by feeding on snails in aquaculture ponds, thus interrupting the yellow grub's lifecycle.

Black carp are also used as a biological control for *Bolbophorus confusus* in the catfish aquaculture industry. Documented cases of *Bolbophorus* are relatively recent with the first cases documented in the late 1990s. Since 1999, several cases have been documented where the parasitic flatworm, *Bolbophorus confusus,* has infected farm-raised catfish. (Henceforth, *Bolbophorus confusus* and "trematode" will be used interchangeably.) No cure has yet been found, and the disease is controlled only by disrupting the trematode's lifecycle (American white pelican to Ram's horn snail to catfish to American white pelican). Within the U.S., the American white pelican winters along the southern coast, including the States of California, Arizona, Louisiana, Mississippi, Alabama, and Florida. The wintering range also just stretches into the southern border of Georgia. The pelican's breeding range includes California, Oregon, Montana, Wyoming, Colorado, North Dakota, and South Dakota (Evans and Knopf 1993). Because the American white pelican is a protected bird, the parasite can only be controlled by restricting the snail population using a mixture of chemical and biological methods. The primary biological control is the use of black carp in the aquaculture ponds.

Similar to the yellow grub, if the fish is infected with *Bolbophorus confusus,* growth rate is reduced, susceptibility to other diseases is increased, and mortality may occur if smaller fish are severely infected (Avery et al 2001). Once the fish is infected, the trematode will not affect human health because cooking will eliminate the flatworm. Furthermore, skinning of the fish removes most of the cyst. While the actual sale of the

fish may possibly not be impacted, the farmer's profit margin may decrease due to smaller sized fish raised, increased costs for pond treatment, and increased mortality.

Affected Population

Possible affected aquaculture industries include catfish, baitfish, and hybrid striped bass, which in 2000 had gross sales of $480 million, $49 million, and $32 million respectively (NMFS, "Fisheries of the United States" 2001). Baitfish include fathead minnows, feeder goldfish, golden shiners, and other baitfish.

Catfish Production

Nationwide, the number of catfish farms has varied by about 10 percent, ranging from 1,319 farms in 1997 to 1,161 farms in 2003 (Table 1). The water surface acreage used for production has faced greater variability, ranging from a low of about 159,000 acres in 1995 to a high of about 197,000 acres in 2002.

Table 1. U.S. Catfish Production 1995 to 2003

YEAR	Number of Operations (Farms)	Water Surface Acres Used for Production	Total Sales (1,000 dollars)
1995	1,267	158,840	$399,542
1996	1,328	167,340	$425,383
1997	1,319	177,460	$426,827
1998	1,243	171,130	$475,309
1999	1,279	180,865	$489,291
2000	1,252	187,330	$501,400
2001	1,277	195,820	$443,681
2002	1,236	196,760	$409,828
2003	1,161	187,200	$424,925

Source: National Agricultural Statistics Service, USDA, 1995-2003.

Catfish production is not distributed evenly across the U.S. (Table 2). Instead, production is concentrated in four states: Alabama, Arkansas, Louisiana, and Mississippi. These four States have consistently represented about 95 percent of the U.S. aquaculture production since 1995 (National Agricultural Statistics Service 1995-2003). Together, the four major catfish producing States (Alabama, Arkansas, Louisiana, and Mississippi) represent 73 percent of catfish operations, 95 percent of water surface acreage, and 95 percent of total sales. Mississippi accounts for the largest percentage of operations (35 percent), water surface acres (58 percent), and total sales (57 percent) in 2003. In 2003, catfish sales accounted for nearly $425 million.

Table 2. 2003 Catfish Production, by State

State	Number of Operations	Water Surface Acres	Total Sales (1,000 dollars)
Alabama	231	25,500	$85,159
Arkansas	155	34,000	$59,047
California	38	2,400	$7,228
Florida	34	660	$1,208
Georgia	43	960	$1,372
Illinois	12	130	$306
Kentucky	60	570	$1,381
Louisiana	57	9,900	$14,505
Mississippi	405	109,000	$243,176
Missouri	31	1,400	$1,954
North Carolina	46	1,700	$6,118
South Carolina	13	130	$121
Texas	36	850	$3,350
U.S.	1,161	187,200	$424,925

Source: National Agricultural Statistics Service, USDA, 2004.

Baitfish and Hybrid Striped Bass Production

Nationwide in 1998, the baitfish industry accounted for nearly $40 million and the hybrid striped bass industry accounted for $30 million (Table 3). Geographically, baitfish sales are concentrated in the Southern Region ($28.86 million). However, the number of baitfish farms are nearly equally distributed across both the Southern Region and the North Central Region. Hybrid striped bass farms are focused in the Southern Region, where there were 43 farms and $13.25 million in sales in 1998.

Table 3. Regional Distribution of Baitfish & Hybrid Striped Bass Aquaculture Farms (2003 dollars)

Region	Baitfish		Hybrid Striped Bass	
	Farms	Sales ($1,000)	Farms	Sales ($1,000)
Northeastern Region	62	(1)	27	$7,756
Southern Region	104	$28,864	43	$13,246
North Central Region	92	$6,845	15	(1)
Western Region	16	$2,726	3	(1)
United States	275	$39,955	88	$30,031

Source: USDA, 1998 Census of Aquaculture. States denoted by (1) are not included to avoid disclosure.

As shown in Table 5, Arkansas accounted for over 60 percent of the U.S. baitfish sales in 1998. The hybrid striped bass industry is distributed across a number of States with only a few farms each. The States of North Carolina and Maryland have the largest concentration with 10 farms ($1.9 million) and 15 farms ($847,000), respectively.

Table 4. 1998 Aquaculture Production of Baitfish and Hybrid Striped Bass, By State (2003 dollars)

State	Baitfish		Hybrid Striped Bass	
	Farms	Sales ($1,000)	Farms	Sales ($1,000)
Alabama	2	(1)	-	-
Arkansas	62	$24,488	3	(1)
California	7	$2,322	1	(1)
Colorado	4	(1)	1	(1)
Delaware	1	(1)	1	(1)
Florida	2	(1)	5	$1,453
Georgia	6	$284	3	$7
Hawaii	1	(1)	-	-
Illinois	6	$330	1	(1)
Indiana	4	(1)	3	(1)
Iowa	4	(1)	2	(1)
Kansas	9	$64	1	(1)
Kentucky	1	(1)	-	-
Louisiana	2	(1)	2	(1)
Maine	28	$116	-	-
Maryland	4	(1)	15	$847
Massachusetts	4	$18	1	(1)
Michigan	4	(1)	1	(1)
Minnesota	16	$871	-	-
Mississippi	5	$1,084	3	(1)
Missouri	13	$871	2	(1)
Nebraska	4	(1)	1	(1)
New Hampshire	2	(1)	-	-
New Jersey	1	(1)	4	(1)
New Mexico	-	-	1	(1)
New York	14	$159	1	(1)
North Carolina	5	(1)	10	$1,895
North Dakota	-	-	-	-
Ohio	12	$577	3	(1)
Oklahoma	5	(1)	-	-
Pennsylvania	8	(1)	3	(1)
Rhode Island	-	-	-	-
South Carolina	-	-	4	$93
South Dakota	1	(1)	-	-
Tennessee	3	(1)	-	-
Texas	7	$171	5	(1)
Utah	2	(1)	-	-
Vermont	-	-	-	-
Virginia	4	(1)	8	$41

West Virginia	-	-	2	[1]
Wisconsin	19	$2,617	1	[1]
Wyoming	3	[1]	-	-
United States	*275 farms*	*$39,955*	*88 farms*	*$30,031*

Source: USDA, 1998 Census of Aquaculture. States denoted by [1] are not included to avoid disclosure.

Use of Black Carp

State Regulations and Production

Table 5 details individual State regulations concerning the use of black carp. An asterisk denotes States that do not permit any use of black carp. States that prohibit black carp will most likely not be affected by the proposed rule because they already limit the use of black carp.

Table 5. Selected State Regulations Regarding the Use of Black Carp as of 2003

State	***Regulation***
Alabama*	Current Alabama regulations do not allow black carp to be imported, possessed, or released. (source: Jernigan, Joe. "Asian Carp in Alabama." Alabama Department of Conservation and Natural Resources. http://www.dcnr.state.al.us/agfd/fish/fnaasian.html)
Arkansas	Requires a permit for the use of triploid black carp for aquaculture use and a permit for diploid black carp as broodstock for production of triploids. As of 2001, there were about 11 black carp permits.
Florida	The Florida Fish & Wildlife Conservation Commission regulates black carp through the use of permits.
Georgia	The State of Georgia requires a wild animal license to possess, import, transport, transfer, sale, or purchase black carp.
Iowa*	The State of Iowa does not include black carp as an approved aquaculture species.
Louisiana	The State of Louisiana prohibits the possession of diploid black carp.
Mississippi	Mississippi Game and Fish Department – allows the importation of certified triploid black carp by permit. (source: APHIS Aquaculture Industry Report, USDA, Animal and Plant Health Inspection Service, July 2000)
Missouri	The State of Missouri regulates black carp through the use of permits. The Missouri Department of Conservation currently possesses diploid black carp broodstock to provide triploids to in-state farms.

