

ENVIRONMENTAL ASSESSMENT
for

**Listing Largescale Silver Carp (*Hypophthalmichthys harmandi*),
as Injurious Wildlife under the Lacey Act**

Last Revised
April 2007

USFWS/DEQ/BIS
4401 North Fairfax Drive, Rm. 322
Arlington, VA 22203

Abstract

We considered two alternatives for the proposed action to list largescale silver carp (*Hypophthalmichthys harmandi*) as an injurious species under the Lacey Act: 1) no action; and 2) adding live largescale silver carp, gametes, viable eggs and hybrids. Two alternatives considered, but rejected from further analysis were 1) adding live and dead largescale silver carp, gametes, viable eggs and hybrids to the list of injurious wildlife; and 2) adding only diploid (fertile) live largescale silver carp, gametes, viable eggs and hybrids as injurious wildlife.

This action is being considered in order to protect the welfare and survival of native wildlife and wildlife resources and the health and welfare of human beings from the potential negative impacts of largescale silver carp by adding them to the list of injurious wildlife and preventing their importation.

The Secretary of the Interior is authorized under the Lacey Act (18 U.S.C. § 42, as amended) to prescribe by regulation those mammals, 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 largescale silver carp are determined to be injurious, then as with all listed injurious species, 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. The interstate transportation of any live largescale silver carp, gametes, viable eggs or hybrids held in the United States for any purposes not permitted would be prohibited.

Introduction

The U.S. Fish and Wildlife Service (Service) contracted with the U.S. Geological Survey (USGS) to produce a biological synopsis and risk assessment of Asian carps of the Genus *Hypophthalmichthys*. During their review of information of the genus, USGS concluded that there was a little known species of *Hypophthalmichthys* named largescale silver carp (*Hypophthalmichthys harmandi*). Largescale silver carp are most closely related to and can hybridize with silver carp (*Hypophthalmichthys molitrix*), a species that is established in the Mississippi River basin in the United States. Since silver carp were under evaluation for potential addition to the list of injurious fishes under the Lacey Act, the Service decided to conduct a concurrent injurious wildlife evaluation of largescale silver carp. Largescale silver carp are not known to be in the United States.

1) Purpose of Action

The purpose of the proposed action to add all forms of live largescale silver carp (*Hypophthalmichthys harmandi*) to the list of injurious wildlife under the Lacey Act is to prevent their introduction and establishment into natural waters of the United States. This action is being considered in order to protect native wildlife, wildlife resources and human beings from the potential negative impacts of largescale silver carp by listing them as injurious and preventing their importation and interstate movement.

2) Need for Action

The need for the proposed action to add live largescale silver carp, gametes, viable eggs and hybrids to the list of injurious wildlife under the Lacey Act developed as a result of concerns of their potential, likely impacts to native fishes and the recreational and commercial fisheries associated with these fish and wildlife dependent on food sources that the largescale silver carp would likely eat, should they become established in U.S. waters. If largescale silver carp hybridized with silver carp present in U.S. waters, those hybrids may negatively impact human health due to jumping behavior. Silver carp regularly jump out of the water when disturbed, particularly in response to outboard motors, and there are numerous reports of injuries. The intent of this environmental assessment is to assess the impacts of two alternatives associated with adding largescale silver carp, gametes, viable eggs and hybrids to the list of injurious wildlife under the Lacey Act.

The Secretary of the Interior is authorized under the Lacey Act (18 U.S.C. § 42, as amended) to prescribe by regulation those mammals, 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 live largescale silver carp, gametes, viable eggs and hybrids 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 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 largescale silver carp, gametes, viable eggs or hybrids 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

Service. The interstate transportation of any live largescale silver carp, gametes, viable eggs and any hybrids held in the United States for any purposes not permitted would be prohibited. The proposed action would not prohibit intrastate transport or possession of largescale silver carp, gametes, viable eggs or hybrids within States, where not prohibited by the State. Any regulation pertaining to the use of largescale silver carp, gametes, viable eggs or hybrids within States is the responsibility of each State.

