Management Plan for the Conservation of **American White Pelicans** in Idaho 2016-2025

Prepared by **IDAHO DEPARTMENT OF FISH AND GAME**

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Executive Summary

PELICAN CCBY IDAHO FISH AND GAME

Numbers of American white pelicans (*Pelecanus erythrorhynchos*), including adult nesting birds, have increased dramatically in southern Idaho since 2002. These increases have been well documented at Idaho's main two nesting colonies located on islands in Blackfoot Reservoir and Lake Walcott (Minidoka National Wildlife Refuge [NWR]). Numbers at Minidoka NWR increased from approximately 400 breeding birds in 2002 to more than 4,000 breeding birds in 2008. The Blackfoot Reservoir colony increased from approximately 1,400 breeding birds in 2002 to 2,400 breeding birds in 2008. Since implementation of the 2009 pelican management plan, the Blackfoot and Minidoka colonies have averaged 2,126 breeding birds/yr (range 724-3,174) and 3,400 breeding birds/yr (range 1,998-4,408), respectively. Pelicans established a new breeding colony at Island Park Reservoir in 2012 with approximately 300 breeding birds, increasing to over 600 birds by 2015. Pelican distribution and abundance has increased at other water bodies throughout southeastern Idaho.

Increases in pelican populations are generally considered as positive contributions to pelican conservation goals in the western population, but the increased number of pelicans has also resulted in documented predation impacts on native cutthroat trout and other important recreational fisheries in southern Idaho. Idaho Department of Fish and Game (IDFG) believes there is a need to develop an approach to manage impacts of pelicans on native trout and sport fisheries in Idaho that balance conservation and recreation interests for both birds and fish.

IDFG has conducted numerous management actions in recent years in an attempt to reduce impacts of pelicans on trout in the Blackfoot Reservoir-Blackfoot River complex. Trout stocking practices were modified to reduce opportunistic predation by pelicans. Significant hazing actions (noise making and bird wires), with lethal reinforcement, have been conducted in an attempt to reduce pelican predation on migrating Yellowstone cutthroat trout (*Oncorhynchus clarkii bouvieri*). Lethal actions have been authorized by the U.S. Fish and Wildlife Service through a depredation permit in an attempt to increase the effectiveness of hazing. Modifications to the nesting island, hazing at the nesting island, and USFWS-permitted egg/nest destruction have been used to reduce the number of nesting pelicans and their productivity.

This document represents the IDFG-proposed ten-year management plan (2016-2025) for reducing pelican predation on fish in areas where current management conflicts exist. The plan identifies both statewide and regional pelican population and management objectives. In southeast Idaho (IDFG Southeast Region), where impacts of avian predation on fish are greatest, the regional population objective (established in 2009) is to maintain a five-year average of 700 breeding pelicans at Blackfoot Reservoir. The colony objective for Minidoka is to maintain 1,800 breeding birds, and the objective for Island Park is 300 breeders. Collectively, management objectives are intended to reduce pelican predation on migrating native cutthroat trout, and to reduce pelican predation on sport fish in other important recreational fisheries.

The overall goal of this plan is to maintain viable breeding populations of pelicans in Idaho while reducing impacts to native fish and recreational fisheries. Emphasis is on reducing predation rates in fisheries in southern Idaho through a combination of management actions that include hazing of foraging birds, manipulation of nesting habitat, and/or directly limiting pelican production and recruitment. Comprehensive monitoring of both bird and fish populations will facilitate an adaptive management approach throughout the life of this plan.