North Carolina	Black carp permits are required from the North Carolina Wildlife Resources Commission.
Oklahoma	The State of Oklahoma requires a permit for the importation and possession of black carp.
South Carolina	Permits are required for the importation, possession, or transport of black carp. There are currently no permits for black carp.
Tennessee*	Diploid and triploid black carp are prohibited
Texas	Diploid black carp are prohibited. Triploid black carp are allowed with a permit.
Wisconsin	Permits are required for the possession of black carp. Currently, there are no permits.

Source: Unless otherwise noted, state regulation information is compiled from Nico and Williams, 2003. An asterisk denotes States that do not permit any use of black carp.

Between 1993 and 1999, the U.S. Fish and Wildlife Service conducted a program to certify the production of triploid black carp. During this time, the Service certified triploid black carp in Arkansas, Florida, Louisiana, Mississippi, North Carolina, Oklahoma, and Wisconsin. Furthermore, Florida, Iowa, Illinois, Louisiana, North Carolina, Oklahoma, and Wisconsin received shipments of triploid black carp while Arkansas, Mississippi, Missouri, and Texas received shipments of diploid black carp (Nico and Williams 2003). Because an injurious wildlife listing does not prevent the intrastate transport of black carp, we assume that States that are capable of producing black carp will not be impacted by the proposed rule. For lack of better data this analysis assumes that the States (Arkansas, Mississippi, and Missouri) that received diploid black carp are capable of producing diploid and triploid black carp. Because Texas now prohibits diploid black carp, the analysis assumes that Texas is not capable of producing black carp.

Possible risk of escape

Flooding of aquaculture facilities is the most likely pathway into the wild, but black carp could also be moved to new locations through interstate transportation, inadvertently sold as bait, escape from bait buckets, intentionally introduced or moved through wildlife predation. According to Nico and Williams, there is only one known record of black carp escaping into U.S. open waters (2003). This event occurred in April 1994 when aquaculture ponds flooded, which caused 30 black carp to escape into the Osage River (Missouri River drainage). No fish were known to be recovered from that event. The first specimen reported captured from the wild was in March 2003 from Horseshoe Lake, Illinois. Analysis of a scale sample from the specimen caught in Horseshoe Lake indicated that the fish was four years old, so that fish did not escape into the Osage River in 1994. Since then, specimens were captured in the lower Red River, Louisiana in April 2004, and in June 2004 in the Mississippi River near Lock and Dam 24 near Clarksville, Missouri (USGS website). On April 5, 2005, a black carp was found in the White River, just north of DeVall's Bluff, Arkansas (USGS website). No tools exist to eradicate black carp from systems like the Mississippi Basin.

Current Prevention and Status of Trematode Infestation

Snail Control

Preventing and controlling the infestation of *B. confusus* is directed toward disrupting the trematode life cycle by eliminating the ram's horn snail in aquaculture ponds. Pond treatment typically includes the use of chemical treatments and biological control species together. Depending on water alkalinity, pond margin treatments include either the application of hydrated lime or copper sulfate (Avery et al 2001). While these chemical treatments can control algae and weeds along the pond margin, they are not an effective choice for the deeper sections of the pond. To control the snail after chemical treatments and the deeper areas, about 10 black carp per acre are stocked.

Within a four State focus area[1], 13 percent of foodsize operations and 12 percent of fry/fingerling operations[2] for catfish production reported problems with snails in 2002. For foodsize operations, snail problems were more prevalent for operations located in the Arkansas, Louisiana, and western Mississippi (19.0 percent) than those operations located in Alabama and eastern Mississippi (7.2 percent) (USDA 2003ab). Because the USDA report does not detail the various types of snail problems, this estimate would represent the maximum number of operations that reported Ram's horn snail problems.

These affected operations used a variety of measures to control snails, as shown in Table 6. In foodsize and fry/fingerling operations, 20 percent and 27 percent (respectively) used measures to control snail populations. For fry/fingerling and foodsize operations, the primary control measures are lime, copper, and weed control. Biological control (which may include black carp) accounts for 3.8 percent for fry/fingerling operations and 1.8 percent for foodsize operations.

[1] The U.S. Department of Agriculture's *Catfish 2003* surveyed catfish producers in Alabama, Arkansas, Louisiana, and Mississippi. As of 2003, these States represent 73 percent of U.S. catfish operations, 96 percent of national catfish sales, and 96 percent of water surface acres used. Due to nationwide data limitations, this analysis uses *Catfish 2003* data as a benchmark.

[2] The *Catfish 2003* study defines fry as "newly hatched fish less than 1-inch long", fingerling are "1- to 8-inch fish, generally larger than fry but smaller than foodsize fish" and foodsize fish are "fish of marketable size, generally more than 10-inches long and up to 3 pounds in weight." Hatcheries tend to harvest their foodsize fish up to 3 pounds in weight. Catfish larger than 3 pounds in weight tend to be used as broodstock.

Table 6. Snail Control Measures

Snail Control Measure	Percent of Operations	
	Fry/Fingerling	Foodsize
Lime	8.6	11.1
Copper	14.5	13.0
Weed Control	7.7	4.6
Biological Control	3.8	1.8
Other Measures	2.3	0.7
*Total**	*26.8*	*19.9*

* The total does not sum because operations may use more than one type of snail control measure.
Source: Part I: Reference of Fingerling Catfish Health and Production Practices in the United States & Part II: Reference of Foodsize Catfish Health and Production Practices in the United States, 2003.

Disease Outbreaks

For foodsize catfish operations in 2002, the most widespread diseases were enteric septicemia of catfish (ESC) (61 percent), columnaris (50 percent), and winter kill (33 percent) (USDA 2003b). Trematodes accounted for a small percentage of disease outbreaks in foodsize operations (4.3 percent) (USDA 2003). Of all foodsize operations, 1.3 percent of ponds experienced trematode outbreaks. For foodsize catfish operations, the severity of the trematode outbreak varied across operations. Table 7 depicts the impact of an outbreak of trematodes in foodsize ponds. As Table 7 shows, nearly 99 percent of the ponds infected with trematodes did not experience any mortality.

Table 7. Average Loss per Trematode Outbreak for Foodsize Ponds

Percentage of Ponds			
None	*Light* (less than 200 lbs)	*Moderate* (200 - 2,000 lbs)	*Severe* (more than 2,000 lbs)
98.7	0.5	0.7	0.1

Source: Part II: Reference of Foodsize Catfish Health and Production Practices in the United States, 2003b.

In fry/fingerling catfish operations, the most common diseases were ESC (53 percent), unknown causes (46 percent), and columnaris (45 percent) (USDA 2003). Trematodes accounted for 1.9 percent of outbreaks in these operations. For fry/fingerling operations that experienced trematode outbreaks in 2002, 1 percent of the stocked fry was lost (USDA 2003a). Small operations stocking less than 1 million fry averaged a loss of 0.1 percent of fry while large operations stocking over 1 million fry averaged a loss of 0.9 percent (USDA 2003a).

Present Damage Due to Trematode Outbreaks: Quantification of Catfish Mortality

This section quantifies the overall present impact of trematodes on the catfish industry, in terms of poundage lost and decreased revenue. In addition to revenue loss, operators also

incur maintenance costs to prevent and control the infestation of trematodes in their ponds. These maintenance costs include the application of lime or copper, testing for snail population levels, and the possible draining of a severely infected pond. While decreased revenue would indirectly affect jobs, employment earnings, and other aspects of the economy, this study does not quantify these effects.

Foodsize Catfish

Poundage lost is estimated by the percentage of ponds impacted by trematodes (Table 7). Because only water surface acreage data is available by State, the average number of ponds is estimated by dividing statewide water surface acreage by the average pond size for foodsize catfish. The current loss due to trematode outbreaks is estimated by applying the data in Table 7 to the average number of ponds (see equations 1 & 2). Minimum and maximum losses were estimated by applying the range of loss for light (0 to 200 pounds), moderate (200 to 2,000 pounds), and severe (2,000 to 55,000 pounds). The upper limit for severe losses assumes that the entire pond is lost[3].

Eq.1 Min. Loss (lbs) = (Avg # of Ponds) *(0.005*0 + 0.007*200 + 0.001*2,000)
Eq.2 Max. Loss (lbs) = (Avg # of Ponds) *(0.005*200 + 0.007*2,000 + 0.001*55,000)

By extrapolating the Catfish 2003 study data nationwide, the impact of trematodes on the industry revenue for foodsize catfish can be estimated (based on 2003 data), as shown by Table 8. Because the majority of catfish is sold to processors, the estimated revenue loss is approximated by the average price per pound. Nationwide, the present poundage impact for foodsize catfish ranges between 47,000 and 970,000 pounds while the revenue impact ranges between approximately $27,000 and $565,000 annually. This impact represents 0.14 percent of the nation's total catfish sales. As a percentage of revenue, the States of California (0.33 percent), Georgia (0.33 percent), and South Carolina (1.0 percent) have the largest impact. In terms of gross revenue, the States of Mississippi and Arkansas have the greatest maximum impact of about $312,000 and $102,000 annually, respectively.