3) Decisions that Need to be Made

The Service is the lead agency for the proposed action. The Service's Director will select one of the alternatives analyzed in detail and will determine, based on the facts and recommendations contained herein, whether this Environmental Assessment (EA) is adequate to support a Finding of No Significant Impact (FONSI) decision or whether an Environmental Impact Statement (EIS) will need to be prepared.

4) Background

In October 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 (*Hypophthalmichthys nobilis*), silver and black (*Mylopharyngodon piceus*) carp (referred to collectively as Asian carp) to the list of injurious wildlife under the Lacey Act. The petition was based upon concerns that Asian carp could invade the Great Lakes from the Mississippi River basin through a man-made ship and sanitary canal. The members of Congress are concerned that bighead, silver and black carp, because they are voracious eaters, may impact food supplies available to native fisheries in the Great Lakes, which are already struggling against impacts caused by other invasive species. The letter also noted that the Great Lakes fisheries are valued at approximately \$4 billion, and resource managers have spent decades trying to restore and protect them. A follow-up letter to the original petition from the 25 members of Congress identified seven additional Legislators that support the petition.

The largescale silver carp is physically most similar to the silver carp, but does resemble bighead carp as well. Presently there are no known introductions of this species in the open waters of the United States, nor any known importations of the species. The relatively larger scale size of the largescale silver carp is the most reliable characteristic to distinguish it from silver carp. The number of scales along the lateral line of the largescale silver carp range from 77 to 88 compared to the silver carp with 85 to 108.

Largescale silver carp are known to hybridize and to produce viable offspring with silver carp, and perhaps bighead carp. In northern Vietnam, native largescale silver carp, introduced silver carp and hybrids are cultured together. The hybrids did not grow as quickly as pure largescale silver carp stock. Research results comparing growth rates between largescale silver carp, silver carp, and their hybrids indicated that largescale silver carp grew faster than silver carp.

Largescale silver carp are native to fresh waters of northern Hainan Island, China, and the Red (Hong Ha) River of northern Vietnam. The native range of largescale silver carp is subtropical to tropical (21-22 °N), making it the southernmost fish of the genus. The species does not occur naturally on the Chinese mainland. Largescale x silver carp hybrids are tolerant of a temperate climate (ca. 42-46 °N).

Largescale silver carp feed on phytoplankton and prefer slow-moving, plankton-rich open waters. This species is a nocturnal feeder and remains in deeper waters during daylight hours. As largescale silver carp are most closely related to silver carp, their salinity tolerance is probably similar to that of silver carp, which is a freshwater species that can live in slightly brackish waters. The reproductive capability is expected to be similar to that of silver carp,

though largescale silver carp reach sexual maturity at a younger age than silver carp. Females reach maturity in two years and males in one year. Spawning typically occurs in rivers during rains or floods in May and June, although spawning may be postponed until mid-August. Because largescale silver and silver carps are closely related and hybridize, spawning requirements are likely similar to those of silver carp. Because this species is most closely related to silver carp, its potential effectiveness in controlling algae and its effect on excess nutrients in closed systems is possibly similar to that of silver carp.

Largescale silver carp is a popular culture and food fish within its native range. Its growth rate is greater than that of silver carp and the species reaches sexual maturity sooner than silver carp. Some adults may weigh 20-30 kilograms. Largescale silver carp x silver carp hybrids were introduced in Kazakhstan where they became established. The climate of Kazakhstan is temperate. Thus, largescale silver carp x silver carp hybrids are more cold tolerant than pure largescale silver carp.

Largescale silver carp remain deep in the water column during daylight hours and swim toward the surface at night to feed on plankton, thus they may be less prone to jumping than silver carp in response to sounds of boat engines during daytime.

At least three trematode parasites (*Dactylogyrus harmandi*, *D. hypophthalmichthys*, *D. chentushenae*) are known to infect largescale silver carp. Bighead, silver, grass, and black carps are known to host the Asian carp tapeworm (*Bothriocephalus acheilognathi*), but it is unknown whether largescale silver carp hosts this species. The Asian carp tapeworm has infected native fishes of concern in five states: Arizona, Colorado, Nevada, New Mexico, and Utah. This is a damaging parasite that erodes mucus membranes and intestinal tissues, often leading to death of the host.