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PELICAN CCBY IDAHO FISH AND GAME

Introduction

ADULT PELICANS CCBY IDAHO FISH AND GAME

American white pelicans (*Pelecanus erythrorhynchos*; pelican) breed at three nesting colonies in Idaho and abundance of breeders has increased significantly since the 1990s. The pelican colony on Blackfoot Reservoir increased from approximately 200 breeding birds in 1993 to almost 2,400 in 2008. The colony at Minidoka National Wildlife Refuge (NWR) experienced similar growth, reaching over 4,400 breeding birds in 2012, and pelicans established a new breeding colony at Island Park Reservoir in 2012. Increases in pelican distribution and abundance were documented throughout southern Idaho through 2010, generally coinciding with documented population increases at the nesting colonies. Since 2010 the statewide breeding population has fluctuated annually, with a most-recent 5-year average of 5,600 breeding pelicans. In Idaho, pelicans predominantly forage on abundant populations of nongame fish resulting in non-consequential or acceptable impacts to other resource values and users. However, pelican predation in some areas measurably impacts sport fishing and native trout conservation programs, creating conflict between pelican and fisheries management objectives.

Based primarily on the documented conflict between increasing pelican predation and native Yellowstone cutthroat trout (*Oncorhynchus clarkii bouvieri*; YCT) in the Blackfoot River drainage, Idaho Department of Fish and Game (IDFG) developed a five-year pelican management plan in 2009 (IDFG 2009). Emphasis was on maintaining viable populations of breeding pelicans in Idaho while reducing predation on YCT and other fisheries. Since 2009 IDFG has actively monitored pelican populations and, in coordination with the U.S. Fish and Wildlife Service (USFWS), implemented a number of measures at Blackfoot to reduce predation impacts. IDFG has also completed several projects to document direct pelican predation impacts at Blackfoot and other southern Idaho fisheries which help describe the scope of conflicts. This new information serves as a basis on which to update the 2009 plan. An adaptive approach to managing pelican predation conflicts, and ongoing monitoring of both pelicans and fisheries, will be required to ensure an appropriate balance between pelican conservation goals and other public resources.

Plan Goals and Objectives

The overall goal of this plan is to establish a management framework which ensures viable breeding populations of pelicans in Idaho while reducing impacts to native trout and recreational fisheries. Emphasis is on reducing predation rates through a combination of management actions that could include hazing and lethal reinforcement of foraging birds, manipulation of nesting habitat, and directly limiting pelican production and recruitment by removing or oiling eggs. Comprehensive monitoring of both pelican and fish populations will facilitate an adaptive management approach throughout the duration of this plan.

American White Pelicans

Population Status and Trends

Rangewide

The continental population of pelicans experienced long-term declines until the 1960s (Knopf and Evans 2004). The population has subsequently experienced a steady increase since the 1980s, likely due to the decrease in the use of organochlorine pesticides, increased federal and state protection, and the adaptability of pelicans (Keith 2005). The most current continental estimate, using survey data from 1998-2001, was 134,000 breeding pelicans in North America (King and Anderson 2005) and an unknown number of non-breeding individuals.

Western Population

In the early 1900s, there were approximately 24 breeding pelican colonies in the western population segment, and 60,000 breeding birds (compilation of data from: Schaller 1964; Shuford 2005; Keith 2005; D. Withers, pers. comm.; Luft, pers. comm.). According to the USFWS (USFWS 1984), this included four colonies in Idaho. By the late 1970s, the western population declined to eight colonies and 16,000 breeding birds, none of which were in Idaho. Pelicans of the western population are an example of a "boom-and-bust" species (Anderson and King 2005), with breeding colonies fluctuating in size and productivity from year to year. In less than a five-year period, the number of nesting birds and/or nest success at particular colonies can vary by 50–100% or more. Changes in colony size from year to year may not be reflected in the pelican population as a whole or in the number of birds using local areas during the nesting season.