Fry/Fingerling Catfish

The current trematode impact on fry and fingerling catfish is depicted in Table 9. The trematode impact on fry/fingerling catfish is estimated slightly differently than for foodsize catfish due to the data available from the Catfish 2003 study. Rather than measuring the impact by the average number of ponds, the impact for fry/fingerling catfish is measured by the actual number of fish lost. Of the estimated 33.8 percent of fry/fingerlings that will not survive, 0.9 percent of this loss is due to trematodes (USDA,

[3] The Catfish 2003 study defined "severe" as "more than 2,000 pounds". This analysis assumes that a severe outbreak would cause the entire pond to be destroyed. The average commercial harvest ranges between 4,000 and 6,000 pounds per acre annually (Aquaculture in North Carolina Catfish). Average pond size (11 acres) multiplied by the average harvest (5,000 pounds) yields 55,000 pounds lost per pond for the upper limit of a severe outbreak.

2003a). Therefore, the total fry/fingerling fish mortality due to trematodes is (Number of Fish in Inventory) * (0.009) * (0.338). From the estimated number of fish lost, the estimated pounds lost and revenue loss can be estimated.

Nationwide, the present poundage impact for fry and fingerling catfish is approximately 102,000 pounds while the revenue impact is about $133,000 annually (Table 9). This impact represents 0.63 percent of the nation's fry and fingerling sales. As a percentage of revenue, the States of Louisiana (4 percent) and California (2 percent) experience the largest impact. In terms of gross revenue, the States of Mississippi and Arkansas have the greatest impact of about $101,000 and $19,000 annually, respectively.

Table 8. Present Loss at Foodsize Catfish Operations

State	Total Number of Operations[a]	Total Foodsize Sales[a] (thousands)	Water Surface Acres Utilized for Foodsize Production, 2003[a]	Average Number of Ponds (Avg. foodsize pond = 11 acres)[b]	Avg. Price per Pound, 2003[a]	Current Loss due to Trematode Outbreaks (thousand pounds)		Current Loss due to Trematode Outbreaks (thousand dollars)		Current Maximum impact (% of Total Sales)
						Minimum	Maximum	Minimum	Maximum	
Alabama	231	$82,160	22,900	2,082	0.52	7	146	$4	$76	0.09%
Arkansas	155	$55,832	28,500	2,591	0.56	9	181	$5	$102	0.18%
California	38	$7,072	1,810	165	2.05	1	12	$1	$24	0.33%
Florida	34	$1,173	590	54	0.69	-	4	-	$3	0.22%
Georgia	43	$1,040	700	64	0.77	-	4	-	$3	0.33%
Illinois	12	$206	65	6	0.84	-	-	-	-	0.17%
Kentucky	60	$1,288	460	42	0.81	-	3	-	$2	0.18%
Louisiana	57	$14,094	8,600	782	0.54	3	55	1	$30	0.21%
Mississippi	405	$224,010	86,000	7,818	0.57	27	547	$15	$312	0.14%
Missouri	31	$1,462	690	63	0.86	-	4	-	$4	0.26%
North Carolina	46	$5,734	1,480	135	0.61	-	9	-	$6	0.10%
South Carolina	13	$32	70	6	0.72	-	-	-	-	1.00%
Texas	36	$2,969	570	52	0.98	-	4	-	$4	0.12%
U.S.	***1,161***	***$397,072***	***152,435***	***13,858***	***0.57***	***47***	***970***	***$27***	***$565***	***0.14%***

[a]Source: Catfish Production, Feb 2004, NASS, Fact finders for agriculture
[b]Source: USDA 2003b
Totals may not sum due to rounding.

Table 9. Present Loss at Fry/Fingerling Catfish Operations

State	Total Number of Farms[a]	Total Fry/ Fingerling Sales (thousands)[a]	Water Surface Acres Utilized for Fry/ Fingerling Production[a]	Avg. # of Ponds[b] (Avg. fry pond = 7.6 acres)	Number of Fish Inventory 2003[a] (1,000)	Average weight per 1,000 fish[a]	Average Price per Pound[a]	Current Average Loss due to Trematode Outbreaks (thousands)			Max. Impact (% of Total Sales)
								Total Fish	Total Pounds	Total Sales	
Alabama	231	$2,482	1,500	197	50,800	33.9	0.73	155	5	$4	0.15%
Arkansas	155	$1,680	4,200	553	131,000	29.6	1.60	399	12	$19	1.12%
California	38	$100	360	47	6,100	27.9	4.15	19	1	$2	2.15%
Florida	34	$35	45	6	3,300	7.9	1.45	10	-	-	0.33%
Georgia	43	$325	115	15	1,550	29.0	5.00	5	-	$1	0.21%
Illinois[(1)]	12	-	45	6	-	-	-	-	-	-	
Kentucky[(1)]	60	-	95	13	600	43.3	-	2	-	-	
Louisiana	57	$100	1,050	138	30,800	36.4	1.20	94	3	$4	4.09%
Mississippi	405	$15,621	16,800	2,211	753,000	34.8	1.27	2,291	80	$101	0.65%
Missouri[(1)]	31	-	590	78	4,040	22.3	-	12	-	-	
North Carolina	46	$342	140	18	7,540	46.4	1.80	23	1	$2	0.56%
South Carolina[(1)]	13	-	25	3	-	-	-	-	-	-	
Texas	36	$334	105	14	800	40.0	3.34	2	-	-	0.10%
States not included to avoid disclosure		$206			633	25.3	3.07	2	-	-	0.07%
U.S.	***1,161***	***$21,225***	***25,070***	***3,299***	***990,163***	***34.0***	***1.23***	***3,012***	***102***	***$133***	***0.63%***

[a]Source: Catfish Production, Feb 2004, NASS, Fact finders for agriculture

[b]Source: USDA 2003a

Notes: States denoted by [(1)] are included in "States not included to avoid disclosure." Totals may not sum due to rounding.

EVALUATION OF PROPOSED RULE: LISTING DIPLOID AND TRIPLOID BLACK CARP AS INJURIOUS WILDLIFE UNDER THE LACEY ACT.

The Draft Environmental Assessment for Listing Black Carp (*Mylopharyngodon piceus*) as Injurious under the Lacey Act (2004) and the Proposed Rule to list Black Carp (Volume 67, pages 49280-49284) as an injurious species are hereby incorporated by reference; some information from those documents is included below.

Black carp are molluscivores (mussel and snail feeders) and have the potential to negatively affect mollusks, fish, turtles, and waterfowl that rely on mollusks as a food source, if they are introduced to or become established in natural waters. Black carp may be particularly harmful to threatened and endangered mollusks that are already imperiled due to many other stressors. A single black carp could eat more than 20,000 pounds of mollusks during its life.

The introduction or establishment of black carp may have negative impacts on humans primarily from the loss of native aquatic mollusk biodiversity, distribution, and abundance. Based on the food habits and habitat preferences of the black carp, it is likely to invade the habitat, feed on, and further threaten most of the federally listed freshwater mussels and about one-third of the federally listed aquatic snails. Freshwater mollusks play an important ecological role in maintaining the health of aquatic ecosystems. Black carp could impact stream communities where snails play an important role as grazers of attached algae and mussels act as filters for phytoplankton. Reduction of snail and mussel populations in those ecosystems could facilitate production of algae mats that may upset the natural balance of wildlife habitats. These losses would affect the aesthetic, recreational, and economic values currently provided by native mollusks and healthy ecosystems. Educational values of mollusks would also be diminished through the loss of biodiversity and ecosystem health. Black carp also have the potential to negatively affect the cultured pearl industry through predation on commercial mussel species, which are harvested to provide the raw material for cultured pearls.

Because triploid and diploid black carp are likely to escape or be released into natural waters; are likely to survive or become established if escaped or released; are likely to spread if introduced; are likely to compete with native species for food; are likely to feed on native mollusks; and because it will be difficult to prevent, eradicate, manage, or control the spread of black carp; difficult to rehabilitate or recover ecosystems disturbed by the species; and because even non-breeding (triploid) populations of black carp are likely to have considerable negative impacts on native snail and mussel populations, the Service's proposed rule is to list all (diploid and triploid) live black carp as injurious under the Lacey Act

In its draft environmental assessment, the Service considers the alternative of listing only diploid black carp under the Lacey Act, instead of the proposed rule to list all forms of black carp. The Service is seeking additional information about the ecological risk associated with this alternative, the costs and benefits to industries currently using black carp for biological control, and the feasibility of regulating the diploid form only.