5) Public Involvement

The Service published a Federal Register notice of inquiry on silver carp (68 FR 43482-43483, July 23, 2003) and provided a 60-day public comment period. We received 31 comments in total, but 12 of these did not address the issues raised in the notice of inquiry. We considered the information provided in the 19 relevant comments. The existence of largescale silver carp and the ability of this species to hybridize with silver carp were not known at the time of the notice of inquiry. Most of the comments supported the addition of silver carp to the list of injurious wildlife. One commenter asked us to delay listing silver carp until a risk assessment could be completed. Biological synopses and risk assessments were compiled for both silver and largescale silver carp. The biological synopsis and risk assessment conducted for the Service by the U.S. Geological Survey is posted online in the Electronic Library of the Service's Contaminants Program at <http://www.fws.gov/contaminants/Documents/ACBSRAFinalReport2005.pdf>. Since silver carp was under evaluation for potential addition to the list of injurious fishes under the Lacey Act, and due to the similarities between the species, the Service decided to conduct a concurrent injurious wildlife evaluation of largescale silver carp. A proposed rule to add all forms of live largescale silver and silver carp to the list of injurious fishes under the Lacey Act was published on September 5, 2006 (71 FR 52305); the comment period on the proposed rule closed on November 6, 2006. We received 97 comments on the proposed rule. In total, the Service received 116 comments during the public comment periods. We reviewed all comments received and no comments on this environmental assessment were received.

6) Alternatives

Two alternatives were considered in this assessment: 1) no action, 2) adding all forms of largescale silver carp, gametes, viable eggs and hybrids to the list of injurious wildlife.

6.1.1) Alternative 1: No Action

The No Action alternative refers to no action being taken to list live largescale silver carp, gametes, viable eggs and hybrids as an injurious species under the Lacey Act, which would allow the importation and interstate transport of this species. If largescale silver carp are brought into the United States, introduction and establishment of largescale silver carp in natural waters of the United States could occur, which would likely impact native wildlife and wildlife resources. Largescale silver carp x silver carp hybrids could possibly harm humans.

If no action is taken, the Service would continue deferring to the States to regulate live largescale silver carp, gametes, viable eggs and hybrids. Many States have repeatedly asked the Federal government to prohibit the importation and interstate transportation of other Asian (black, bighead and silver) carp species. They are concerned that any use of these species might enable the fish to be introduced to new waterways through human movement and connected waterways. They are concerned that interstate transportation, through trucking accidents or exchange of hauling water, could result in the introduction of Asian carp into State waters where they do not exist and are prohibited by State law. Several States submitted letters of support for the addition of silver carp to the list of injurious wildlife. If largescale silver carp were imported for use in the United States, fish that are allowed in one state may become established in interstate waterways, thus becoming established in a waterbody in a state that does not allow their possession or use.

6.1.2) Alternative 2: Add all Forms of Live Largescale Silver Carp, Gametes, Eggs and Hybrids

Under this alternative, the Service would add all forms of largescale silver carp to the injurious wildlife list under the Lacey Act, which would prohibit importation and interstate transport of live largescale silver carp, gametes, viable eggs or hybrids. The proposed action would not prohibit intrastate transport or possession of largescale silver carp within States, where permitted by the State.

Largescale silver carp are not known to have been imported or used in the United States. Silver carp, with which largescale silver carp can hybridize, have been collected from the natural waters of 16 States and Puerto Rico. Silver carp are well established throughout much of the Mississippi River basin and their range is expanding.

6.1 Summary Table of Alternative Actions

Actions	Alternative A: No Action	Alternative B: Proposed Action (List as Injurious Live Largescale Silver Carp and Hybrids)
Prohibit the importation of live largescale silver carp and hybrids	No	Yes
Prohibit the interstate transport of live largescale silver carp and hybrids	No	Yes
Reduced risk of introduction of largescale silver carp and hybrids in U.S. waters	No	Yes
Reduced risk of	No	Yes

establishment of largescale silver carp and hybrids in U.S. waters		
Economic Impacts	Likely reduction in native fish abundance, with unquantified associated loss of value in the recreational and commercial fishing industry. Many other costs to natural resources, and the economies that they support.	Largescale silver carp are not in use in the United States, so there are no known economic impacts of this alternative.