Following the decline in pelican abundance in the western population, the USFWS drafted the "Guidelines for the Management of the American White Pelican, Western Population" in 1984, in hopes of establishing or reestablishing colonies in the West to avoid potential ESA listing of the western pelican population. The western population subsequently increased through the 1990s to a peak of 46,000 breeding birds, and has since remained relatively stable (Moulton et

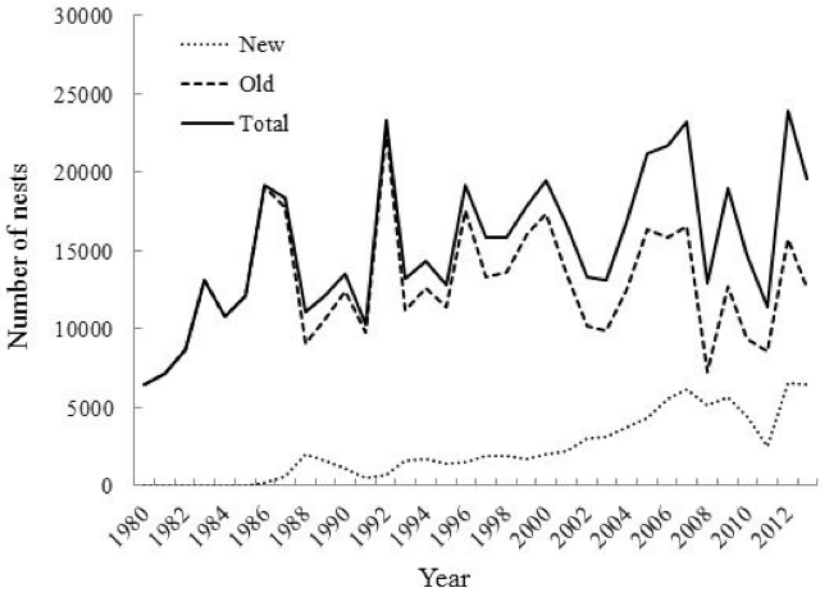

Figure 1. Number of nests reported from western American white pelican colonies from 1980-2013, with a comparison between the number of nests from five colonies which have been continuously active since at least the 1960s ("Old") and four colonies that are new or re-established since 1980 ("New").

al. In Review; Fig. 1). Three new colonies were established in the early 1990s and include Arod Lake (MT), Canyon Ferry Lake (MT), and Badger Island on the Columbia River (WA). Since 2007, three additional colonies have become active. These include Malheur NWR (OR), which was inactive for a number of years but has been used consistently by breeding birds since 2010, Miller Sandspit (WA; established in 2010), and Island Park Reservoir (ID; established in 2012). Current (2014) information indicates the western population includes 18 colonies (four were inactive in 2014) and approximately 43,000 breeding birds (Pacific Flyway Council 2015; Fig. 2). In 2014 approximately 92% of the breeding population was distributed among six colonies; these include the colonies at Minidoka NWR and Blackfoot Reservoir. Idaho currently supports approximately 16% of the western pelican breeding population and is the third largest relative contributor to this population (Fig. 3).

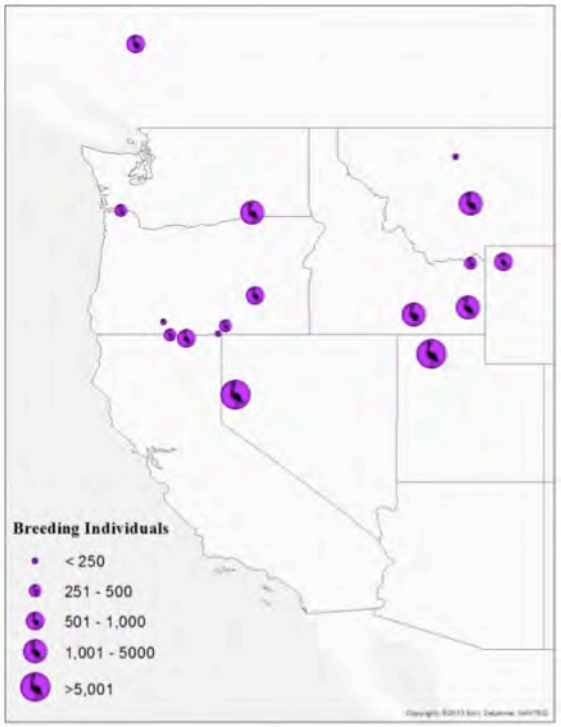

Figure 2. Current locations and relative sizes (average of 2010-2014 nest counts) of western pelican colonies.