Industry Costs: Projected Impacts to the Catfish Industry without Diploid and Triploid Black Carp

Assumptions: The following assumptions pertain to the catfish industry. Those aquaculture farms that permit black carp and do not have an in-state source for black carp may incur industry costs. Detailed data regarding the impact of the parasite on the baitfish and hybrid striped bass industries were not provided or were not unavailable when this report was prepared. However, this report recognizes that these industries may be more susceptible to parasite outbreaks if snail populations are no longer controlled by black carp.

1. The costs of this proposed rulemaking are calculated for a 10-year period, between 2005 and 2014.

2. In accordance with current OMB guidance, total program costs are calculated as a net present value (PV), discounted at 7 percent.

3. Foodsize ponds (1.3 percent of ponds) and fry/fingerling operations (1.9 percent) experienced disease outbreaks of trematodes in 2002-2003 (USDA 2003b). We assume operations that experienced outbreaks did not utilize black carp to control snail populations. Thus, we further assume that the rate and severity of disease outbreaks would continue if black carp use discontinues. This may be an underestimate because 45.3 percent of the surveyed foodsize operations were unfamiliar with trematodes (USDA 2003b).

4. Fry/fingerling operations (3.8 percent of operations) and foodsize operations (1.8 percent) use black carp as a biological control for the Ram's Horn snail (Table 6). The referenced study (USDA 2003) does not specify the types of biological control used; therefore, this analysis assumes the only biological control used is black carp. Thus, this may be an overestimate for black carp use and overestimate the impacts of the rule. We assume that black carp used to control snails wholly prevented trematode outbreaks that would have occurred otherwise because we do not know the extent to which chemical and biological individually contribute to snail control. If black carp use discontinues, then these operations would be more susceptible to trematode outbreaks.

5. All losses are assumed to be complete loss of the fish due to mortality. Each fish is assumed to be of marketable size. Reduced growth is not considered in this analysis. Furthermore, increased susceptibility to other diseases is not considered.

Due to limited data availability, we do not attempt to estimate the increasing rate of the trematode outbreaks over the next 10 years. The cost to remediate a severely infected pond is not quantified. Furthermore, due to limited data availability for the impact of black carp on baitfish and hybrid striped bass, the remainder of this report addresses the impact to the catfish industry. Thus, this report underestimates this impact of the proposed rulemaking.

Expected Costs for the Foodsize Catfish Industry

As noted in Assumption 4, we assume that black carp used to control snails wholly prevented trematode outbreaks that would have occurred otherwise. Therefore, if black carp are prohibited from interstate transport and a State does not have an in-State source for black carp, then that State's catfish production that was using black carp is now susceptible to trematode outbreaks.

Data regarding the percentage of ponds that use black carp are unavailable. Therefore, the following analysis was used. As stated in the Catfish 2003 study, 4.3 percent of foodsize operations (or, 1.3 percent of foodsize ponds) experienced trematode outbreaks. Assuming the same ratio of operations to ponds for utilizing biological controls, 1.8 percent of foodsize operations using black carp yields 0.54 percent of ponds using black carp. We further assume that those 0.54 percent of ponds that are no longer able to use black carp will experience losses to trematodes similar to the rate as those ponds that didn't use black carp[4] (Table 7). The percentage of ponds that no longer utilize black carp will experience light, moderate, and severe losses at 0.21, 0.29, and 0.04 percent, respectively, for a total of 0.54 percent of ponds that will suffer a degree of mortality.

Table 10 shows the annual, non-discounted impact to the foodsize catfish industry. Nationwide, the maximum impact on pounds sold for foodsize catfish would range between about 2,000 and 37,000 pounds while the revenue impact would range between approximately $1,000 and $29,000 annually. The maximum impact represents 0.09 percent of the nation's total catfish sales. As a percentage of revenue, the States of South Carolina (0.40 percent) and Georgia (0.13 percent) would experience the largest impact. In terms of gross revenue, the State of California would experience the largest maximum impact of about $10,000 annually.

Expected Costs for the Fry/Fingerling Catfish Industry

As of 2003, 3.8 percent of operations reported using biological controls to control snail populations in fry/fingerling catfish ponds (USDA 2003a). As noted in Assumption 4, we assume that black carp used to control snails wholly prevented trematode outbreaks that would have occurred otherwise. Therefore, if black carp are prohibited from interstate transport and a State does not have an in-State source for black carp, then that

[4] Table 7 shows that 98.7 percent of ponds that experienced a trematode outbreak did not suffer losses due to mortality and 1.3 percent of ponds that experienced a trematode outbreak suffered mortality losses at various degrees of severity. Our analysis conservatively assumes that the 0.54 percent of ponds that can no longer use black carp will all suffer a degree of loss due to mortality. Ratios were derived from Table 7 to determine the percentage of ponds that will now suffer light, moderate, and severe losses. The derived ratios show that 38.46 percent of ponds with mortality had light losses; 53.85 percent of ponds with mortality had moderate losses; and, 7.69 percent of ponds with mortality had severe losses. Applying these mortality percentages to the 0.54 percent of ponds that can no longer use black carp yields 0.21 percent of ponds with light losses, 0.29 percent of ponds with moderate losses, and 0.04 percent of ponds with severe losses.

State's catfish production that was using black carp (3.8 percent) is now susceptible to trematode outbreaks.

Data regarding the number of fry/fingerling that are dependent on black carp are unavailable. Therefore, the following analysis was used. As stated in the Catfish 2003 study, 1.9 percent of fry/fingerling operations experienced trematode outbreaks resulting in 0.3 percent of fry/fingerlings to be lost. Assuming the same ratio of operations to loss for utilizing biological controls, 3.8 percent of foodsize operations no longer able to use black carp would yield 0.60 percent of fry/fingerlings to be lost.

Table 11 shows the annual, non-discounted impact to the fry/fingerling catfish industry. Nationwide, the expected impact for fry/fingerling catfish would be about 300,000 fish, about 11,000 pounds, and approximately $19,000. This impact represents 0.14 percent of the nation's total fry/fingerling sales. As a percentage of revenue, the States of Louisiana (8.07 percent) and California (4.24 percent) would experience the largest impact. In terms of gross revenue, the State of Louisiana would experience the largest impact of about $8,000 annually.

Table 10. Annual Expected Costs at Foodsize Catfish Ponds (Non-discounted)

State	Total Number of Operations[a]	Total Foodsize Sales[a] (thousands)	Water Surface Acres Utilized for Foodsize Production, 2003[a]	Average Number of Ponds (Avg. foodsize pond = 11 acres)[b]	Avg. Price per Pound, 2003[a]	Expected Costs due to Trematode Outbreaks (thousand pounds)		Expected Costs due to Trematode Outbreaks (thousand dollars)		Maximum impact (% of Total Sales)
						Minimum	Maximum	Minimum	Maximum	
Alabama*	231	$82,160	22,900	2,082	0.52	n/a	n/a	n/a	n/a	n/a
Arkansas*	155	$55,832	28,500	2,591	0.56	n/a	n/a	n/a	n/a	n/a
California	38	$7,072	1,810	165	2.05	-	5	-	$10	0.13%
Florida	34	$1,173	590	54	0.69	-	2	-	$1	0.09%
Georgia	43	$1,040	700	64	0.77	-	2	-	$1	0.13%
Illinois	12	$206	65	6	0.84	-	-	-	-	0.07%
Kentucky	60	$1,288	460	42	0.81	-	1	-	$1	0.07%
Louisiana	57	$14,094	8,600	782	0.54	1	22	$1	$12	0.08%
Mississippi*	405	$224,010	86,000	7,818	0.57	n/a	n/a	n/a	n/a	n/a
Missouri*	31	$1,462	690	63	0.86	n/a	n/a	n/a	n/a	n/a
North Carolina	46	$5,734	1,480	135	0.61	-	4	-	$2	0.04%
South Carolina	13	$32	70	6	0.72	-	-	-	-	0.40%
Texas	36	$2,969	570	52	0.98	-	1	-	$1	0.05%
Total U.S.	*1,161*	*$397,072*	*152,435*	*13,858*	*0.57*	n/a	n/a	n/a	n/a	n/a
U.S. (excluding States* that may produce black carp or prohibit black carp)	***339***	***$33,608***	***14,345***	***1,304***	**--**	***1,800***	***37***	***$1***	***$29***	***0.09%***

[a]Source: Catfish Production, Feb 2004, NASS, Fact finders for agriculture
[b]Source: USDA 2003b
An asterisk denotes States that either prohibit black carp or produce black carp. This analysis assumes that these States will not be impacted by the Rule. Totals may not sum due to rounding.