6.2) Alternatives Considered But Dismissed From Further Consideration

6.2.1) *Adding Live and Dead Largescale Silver Carp, Gametes, Eggs and Hybrids*

This alternative was dismissed from further consideration because there are no known impacts to wildlife, wildlife resources, humans, agriculture, horticulture or forestry from dead largescale silver carp, so there is no need to prohibit the importation and interstate transportation of dead largescale silver carp.

6.2.2) *Adding only Diploid (fertile) Live Largescale Silver Carp, Gametes, Eggs and Hybrids*

This alternative was dismissed from further consideration because there is no need to distinguish between diploid (fertile) and triploid (sterile) forms of largescale silver carp as we do not believe they have been imported or are used in the United States

7) Affected Environment

To our knowledge, largescale silver carp have not been imported into the United States. In its native range, largescale silver carp occurs in subtropical to tropical climates. Therefore, should pure stock be introduced to U.S. waters, its potential range could be limited to subtropical waters such as those present in southern Florida, southern Texas and Hawaii. The likelihood of spread of largescale silver carp would be high in subtropical and tropical waters of the United States. Largescale silver x silver carp hybrids, however, would be expected to tolerate temperate waters in the United States as they do in Kazakhstan at about 42-46 °N. Largescale silver carp x silver carp hybrids are more cold-tolerant than pure largescale silver carp. Silver carp have been collected from the natural waters of 16 States and Puerto Rico. Silver carp are well established throughout much of the Mississippi River basin, and their range is expanding. Because largescale silver carp can occupy reservoirs, the potential to also live in lakes exists. The same is probably true for hybrids.

8) Environmental Consequences

8.1) Ecological Impacts

Alternative 1: No Action

Not adding largescale silver carp to the list of injurious wildlife would allow for their importation and interstate transportation, thus increasing the risk of their release or escape and establishment in U.S. waters, which would likely threaten native fish and wildlife. Escape from culture, as happened with silver carp, would provide a pathway for release into natural waters. Should this fish or its hybrids be released into natural waters, connected waterways would become a secondary pathway for spread. Because of the morphological similarity between this species and silver carp, stock contamination of silver carp by largescale silver carp is possible if imported from regions with populations of *H. harmandi*. Another possible introduction pathway, should largescale silver carp or their hybrids be imported for culture, would be sale of live individuals in retail markets.

Largescale silver carp can hybridize with silver carp, a species well established in the Mississippi River basin. Largescale silver carp have a faster growth rate than silver carp and native species would likely be negatively affected through competition for food if populations of largescale silver carp or their hybrids become large enough to dominate other planktivorous fish species.

Because there is evidence of eutrophication of waters into which silver carp have been introduced, nutrients are another concern; the same may apply to largescale silver carp or their hybrids.

Competition for habitat between largescale silver carp and native species is likely high, especially in large rivers, lakes, and reservoirs. Because they are planktivorous, the potential of largescale silver and any hybrids to cause habitat degradation or destruction is low as is direct predation on native mammals, birds, amphibians, reptiles, mollusks or other live, non-aquatic animals.

Alternative 2: Add Live Largescale Silver Carp, Gametes, Eggs and Hybrids

Because largescale silver carp may compete with native species for habitats and food, adding largescale silver carp to the list of injurious will help protect biota in large river systems and tributaries. No negative impacts to habitats will result from listing largescale silver carp or hybrids. Largescale silver carp and hybrids have the potential to negatively affect threatened and endangered species biodiversity, distribution and abundance by competing for phytoplankton and zooplankton. Native fishes are likely already being impacted by reduced phytoplankton available for feeding in areas where silver carp are found.