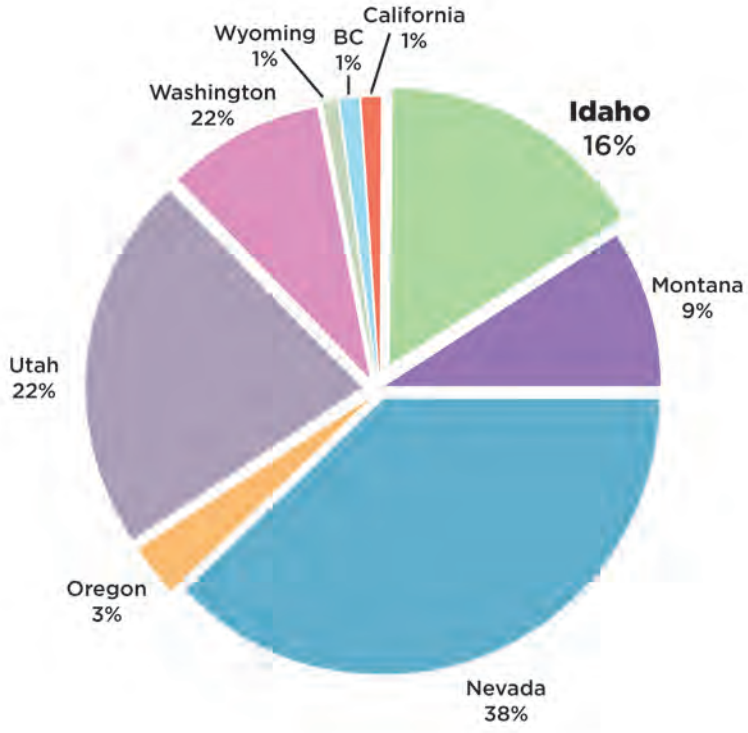

Figure 3. Relative contribution by state and province of breeding adult American white pelicans in the western population (these data represent population estimates from the 2014 Pacific Flyway range wide survey effort).

Data provided by: Ministry of Environment (Canada), Montana Fish, Wildlife & Parks, National Park Service, Oregon State University, U.S. Fish and Wildlife Service, Utah Division of Wildlife Services, and Washington Department of Fish and Wildlife.

Idaho

The three documented nesting colonies in Idaho are located at Blackfoot Reservoir, Minidoka NWR, and Island Park Reservoir. It is assumed that the Blackfoot Reservoir colony (Gull Island) originated shortly after the construction of Blackfoot Reservoir in 1910. Local anglers deterred successful nesting at this site as late as the early 1960s (Burleigh 1972; USFWS 1984). Surveys conducted in the mid-1980s documented adult birds but no evidence of nesting (Trost 1985). In 1991 and 1992, IDFG contracted with USDA Wildlife Services to remove native predators (badgers) from Gull Island. The following year (1993) was the first record of pelican production at Blackfoot Reservoir when 80–100 nearly-fledged young were observed (Trost and Gerstell 1994). IDFG began surveying the colony in 2002 and counted 1,352 breeding birds. The colony increased to a peak of 3,418 breeding birds in 2007 and has averaged 1,860 breeding birds the last 5 years (range 724–3,034; Fig. 4). In 2010, IDFG began installing nest exclusion fences and flagging to reduce the habitat available to nesting pelicans at the Blackfoot Reservoir colony.

The Minidoka NWR colony in Lake Walcott was active in the early 1910s, but became inactive in the late 1950s, likely as a result of disturbance from recreational boating near the nesting islands (USFWS 1984). Pelicans were successful at reestablishing this colony in the 1980s. Similar to the Blackfoot colony, this colony increased steadily to a peak of 4,408 in 2012, and has averaged 3,400 breeding birds the last 5 years (range 1,998–4,408; Fig. 4).