Table 11. Annual Expected Costs at Fry/Fingerling Catfish Operations (Non-discounted)

State	Total Number of Operations[a]	Total Fry/ Fingerling Sales (thousands)[a]	Water Surface Acres Utilized for Fry/ Fingerling Production[a]	Avg. # of Ponds[b] (Avg. fry pond = 7.6 acres)	Number of Fish Inventory 2003[a] (1,000)	Avg. weight per 1,000 fish[a]	Average Price per Pound[a]	Expected Average Loss due to Trematode Outbreaks (thousands)			Max. Impact (% of Total Sales)
								Total Fish	Total Pounds	Total Sales	
Alabama*	231	$2,482	1,500	197	50,800	33.9	0.73	n/a	n/a	n/a	n/a
Arkansas*	155	$1,680	4,200	553	131,000	29.6	1.60	n/a	n/a	n/a	n/a
California	38	$100	360	47	6,100	27.9	4.15	37	1	$4	4.24%
Florida	34	$35	45	6	3,300	7.9	1.45	20	-	-	0.65%
Georgia	43	$325	115	15	1,550	29.0	5.00	9	-	$1	0.41%
Illinois[c]	12	-	45	6	-	-	-	-	-	-	-
Kentucky[c]	60	-	95	13	600	43.3	-	4	-	-	-
Louisiana	57	$100	1,050	138	30,800	36.4	1.20	185	7	$8	8.07%
Mississippi*	405	$15,621	16,800	2,211	753,000	34.8	1.27	n/a	n/a	n/a	n/a
Missouri[c*]	31	-	590	78	4,040	22.3	-	n/a	n/a	n/a	n/a
North Carolina	46	$342	140	18	7,540	46.4	1.80	45	2	$4	1.10%
South Carolina[c]	13	-	25	3	-	-	-	-	-	-	-
Texas	36	$334	105	14	800	40.0	3.34	5	-	$1	0.19%
States not included to avoid disclosure		$206			633	25.3	3.07	4	-	-	0.14%
U.S.	***1,161***	***$21,225***	***25,070***	***3,299***	***990,163***	***34.0***	***1.23***	n/a	n/a	n/a	n/a
U.S. (excluding States* that may produce black carp or prohibit black carp)	***339***	***$1,442,000***	***1,815***	***239***	***50,723***	***--***	***--***	***304***	***11***	***$19***	***1.29%***

[a]Source: Catfish Production, Feb 2004, NASS, Fact finders for agriculture
[b]Source: USDA 2003a
Note: States denoted by "c" are included in the row, "States not included to avoid disclosure." An asterisk denotes States that either prohibit black carp or produce black carp. This analysis assumes that these States will not be impacted by the Rule.

Total Costs: Catfish Aquaculture Industry

The total industry costs are calculated in Table 12. Table 12 presents estimated costs to the catfish industry if Arkansas, Mississippi, and Missouri continue to supply black carp to their catfish producers and if Alabama continues to prohibit the possession of black carp. If this assumption holds true, then the non-discounted cost for this proposed rule would be approximately $474,000, and the discounted 10-year cost for this rule would be about $356,000. These costs do not account for increased maintenance costs due to the inability to use black carp to control the trematode.

These costs do not account for possible impacts to the baitfish and hybrid striped bass industries. If baitfish and hybrid striped bass industries are impacted by yellow grub to the same degree as the catfish industry is impacted by the trematode, then we expect each industry to lose about 1.4 percent of its annual gross revenue.

Table 12. Total Costs (NOT Including States That May Produce Black Carp or Prohibit Black Carp) (thousands)

Year	Annual Cost		Discounted Cost (7 percent)	
	Foodsize	Fry/Fingerling	Foodsize	Fry/Fingerling
2005	$29	$19	$29	$19
2006	$29	$19	$27	$17
2007	$29	$19	$25	$16
2008	$29	$19	$24	$15
2009	$29	$19	$22	$14
2010	$29	$19	$21	$13
2011	$29	$19	$19	$12
2012	$29	$19	$18	$12
2013	$29	$19	$17	$11
2014	$29	$19	$16	$101
Subtotal	$288	$186	$217	$140
Total Catfish Industry Costs	*$474*		*$356 (PV)*	

Totals may not sum due to rounding.

Industry Benefits: Freshwater Mussels

The Risk Assessment for black carp that was conducted by the U.S. Geological Survey concluded that black carp is high risk for escape from aquaculture facilities, establishment of populations, and environmental impact. This rule will protect the interests of human beings, and wildlife and wildlife resources from the purposeful or accidental introduction and subsequent establishment of black carp populations into ecosystems of the United States.

At particular risk are freshwater mussels, which provide both ecological and economic value. Ecologically, mussels act as natural water filters for sedimentation and contaminants, cleaning as much as several gallons of water per day (USFWS 2003). "Freshwater mussels are the largest group of federally listed endangered or threatened invertebrates" (USGS 2003). Furthermore, "in North America, it is estimated that 43 percent of the 300 species of freshwater mussels are in danger of extinction" (USGS 2003). Freshwater mussels are declining due to decreased water quality, habitat loss, zebra mussels, and other causes. As a result, many private, State, and Federal funds support freshwater mussel propagation and restoration. Re-establishment of extirpated mussel and snail populations, if biologically possible, would be labor and cost intensive and would depend on eradication of black carp within the habitat of the mussels and snails.

In addition to ecological importance, mussels also have economic value for recreational and commercial uses. While regulations vary by State, mussels (including various species that are not endangered or threatened) are harvested recreationally. Freshwater mussels have been harvested commercially since the early 1900s. While they were originally harvested to manufacture buttons, freshwater mussels are currently harvested for the cultured pearl industry. Approximately 50 percent of the exported shells are harvested in Tennessee (Hubbs, Todd, and Crouch 1998).

The Economic Census conducted by the U.S. Census Bureau does not have detailed data for mussel production (NAICS 112512) or mussel fishing (NAICS 114112). Furthermore, the highest level of detail collected by NASS includes Fishing, Hunting, and Trapping (NAICS 114) by State. The National Native Mussel Conservation Committee has reported that the U.S. mussel shell industry is approximately $40 to $50 million (National Native Mussel Conservation Committee 1998). The mussel shells are used in the cultured pearl and jewelry industries, and the shell harvest provides employment to about 10,000 residents, primarily in the Mississippi River basin (National Native Mussel Conservation Committee 1998). As an example in one State, Table 13 depicts statistics for Tennessee to illustrate the freshwater mussel industry in one particular State.

Table 13. Tennessee Commercial Freshwater Mussel Shell Industry

Year	Harvesters	Dealers	Tonnage	Revenue (Millions $)
1996	1,188	23	2,362	$6.8
1997	641	25	1,061	$3.0
1998	351	19	601	$0.7
1999	260	15	1,335	$2.8
2000	421	24	1,717	$2.4
2001	416	17	2,144	$2.7
2002	144	11	714	$0.66

Source: Tennessee Commercial Mussel Report, 2002.

According to several natural resource departments at individual States, black carp predation could severely impact freshwater mussel populations (Public Comment records from the Indiana Department of Natural Resources, Minnesota Fish & Wildlife Service, Missouri Department of Conservation). Impacts would include decreased freshwater mussel populations, reduced water quality and ecological services, lower recreational harvests, and decreased mussel shell revenue. Mussel and snail populations nationwide may be at risk from black carp predation. Due to the difficulty in determining the proportion of mussel populations that would decline from black carp predation, this analysis does not calculate the benefits for the 10-year period (as with the total industry costs). However, as stated above, freshwater mussels provide many ecological and economic values. Therefore, the economic benefits of the preferred alternative are underestimated.