8.2) Impacts on Native Species

Alternative 1: No Action

Largescale silver carp consume primarily planktonic food sources. It is unknown if largescale silver carp feed more heavily on phytoplankton than zooplankton, but their hybrids with silver carp would probably show a preference for phytoplankton. Therefore, largescale silver carp and any hybrids are highly likely to compete for food with other planktivorous native fishes such as walleye (*Sander vitreum*) and crappies (*Pomoxis* spp.) during their early life cycle and paddlefish (*Polyodon spathula*), buffalo (*Ictiobus* spp.), and shads (*Dorosoma* spp.) throughout their lives, particularly in waters where food may become limited, should they become established in the United States. Post-larvae and early juveniles of most native fishes are also planktivorous. Gizzard shad are a primary forage base for predacious fishes and important to the ecology of midwestern rivers; thus, this is cause for concern.

Potential for direct predation and injury of drifting fertilized eggs and larvae of native fishes exist. Mussels are also filter feeders but live partly or totally buried in the substrate; they would be less likely to be affected by filter-feeding largescale silver carp or their hybrids. Largescale silver carp feed in the water column at night. Nevertheless, changes in the fish community structure caused by largescale silver carp or hybrids could have adverse effects on abundance and availability of host fishes required for mussel reproduction. There is evidence of overloading of nutrients in waters into which silver carp have been introduced, and the same may apply to largescale silver carp or their hybrids.

The potential for largescale silver carp to transfer pathogens to fishes native to the United States has not been investigated. No detailed studies of disease causing agents of largescale silver carp have been found, but at least three trematode parasites (*Dactylogyrus harmandi*, *D. hypophthalmichthys*, *D. chenthushenae*) are known to infect largescale silver carp. Since largescale silver carp are very similar to silver carp, they can likely host the Asian carp tapeworm, *Bothriocephalus acheilognathi*. This parasite, which is often fatal, has been found in several species of native fishes, including endangered species, and is known to occur in silver and bighead carp.

Hybridization with native fishes is highly unlikely. Largescale silver carp can hybridize with silver carp and possibly bighead carp, both of which are present in U.S. waters.

Alternative 2: Add Live Largescale Silver Carp, Gametes, Eggs and Hybrids

Prohibiting the importation and interstate transportation of largescale silver carp will help protect native fishes, wildlife and humans in large river systems and their tributaries. Only positive impacts to native species will result from listing largescale silver carp.

8.3) Impacts to Threatened and Endangered Species

Alternative 1: No Action

Adverse effects of largescale silver carp to threatened and endangered freshwater fishes would most likely come about through direct competition for food resources, particularly phytoplankton and, to a lesser extent, zooplankton, in the water column during the larval stage. Largescale silver carp and their hybrids have the potential to alter food webs and ultimately alter nutrient and energy cycling in aquatic communities. The most likely effect would be an alteration of fish community structure through competition for food. Candidate fishes and mussels would likewise be at risk. Potential for direct predation and injury of drifting fertilized eggs and larvae of native fishes exist. Mussels are also filter feeders but live partly or totally buried in the substrate. Their association with the benthic environment means that they would be less likely to be affected by filter-feeding largescale silver carp or their hybrids. Largescales feed in the water column at night. Changes in the fish community structure caused by largescale silver carp or their hybrids could easily have adverse effects on abundance and availability of host fishes required for mussel reproduction.

It is highly likely that largescale silver carp and particularly their hybrids with silver carp would have adverse effects on designated critical habitats of threatened and endangered species. Of the fishes and mussels with designated critical habitat, 26 inhabit lakes or reaches of streams large enough to support hybrids of largescale silver carp and silver carp.

Native species may be placed in danger of extinction as a result of the introduction or establishment of largescale silver carp if pure stock became established in subtropical or tropical waters in the United States. However, there is a higher risk for negative impacts to native fishes from largescale silver carp hybrids. Large populations of hybrids could alter native fish community structure, ultimately resulting in decline of native mussels since many rely on native host fishes for reproduction. The fact that hybrids with silver carp have potential to become abundant and reach a very large size, > 1 m in length, in rivers, lakes, and reservoirs,

increases the probability of a negative impact on aquatic ecosystems should largescale silver carp be introduced and establish.

Alternative 2: Add Live Largescale Silver Carp, Gametes, Eggs and Hybrids

Adding largescale silver carp to the list of injurious wildlife will help protect threatened and endangered species in large river systems and tributaries. No negative impacts to threatened and endangered species will result from listing largescale silver carp. Largescale silver carp have the potential to negatively affect threatened and endangered species biodiversity, distribution and abundance. Fish, turtles and waterfowl that rely on phytoplankton, zooplankton and detritus as food may also be impacted by largescale silver carp in natural waters.