The Island Park Reservoir colony on Trude Island became established in 2012. There are no prior records of pelicans nesting in this location. There were approximately 300 and 460 breeding birds during 2012 and 2013, respectively, but no fledglings were produced. The colony was

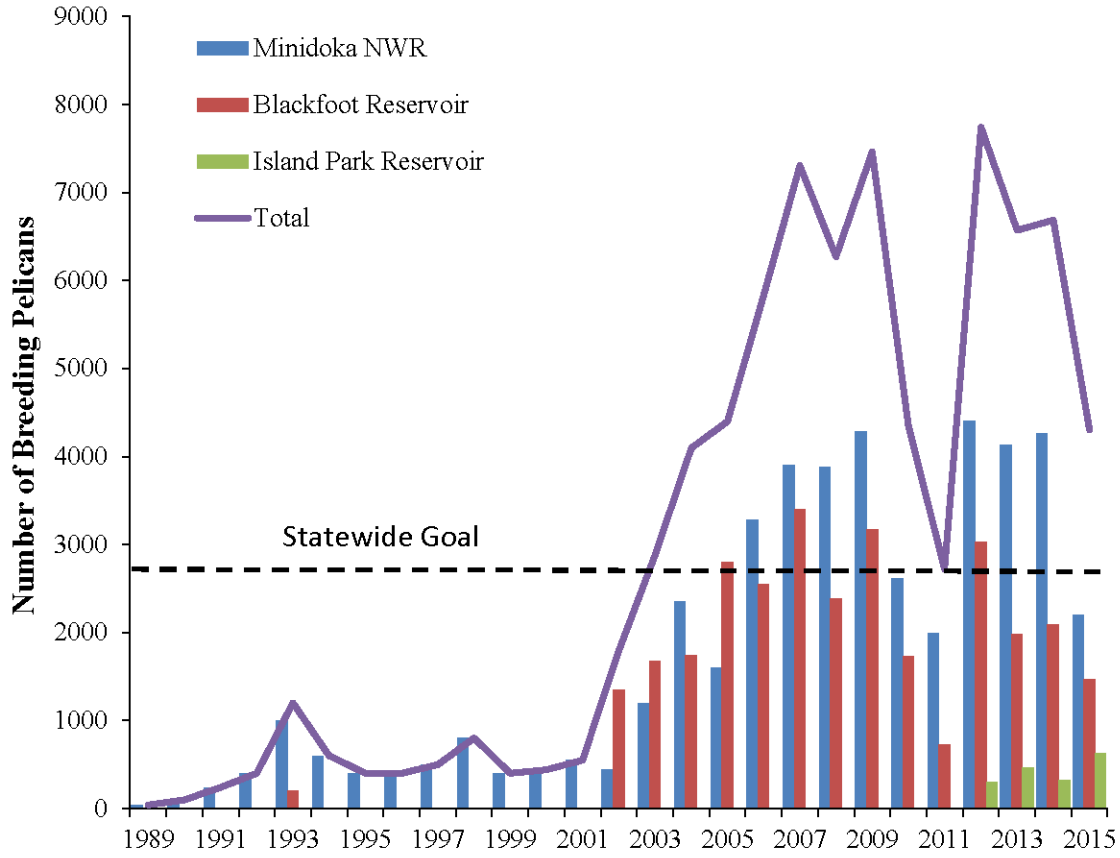

Figure 4. Estimated number of breeding pelicans at Idaho's three nesting colonies during annual nest counts, 1989-2015. Counts were conducted once per season during the peak nesting period. For Blackfoot Reservoir, the gap between 1993 and 2002 reflects lack of survey effort, not necessarily absence of pelicans.

successful in 2014 when 326 breeding birds produced 88 young (Fig. 3). In 2015, 632 birds bred on the island; the colony was successful at producing young, but a count was not conducted.