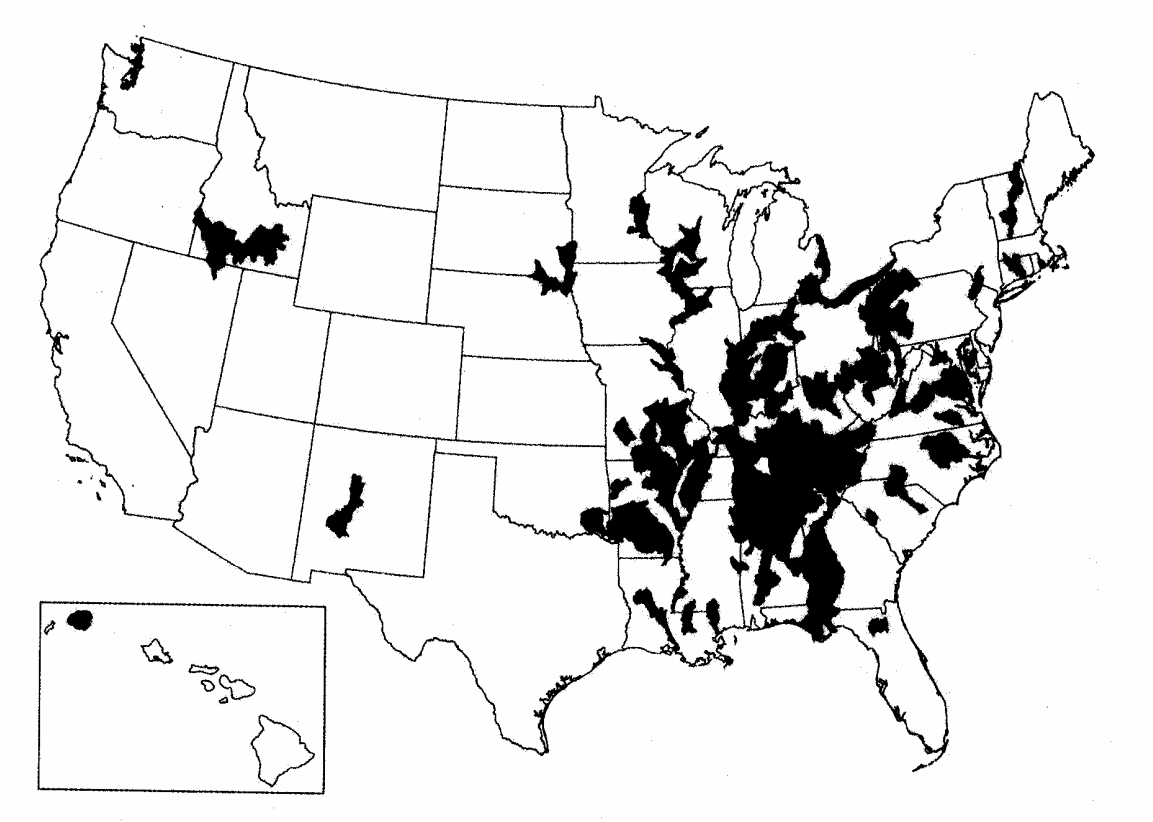

Figure 1. Watersheds of the U.S. with one or more endangered or threatened (Federal list) aquatic mollusks. Drainages shown at the Hydrologic Unit Code (HUC) 8 level. Coverage is based on a total of 54 freshwater mussels and 17 aquatic snails (Nature Serve, Arlington, VA). (Note: map does not include experimental populations (reintroductions) that are not protected as threatened or endangered species). From Nico and Williams 2003.

References Cited

Avery, Jimmy, Jeff Terhune, David Wise, and Lester Khoo. "New Trematode in Channel Catfish." Thad Cochran National Warmwater Aquaculture Center. Revised August 2001. http://www.msstate.edu/dept/tcnwac/tr.pdf Accessed 3/20/03.

Catfish Production National Agricultural Statistics Service, Agricultural Statistics Board, U.S. Department of Agriculture. Released February 5, 2004. Accessed 3/12/04.

Core, Jim. "Nailing the Snail that Harbors a Fish Parasite." *Agricultural Research* September 2002.

Evans, R.M. and F.L. Knopf. 1993. American White Pelican (*Pelecanus erythrorhynchos*). *In* The Birds of North America, No. 57 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington D.C.: The American Ornithologists' Union.

Gray, D. Leroy. "Yellow Grub in Fish." University of Arkansas Cooperative Extension Service, Little Rock. http://www.uaex.edu/aquaculture2/FSA/FSA9006.htm Accessed 4/12/04.

Hubbs, Don, Robert Todd, and C. Freddie Couch. "Managing Commercial Mussel Shell Harvest." 1998 Southern Division of the American Fisheries Society Midyear Meeting. http://www.sdafs.org/meetings/98sdafs/mussels/mussels.htm Accessed 4/12/04.

Jernigan, Joe. "Asian Carp in Alabama." Alabama Department of Conservation and Natural Resources. Revised March 8, 2001. http://www.dcnr.state.al.us/agfd/fish/fnaasian.html Accessed 3/31/03.

National Native Mussel Conservation Committee. "National Strategy for the Conservation of Native Freshwater Mussels." *Journal of Shellfish Research* 17:5. 1419–1428. 1998.

Nico, L. and J. Williams. 2003. Black carp: biological synopsis and risk assessment of an introduced fish. Draft of book manuscript submitted to the American Fisheries Society.

Tillitt, D. 2003. "Reproductive potential of triploid grass and black carp." U.S. Geological Survey Fact Sheet. http://www.cerc.cr.usgs.gov/pubs/center/pdfDocs/black_carp.pdf

U.S. Department of Agriculture. "1998 Census of Aquaculture." National Agricultural Statistics Service.

http://www.nass.usda.gov/census/census97/aquaculture/aquaculture.htm Accessed 4/03/03.

U.S. Department of Agriculture. 2003a. Part I: Reference of Fingerling Catfish Health and Production Practices in the United States, 2003 USDA:APHIS:VS, CEAH, National Animal Health Monitoring System, Fort Collins, CO #N406.1103

U.S. Department of Agriculture. 2003b. Part II: Reference of Foodsize Catfish Health and Production Practices in the United States, 2003 USDA:APHIS:VS, CEAH, National Animal Health Monitoring System, Fort Collins, CO #N407.1103

U.S. Fish and Wildlife Service. July 30, 2002. "Proposed Rule to add black carp to the list of injurious fishes under the Lacey Act." Federal Register volume 67, pages 49280-49284.

U.S. Fish and Wildlife Service. 2004. "Draft Environmental Assessment for Listing Black Carp (*Mylopharyngodon piceus*) as Injurious under the Lacey Act."

U.S. Fish and Wildlife Service. "History of Mussel Harvest on the River." Freshwater Mussels of the Upper Mississippi River System. Updated 9/30/03. http://midwest.fws.gov/mussel/ Accessed 4/12/04.

U.S. Geological Service website. "Collection information results for *Mylopharyngodon piceus.*" http://nas.er.usgs.gov/queries/CollectionInfo.asp?SpeciesID=573& Accessed 10/04 and 6/05.

U.S. Geological Service. "Landscape Analysis of Freshwater Mussels in the Upper Mississippi River Basin." Upper Midwest Environmental Sciences Center. Updated July 31, 2003. http://www.umesc.usgs.gov/aquatic/native_mussels/5004455.html Accessed 4/12/04.

Initial Regulatory Flexibility Analysis for Listing
Live Black Carp as Injurious Under the Lacey Act

Background

The Regulatory Flexibility Act of 1980 (Public Law 96-354) requires agencies to evaluate the potential effects of their proposed and final rules on small businesses, small organizations, and small governmental jurisdictions.

Section 603 of the Act requires agencies to prepare and make available for public comment a initial regulatory flexibility analysis (IRFA) describing the impact of rules on small entities. Section 603(b) of the Act specifies the content of an IRFA. Each IRFA must contain:

1. A description of the reasons why action by the agency is being considered;
2. A succinct statement of the objectives of, and legal basis for, the final rule;
3. A description and, where feasible, an estimate of the number of small entities to which the proposed rule will apply;
4. A description of the projected reporting, record keeping, and other compliance requirements of the final rule including an estimate of the classes of small entities which will be the subject to the requirement and the type of professional skills necessary for preparation of the report or record;
5. An identification, to the extent practicable, of all relevant Federal rules that may duplicate, overlap, or conflict with the final rule; and

1. <u>Description of the reasons why action by the agency is being considered</u>

The black carp (*Mylopharyngodon piceus*) is native to Asia and was imported by the channel catfish aquaculture industry mainly to control snails in channel catfish ponds. Black carp are now used to control snails in catfish, baitfish, and hybrid striped bass ponds. This biological snail control is used in conjunction with weed control methods such as the application of lime and copper sulfate. Other fishes that are indigenous to the U.S., including the pumpkinseed sunfish, freshwater drum, copper redhorse, river redhorse, and robust redhorse, hold potential to be used for snail control in aquaculture ponds, but may not be as effective as black carp. The Service is seeking additional information on alternative biological control methods.

The black carp feeds mainly on mollusks (mussels and snails), which are the most imperiled group of freshwater animals in the United States. The U.S. Fish and Wildlife Service (Service) has proposed to list all forms (triploid and diploid) of live black carp as an injurious species under the Lacey Act. Listing the black carp as an injurious species will prohibit the importation and interstate transport of that species, which will prohibit its movement to areas beyond its current locations and reduce the risk of its introduction into the natural waters of the United States. The proposed rule will not prohibit intrastate transport or any use of black carp within States. Any regulations pertaining to the use of

black carp within States would continue to be the responsibility of each State. The best available information indicates that this action is necessary to protect the interests of human beings, and wildlife and wildlife resources from the purposeful or accidental introduction and subsequent establishment of black carp populations into ecosystems of the United States.

In February 2000, the Service received a petition from the Mississippi Interstate Cooperative Resources Association to list the black carp under the injurious wildlife provision of the Lacey Act. The petition was based on Mississippi River Basin State concerns about the potential impacts of black carp on native freshwater mussels and snails in the Mississippi River Basin. On October 23, 2002, the U.S. Fish and Wildlife Service received a petition signed by 25 members of Congress representing the Great Lakes region to add bighead carp, silver carp and black carp to the list of injurious wildlife under the Lacey Act.