8.4) Cumulative Impacts

Alternative 1: No Action

The No Action alternative refers to no action being taken to list largescale silver carp as an injurious species under the Lacey Act, which would allow their importation and interstate transport.

Releases of closely related species, the silver and bighead carps, into natural waters of the United States have occurred. Should largescale silver carp be imported into the United States for use, and should they escape into natural waters, the species could likely hybridize with silver carp, and possibly bighead carp, in waters where silver and bighead carp are currently established. Under the no action alternative, largescale silver carp may be used and transported among states. The risk of floods in states where largescale silver carp could be utilized in the future exists, as does the potential for escapement through transport accidents.

Silver and bighead carps now outnumber the catch of native species sought after commercially in several waters of the Midwest. Declines in native fishes, particularly of planktivorous species, are well documented from several other countries in which these fishes have been introduced. Given examples of declines in native fishes after the introduction of bighead and silver carps, it is reasonable to expect similar declines in native fishes in the United States, particularly those that rely heavily on plankton as a food resource, if largescale silver carp or any hybrids with silver carp are introduced. The species could become established in additional U.S. waters, thereby potentially degrading native fish stocks and impacting humans.

Since effective measures to control or eradicate introduced fish populations are not currently available, the ability to rehabilitate or recover ecosystems that would likely be disturbed by the largescale silver carp, should they be introduced, is low. There would likely be considerable impacts to native fishes and wildlife resources if largescale silver carp established in U.S. waters. Re-establishment of impacted populations, if biologically possible, would be labor and cost intensive and would depend on eradication of largescale silver carp within the habitat. Controlling the spread of pathogens that largescale silver carp may carry into the United States would be highly unlikely.

If no action is taken to prohibit the importation and transportation of largescale silver carp, release or introduction of this species to waters of the U.S. will likely add to the cumulative impacts that have already impacted native species.

Alternative 2: Add Live Largescale Silver Carp, Gametes, Eggs and Hybrids

Listing live largescale silver carp, gametes, viable eggs and hybrids as an injurious species under the Lacey Act, would prohibit their importation and interstate transport. This action will legally prevent live largescale silver carp from being brought into the United States, thereby preventing the introduction of largescale silver carp into U.S. waters through live market transportation, prayer release, baitfish movement and flood events, unless illegally imported.

Releases or escapes of silver carp into natural waters of the United States have occurred at facilities through flooding and human movement and this could happen with largescale silver carp without any action taken to prohibit their importation and interstate transport.

No effective and feasible tools are currently available to manage or eradicate any populations of largescale silver carp in open river systems, should they establish.

8.4) Summary Table of Environmental Consequences by Alternative

Impacts	Alternative 1: No Action	Alternative 2: (List as Injurious Live Largescale Silver Carp and Hybrids)
Ecological impacts	Likely water quality degradation if largescale silver carp and hybrids introduced and established in U.S. waters	Greatly reduced risk
Impacts to native fish	Likely negative impacts if largescale silver carp and hybrids introduced and established in U.S. waters	Greatly reduced risk
Impacts to threatened and endangered species	Likely negative impacts to listed species if largescale silver carp and hybrids introduced and established in U.S. waters	Greatly reduced risk
Cumulative impacts	Risk of additional negative impacts to native species, threatened and endangered species and humans will not be reduced.	Greatly reduced risk

9) List of Preparers

Erin Williams, U.S. Fish and Wildlife Service, Branch of Invasive Species, Fish and Wildlife Biologist, 4401 North Fairfax Drive, Room 322, Arlington, VA 22203

10) References

Kolar, C., Chapman, D., Courtenay, Jr. W., Housel, C., Williams, J., and D. Jennings. 2005. Asian carps of the Genus *Hypophthalmichthys* (Pisces, Cyprinidae) – A Biological Synopsis and Environmental Risk Assessment. U.S. Geological Survey deliverable to U.S. Fish and Wildlife Service under interagency agreement 94400-3-0128.