Ecology

The American white pelican is the second largest bird in North America, next to the California condor (*Gymnogyps californianus*). They are colonial-nesting, long-lived, fish-eating birds. The typical lifespan of a pelican is 12–14 years, although the maximum reported lifespan is 26.4 years (Clapp et al. 1982). During the breeding season, pelicans predominantly use isolated, permanent islands in freshwater lakes or ephemeral islands in shallow wetlands (Knopf and Evans 2004). In Idaho, pelicans currently nest successfully only on isolated islands within managed reservoirs. Winter range typically includes southern and western coastal marine habitats, including shallow coastal bays, inlets, and estuaries (Chapman 1988). However, band returns from pelicans banded as fledglings in Idaho indicate that most winter inland on reservoirs and large rivers that remain ice-free. Birds usually winter where minimum January temperature stays above 40º F (Root 1988), although some birds banded in Idaho have been observed over-wintering in the Salt Lake, Utah area.

Taxonomy and Distribution

Breeding range for the pelican is from Canada through Minnesota, the Dakotas, Montana, Wyoming, Colorado, Utah, Nevada, California, Oregon, and Idaho. Pelicans are divided into two distinct populations (eastern and western) based on their breeding and wintering distributions, as reflected in banding data, and the contrasting ecological conditions they inhabit. Most pelicans from the western population (including Idaho's birds) breed west of the Continental Divide. Winter range includes the Pacific coast from central California south to Mexico and the Yucatan Peninsula. Pelicans migrate annually, traveling to northern breeding grounds during the spring, and returning to winter range during the fall.

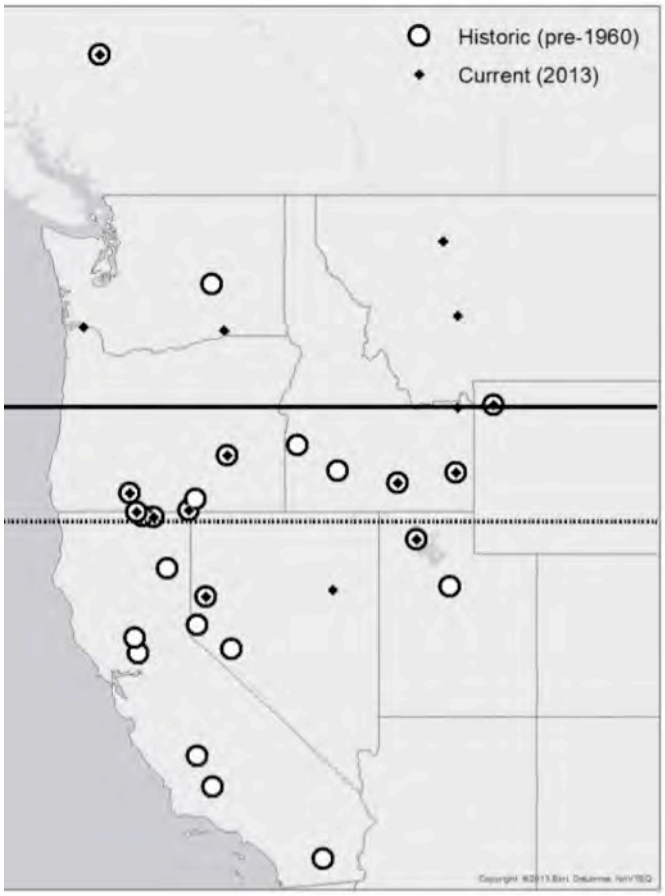

Figure 5. Historic (pre-1960) and current (2013) distribution of western American white pelican colonies. The dashed black line represents median latitude of historic colonies and the solid black line represents median latitude of currently active colonies.