The United States has the greatest diversity of freshwater mussels in the world. About 1,000 species occur globally, and 297 species and subspecies are native to the United States. Most (72%) of the mussels native to the United States are considered imperiled (i.e., endangered, threatened, or of special concern), and many of the species not considered imperiled have declined in abundance and distribution. Our Nation contains about 600 species of freshwater snails, which is about 15% of the world's diversity of this taxonomic group. The Service is charged with the responsibility to identify, protect, manage, and recover species of plants and animals in danger of extinction. Adding black carp to the list of injurious wildlife under the Lacey Act is an action primarily intended to protect native mussels and snails by reducing the risk of black carp escapement into, and establishment of feral populations in, waters of the United States.

The Risk Assessment for black carp that was conducted by the U.S. Geological Survey concluded that the species poses a high risk for escape from aquaculture facilities, establishment of populations, and environmental impact. Flooding of aquaculture facilities is the most likely pathway into the wild, but black carp could also be moved to new locations through interstate transportation, inadvertently sold as bait and escape from bait buckets. At least two escapements of black carp have occurred. No tools exist to eradicate black carp from systems like the Mississippi River Basin, where at least five black carp have been caught in the wild.

2. Objectives of, and legal basis for, the proposed rule

The U.S. Fish and Wildlife Service proposes to amend 50 CFR 16.13 to add all forms of live black carp to the list of injurious fish, mollusks, and crustaceans. This listing would prohibit the importation into the United States and interstate transport within the United States of either live black carp or viable black carp eggs. The best available information indicates that this action is necessary to protect the interests of human beings, and wildlife and wildlife resources from the purposeful or accidental introduction and subsequent establishment of black carp populations into ecosystems of the United States.

The Secretary of the Interior is authorized, under the regulations contained in 50 CFR part 16 of the Lacey Act (18 U.S.C. § 42, as amended), to prescribe by regulation those wild mammals, wild birds, fish (including mollusks and crustaceans), amphibians, reptiles, and the offspring or eggs of any of the aforementioned, which are injurious to human beings, to the interests of agriculture, horticulture, or forestry, or to the wildlife or wildlife resources of the United States. The lists of injurious wildlife species are at 50 CFR 16.11-15. If black carp are determined to be injurious, then as with all listed injurious animals, their importation into, or transportation between, States, the District of Columbia, the Commonwealth of Puerto Rico, or any territory or possession of the United States by any means whatsoever is prohibited, except by permit for zoological, educational, medical, or scientific purposes (in accordance with permit regulations at 50 CFR 16.22), or by Federal agencies without a permit solely for their own use, upon filing a written declaration with the District Director of Customs and the U.S. Fish and Wildlife Service Inspector at the port of entry. In addition, no live black carp, progeny thereof, or viable eggs acquired under permit could be sold, donated, traded, loaned, or transferred to any other person or institution unless such person or institution has a permit issued by the Director of the U.S. Fish and Wildlife Service. The interstate transportation of any live black carp or viable eggs currently held in the United States for any purposes not permitted would be prohibited.

The Lacey Act makes no provision for regulatory exemptions or alternative standards that would reduce the impact of a listing action on small entities. Based on the outcome of an injurious wildlife evaluation, the Service could list various forms of a species. If triploid black carp are found not to be injurious and only diploid black carp are listed under the Lacey Act, this would allow triploid black carp to still be used by the aquaculture industry. As explained in greater detail below, many of the entities currently utilizing live black carp are small businesses; to allow them to continue to engage in interstate commerce while prohibiting large entities from doing so would, from a practical standpoint, eliminate the benefits of listing the species as injurious. Similarly, it might be theoretically possible to control the spread of black carp from aquaculture or interstate transportation operations by imposing regulations specifying engineering standards for ponds or shipping containers, or by establishing a manifest system similar to that currently imposed on entities that generate, store, transport, treat, or dispose of hazardous waste. Such standards, however, would likely prove prohibitively expensive to implement. While the Service has presented the alternative of listing only the diploid form of the black carp, sufficient information is not available at this time to assess the impact to small businesses of doing so. The Service is seeking additional data to enable it to consider this alternative in more detail when formulating the final rulemaking documents. In light of these considerations, the IRFA focuses solely on the impact of listing all forms (triploid and diploid) of live black carp as injurious; alternative regulatory actions are not analyzed.

No duplicative, overlapping, or conflicting Federal rules have been identified. As noted below, the Service seeks comments and information about any such rules, as well as any other directly related state, local, or industry rules or policies.

3. Description and estimate of the number of small entities to which the proposed rule will apply

Black carp are neither marketed as a food fish nor exported by U.S. farmers. Because sources of domestic black carp brood stock are adequate, the aquaculture industry does not currently import black carp from sources outside the United States and most likely will not resume imports. Black carp are used as a biological control for the parasite yellow grub in the baitfish and hybrid striped bass industries and for the parasite *Bolbophorus confusus* in the catfish industry. Yellow grubs infect baitfish and hybrid striped bass by burrowing into the skin and muscle of the fish. Both parasites require a snail and a fish as intermediate hosts, and a fish-eating bird as a final host. Infected fish may be more susceptible to disease, grow slowly, and may die if severely infected. Black carp aid in controlling the parasites by feeding on the snails in aquaculture ponds. Channel catfish, hybrid striped bass, and baitfish producers that use black carp will be affected if black carp are listed as Injurious.

The U.S. Small Business Administration defines a "small business" as one with annual revenue that meets or is below the established size standard, which is $750,000 for "Finfish Farming and Fish Hatcheries" businesses (NAICS 112511). According to the 1998 Census of Aquaculture, a substantial number of these businesses are small businesses (Table 14). Approximately 89 percent of catfish farms, 97 percent of baitfish farms, and 91 percent of hybrid striped bass farms are small businesses with less than $750,000 sales annually. If the sales were adjusted to 2003 dollars, it is possible that a few less farms would qualify as small businesses. Because the allocation of small businesses is only available by a range of total sales (i.e., $1,000 to $24,999) from the National Agricultural Statistics Service, total sales were not adjusted to 2003 dollars.

Table 14. 1998 U.S. Aquaculture Sales for Select Species (1998 dollars)

1998 Total Sales	Catfish Operations	Baitfish Operations	Hybrid Striped Bass Operations
$1 to $999	45	34	8
$1,000 to $24,999	470	127	44
$25,000 to $49,999	112	28	4
$50,000 to $99,999	165	22	8
$100,000 to $750,000	433	56	16
$750,001 or more	145	8	8
Small Businesses (<$750,000)	1,225	267	80
Total Businesses	1,370	275	88

Source: National Agricultural Statistics Service, USDA, 1998

Not all small businesses would be affected by this rulemaking. Only businesses located in States that permit the use of black carp and do not produce black carp will be affected. Therefore, we assume that small businesses located in Alabama, Iowa, and Tennessee will not be impacted because these States do not allow the possession of any black carp. Furthermore, small businesses located in Arkansas, Missouri, and Mississippi will not be impacted because there are hatcheries in these States that produce black carp. The number of small businesses was only available for 1998 data. Hence, the percentage of small businesses nationwide in 1998 was extrapolated to estimate the number of small businesses in each State in 2003.

Catfish Producers

As shown in Table 15, approximately 302 of the 339 catfish producers that would be affected by this rule are small businesses. In particular, this rule would impact those businesses that use black carp. Approximately 3.8 percent of fry/fingerling ponds and 1.8 percent of foodsize ponds use biological controls (such as black carp) to control snails (U.S. Department of Agriculture 2003). If this ratio holds for small businesses, then 6 to 12 small businesses would be impacted by this proposed rule.

The total maximum annual revenue loss due to trematode infestation in all foodsize and fry/fingerling ponds is estimated to be $49,000 (Table 15). We assume that 89 percent of this loss would be incurred by small businesses. Thus, we estimate that individual small businesses would lose between $3,600 and $7,300 (3 to 6 percent) of annual revenue (Table 16). However, the degree to which these businesses may be impacted is variable. For foodsize catfish ponds that experience a trematode outbreak, 0.5 percent of ponds lose less than 200 pounds, 0.7 percent of ponds lose between 200 – 2,000 pounds, 0.1 percent of ponds lose more than 2,000 pounds, and 98.7 percent of ponds lose none to mortality (U.S. Department of Agriculture 2003). Thus, it is possible for farms that experience trematode infestations to lose less than 3 percent of revenue or to lose entire ponds.

These cost estimates do not account for infected fish that die from other diseases due to weakened immune systems or decreased growth rate in infected fish. These estimates also do not account for the increased costs to use other snail control methods or the costs to drain severely infected ponds. This estimate was not discounted to incorporate the possibility of using alternative snail control techniques and assumes total control of snails by black carp, which is unlikely.