Distribution changes resulting from colony inactivity and new colony establishment have resulted in a change in the mean and median latitude of western pelican colonies since the 1960s. While much of the initial change was the result of the historic colony loss in southern and central California, primarily from water diversion (Shuford 2005), recent changes have been a result of new colonies becoming established at higher latitudes. The current median location of active colonies is 44.01 degrees latitude (Moulton et al. In Review). This represents a 2.57 degree northward change in latitude, which is a 285 km shift over 53 years. Currently, Anaho Island (Pyramid Lake, NV) is the southernmost active colony; there were seven other historic colonies at lower latitudes that have not been active since the 1970s (Fig. 5). Of the ten colonies that are new or reestablished since the 1980s, all are at

40 degrees latitude or higher and their median latitude is 45.24 degrees. The most recently established colony, at Island Park Reservoir (ID), is located less than 1 km from the current median latitude.

JUVENILE PELICANS CCBY IDAHO FISH AND GAME

Breeding

Pelicans breed colonially on isolated islands in lakes of the inland northern U.S. and Canada, and require minimal disturbance at the nesting colony for successful nesting and rearing of young. When disturbance is significant, pelicans may abandon their nests or young (Knopf and Evans 2004). Breeding begins at age 3 (Sloan 1982), and individuals may breed each year thereafter (Knopf and Evans 2004). Although pelicans lay two eggs per clutch, it is rare for more than one chick to fledge. Young are capable of flight at 9–10 weeks and typically begin leaving the colony in late August to early September (O'Malley and Evans 1982).

Reproductive Success and Survival

Average annual productivity (chicks fledged / nest) in the western population has declined over the last 30 years, from 0.78 in the 1980s to 0.38 during 2003-2013 (Moulton et al. In Review). Despite this trend, overall abundance of breeding birds in the west has been stable or increasing over the last 30 years (Fig. 1), and Idaho populations have increased dramatically (Fig. 4). At the Blackfoot Reservoir colony productivity has averaged 0.34 from 2007 to 2014 (range 0.13 –0.60; see Southeast Region for details). After fledging, mortality has been estimated at 41% through the first year, 16% in the second year, and a mean of 21.3% for the third through thirteenth year (Strait and Sloan 1974).

Feeding Habits

Pelicans require shallow water (typically 1–2 ft; Ivey and Herziger 2006), or fish that can be reached within 3.3 ft of the surface of deep water (Finholdt and Anderson 1995). Pelican diets are predominantly comprised of nongame fish such as chubs, suckers (*Castostomus* sp.), and carp (Knopf and Evans 2004, Teuscher 2004). However, pelicans are opportunistic foragers, selecting sites and prey that are most readily available (Hall 1925; Knopf and Kennedy 1980, 1981; Lingle and Sloan 1980; Flannery 1988; Findholt and Anderson 1995). They are cooperative feeders that herd schools of fish to shore (or toward a culvert/weir) by forming a herding wing. Foraging groups are generally less than 10 birds, but can be up to 300 birds. Pelicans are capable of successfully foraging at night. Nestlings close to fledging are fed approximately 2.4 lbs of fish once a day (Knopf and Evans 2004). Breeding adult foraging requirements have been estimated at 4.0 lbs per day (20–40% of body mass). Total food to rear one young to fledging was estimated to be 150 lbs (Hall 1925). During the breeding season, foraging sites generally need to be within 50 miles of the nest colony, but it is not uncommon for

pelicans to regularly travel up to 80 miles to find food (Findholt and Anderson 1995, D. Withers, pers. comm.). Using PIT-tagged fish, Meyer et al. (2016) documented foraging distances up to 120 miles from Idaho colonies. Idaho likely provides foraging habitat for nesting birds from Utah's colony at the Great Salt Lake (~22% of the western population), and migrating birds from Utah, Montana, and Wyoming (~32% of the western population).

Conservation status

Standard natural heritage methodology developed by NatureServe is used to compile population data and to assess current conservation condition across a species' range and within individual states and provinces (http://www.natureserve.org/aboutUs/network.jsp). In 2008, NatureServe ranked pelicans rangewide as G4, or "apparently secure." The reasons cited for the ranking were that the population included more than 120,000 breeding birds, and had increased greatly since the 1960s, but remained highly vulnerable to disturbance, with continued concerns regarding habitat protection and increased incidence and severity of disease (NatureServe 2015). Current threats to the western population include relatively few colonies, large fluctuations in colony size and productivity, hydrological alterations, disease pandemics, and possibly West Nile virus (Moulton et al. In Review, Murphy and Tracy 2005, Rocke et al. 2005, Shuford 2005).