Table 15. 2003 Catfish Operations and Expected Costs

State	Total Number of Operations	Approximate Number of Small Businesses	Total Annual Catfish Sales (thousands)	Total Annual Maximum Revenue Loss (thousands)
Alabama*	231	206	$85,159	n/a
Arkansas*	155	138	$59,047	n/a
California	38	34	$7,228	$14
Florida	34	30	$1,208	$1
Georgia	43	38	$1,372	$3
Illinois[a]	12	11	$306	-
Kentucky[a]	60	53	$1,381	-
Louisiana	57	51	$14,505	$20
Mississippi*	405	360	$243,176	n/a
Missouri*[a]	31	28	$1,954	n/a
North Carolina	46	41	$6,118	$6
South Carolina[a]	13	12	$121	-
Texas	36	32	$3,350	$2
States not included to avoid disclosure				$3
Total U.S.	1,161	1,033	$424,925	n/a
U.S. (excluding States* that would not be affected)	***339***	***302***	$35,589	$49

Notes: States denoted by "a" are included in the row, "States not included to avoid disclosure."
States that are not expected to be affected by the rulemaking are marked by an asterisk and shaded. These States either produce black carp or prohibit the possession of black carp. Totals may not sum due to rounding.

Table 16. Impact to Small Businesses using Black Carp in Foodsize & Fry/Fingerling Ponds

Small Businesses using Black Carp	Total Annual Maximum Revenue Loss	Average Loss per Small Business
6 – 12	$43,600	$3,600 – $7,300

Baitfish & Hybrid Striped Bass Producers

Table 17 shows the baitfish and hybrid striped bass production by state for 1998. Approximately 180 of the 186 affected baitfish farms (97 percent) and 71 of the 78 affected hybrid striped bass farms (91 percent) are small businesses.

Adequate data were not available to estimate the impact of listing black carp on producers of black carp, baitfish, and hybrid striped bass. It is unknown how many baitfish and hybrid striped bass farms use black carp for biological control, so impacts on small, baitfish and hybrid striped bass businesses cannot be estimated. If use of black carp is similar to the catfish industry, baitfish and hybrid striped bass businesses will lose between 3 and 6 percent of revenue on average.

Table 17. 1998 Aquaculture Production of Baitfish and Hybrid Striped Bass, By State (2003 dollars)

State	Baitfish		Hybrid Striped Bass	
	Total Farms	Total Sales ($1,000)	Total Farms	Total Sales ($1,000)
Alabama*	2	(1)	-	-
Arkansas*	62	$24,488	3	(1)
California	7	$2,322	1	(1)
Colorado	4	(1)	1	(1)
Delaware	1	(1)	1	(1)
Florida	2	(1)	5	$1,453
Georgia	6	$284	3	$7
Hawaii	1	(1)	-	-
Illinois	6	$330	1	(1)
Indiana	4	(1)	3	(1)
Iowa*	4	(1)	2	(1)
Kansas	9	$64	1	(1)
Kentucky	1	(1)	-	-
Louisiana	2	(1)	2	(1)
Maine	28	$116	-	-
Maryland	4	(1)	15	$847
Massachusetts	4	$18	1	(1)
Michigan	4	(1)	1	(1)
Minnesota	16	$871	-	-
Mississippi*	5	$1,084	3	(1)
Missouri*	13	$871	2	(1)
Nebraska	4	(1)	1	(1)
New Hampshire	2	(1)	-	-
New Jersey	1	(1)	4	(1)
New Mexico	-	-	1	(1)
New York	14	$159	1	(1)

North Carolina	5	(1)	10	$1,895
North Dakota	-	-	-	-
Ohio	12	$577	3	(1)
Oklahoma	5	(1)	-	-
Pennsylvania	8	(1)	3	(1)
Rhode Island	-	-	-	-
South Carolina	-	-	4	$93
South Dakota	1	(1)	-	-
Tennessee*	3	(1)	-	-
Texas	7	$171	5	(1)
Utah	2	(1)	-	-
Vermont	-	-	-	-
Virginia	4	(1)	8	$41
West Virginia	-	-	2	(1)
Wisconsin	19	$2,617	1	(1)
Wyoming	3	(1)	-	-
United States	*275 farms*	*$39,955*	*88 farms*	*$30,031*
U.S. (excluding States* that would not be affected)	**186 farms**		**78 farms**	

Note: States that are not expected to be affected by the rulemaking are marked by an asterisk and shaded. These States either produce black carp or prohibit the possession of black carp.

4. Description of the projected reporting, record keeping, and other compliance requirements for small entities

The proposed rule will prohibit the importation and interstate transport of live black carp and viable eggs. No reporting, recordkeeping, or other compliance requirements are necessary.

5. Duplication with other Federal rules

The Service is unaware of any duplicative, overlapping, or conflicting Federal rules. The Service seeks comments and information about any such rules, as well as any other directly related state, local, or industry rules or policies.

6. Description of any significant alternatives to the proposed rule

There are two alternatives to the proposed rule to list all forms of black carp considered by the Service.

a) Not adding any form of black carp to the list of injurious wildlife.
b) Adding only diploid black carp to the list of injurious wildlife.

These alternatives may have costs and benefits to small businesses. The cost and benefit of any alternative to the proposed rule is unknown at this time. The Service is seeking information about the costs and benefits to small businesses of only listing diploid black carp as injurious.

Summary Table of Alternative Actions (from Draft Environmental Assessment)

Actions	**Alternative 1:** No Action	**Alternative 2: Proposed Action** (List as Injurious All Black Carp)	**Alternative 3:** (List as Injurious only Diploid Black Carp)
Prohibit the importation of live black carp	No	Yes	Yes – Diploids No – Triploids
Prohibit the interstate transport of live black carp	No	Yes	Yes – Diploids No – Triploids
Reduced risk of escapement of diploid black carp into the wild	No	Yes. However, for states where the carp is already in use, risk will not be eliminated	Yes. However, for states where the carp is already in use, risk will not be eliminated
Reduced risk of escapement of triploid and diploid black carp into the wild	No	Yes. However, for states where the carp is already in use, risk will not be eliminated	No – Triploids Yes. However, for states where the carp is already in use, risk will not be eliminated -- Diploids
Economic Impacts	Likelihood of reduction in mussel abundance, with unquantified associated loss of value in the mussel shell industry, and costs of mussel population recovery. Many other costs to natural resources, and the economies that they support.	For catfish industry during 2005-2014 estimated at a maximum of $474,000. Using the Office of Management and Budget guidance to compute the net present value discounted by 7%, the 10-year costs to the catfish industry was analyzed to be $356,000. Because black carp are used in existing states, mollusks may still be impacted.	Likelihood of reduction in mussel abundance, with unquantified associated loss of value in the mussel shell industry, and costs of mussel population recovery. Many other costs to natural resources, and the economies that they support. Because black carp are used in existing states, mollusks may still be impacted. Loss of interstate movement of diploids resulting in impacts to black carp producers

			and other aquaculture facilities that purchase from those producers.

Summary Table of Environmental Consequences by Alternative (from Draft Environmental Assessment)

Impacts	**Alternative 1:** No Action	**Alternative 2: Proposed Action** (List as Injurious All Black Carp)	**Alternative 3:** (List as Injurious only Diploid Black Carp)
Escape of live diploid black carp	Likely	Greatly reduced risk (Note: Some States may continue to allow possession and use of black carp) in states other than those states where they are already found. There may be reduced risk in States where they are already found	Greatly reduced risk (Note: Some States may continue to allow possession and use of black carp) in states other than those states where they are already found. There may be reduced risk in States where they are already found
Escape of live triploid black carp	Likely	Greatly reduced risk in states other those states where they are already found. There may be reduced risk in States where they are already found	No reduced risk.
Establishment of populations of black carp	Likely	Greatly reduced risk in states other than those states where they are already found. There may be reduced risk in States where they are already found	Somewhat reduced risk (less than alternative 2) in states other than states where they are already found. There may be reduced risk in States where they are already found
Reductions in mollusk populations	Likely	Greatly reduced risk in states other than those states where they are already found. There may be reduced risk in States where they are	Somewhat reduced risk in states (somewhat less than alternative 2) other than states where they are already found. There may be reduced

		already found	risk in States where they are already found
Degradation in water quality due to reduction in mussel abundance	Likely	Greatly reduced risk in states other than those states where they are already found. There may be reduced risk in States where they are already found	Somewhat reduced risk in states (less than alternative 2) other than states where they are already found. There may be reduced risk in States where they are already found
Threatened and Endangered Mollusks	Likely reductions in some of the 102 listed mollusks	Greatly reduced risk of population reduction of 102 listed mollusks in states other than those where they are already found. There may be reduced risk in States where they are already found	Somewhat reduced risk in some of the 102 listed mollusks (less than alternative 2).
Cumulative impacts	Risk of additional impacts to threatened and endangered mollusks will not be reduced	Greatly reduced risk of additional impacts to threatened and endangered mollusks in states other than those where they are already found. There may be reduced risk in States where they are already found	Somewhat reduced risk (less than alternative 2) of additional impacts to threatened and endangered mollusks

References Cited

Nico, L. G., and J. D. Williams. 2003. Black carp: biological synopsis and risk assessment of an introduced fish. Draft of book manuscript to be submitted to the American Fisheries Society.

U.S. Fish and Wildlife Service. 2005. Rulemaking to List Black Carp Under the Lacey Act: Draft Economic Analysis.