The same methodology was used by IDFG (a member program of NatureServe) in 2015 to calculate a state conservation rank of S3B, or "vulnerable." Other efforts to assess the conservation status of the pelican include Audubon's watchlist (status is "green" for the pelican indicating no current conservation concerns), and North American Waterbird Conservation Plan's (NAWCP) Conservation Concern List (pelican categorized as "moderate concern" - species that are either declining with moderate threats or distribution, stable with known potential threats and moderate to restricted distributions, or relatively small with restricted distributions).

State classification

Pelicans are classified as a species of greatest conservation need in all eight western states in which they breed, are listed as state-listed endangered in Washington, and are classified as endangered in British Columbia. In Idaho, pelicans are classified under the Idaho Administrative Procedures Act (IDAPA) as "protected nongame". The Idaho State Wildlife Action Plan (SWAP) identifies the pelican as one of 205 "species of greatest conservation need" due to (1) a low number of breeding colonies in Idaho, and (2) a vulnerable rangewide conservation status (IDFG 2016). Specific conservation actions identified in the SWAP include working with the Pacific Flyway Council's Nongame Technical Committee to develop and implement a wetland connectivity assessment to address impacts of drought, analyze trends in population size and productivity, and determine current survivorship rates.

PELICAN EGGS CCBY IDAHO FISH AND GAME

Fisheries Conflicts

Native Trout

Yellowstone Cutthroat Trout

YellowstoneCutthroatTrout CCBY Joesph Tomelleri

In Blackfoot Reservoir and the Blackfoot River drainage above, IDFG's primary fisheries management objective is to recover the native cutthroat population, including the adfluvial component that rears in the reservoir and ascends the river to spawn. This fishery collapsed by the 1980s primarily due to overharvest, prompting development of a Blackfoot River Management Plan (Labolle and Schill 1988). In 1990 IDFG began restricting angler harvest and by 1998 both the reservoir and the river above were closed to YCT harvest. The cutthroat trout population responded dramatically, increasing from a few hundred spawning fish to an estimated run of over 4,700 spawners in 2001. Despite the early success of harvest closures, the run collapsed to a low of only 16 fish in 2005 and has since remained low with an average run size of about 650 (range 19 to 1,843). This more recent YCT trout collapse coincided with a rapidly expanding pelican breeding colony on Blackfoot Reservoir and increases in pelican use of the Blackfoot River to forage (Teuscher and Schill 2010). Subsequent work by IDFG staff has documented that pelican predation rates on adult and juvenile cutthroat trout generally exceeded 20%, with the highest values above 60% (Teuscher et al. 2015).

Pelicans have also been observed foraging on other YCT spawning runs in southeast and eastern Idaho. McCoy Creek, a tributary to Palisades Reservoir, also supports a spawning run of YCT. As many as 250 pelicans have been observed foraging at the mouth of McCoy Creek during the cutthroat spawning run. At Henry Lake, large flocks of pelicans assemble around the mouths of key YCT spawning tributaries in spring, and also in mid-summer when YCT and other trout use these tributaries as thermal refugia. Specific predation rates and impacts to populations and/or fisheries have not been quantified in these locations. All of these YCT spawning streams are managed with restrictive seasons and bag limits to reduce or eliminate angler harvest, and managers are concerned that unmanaged pelican predation will negate the benefits from harvest closures, habitat improvements, and other actions to conserve YCT.

Bonneville Cutthroat Trout

BonnevilleCutthroatTrout CCBY Joesph Tomelleri

The Bear Lake population of Bonneville cutthroat trout (*Oncorhynchus clarki utah*; BCT) is the only natural adfluvial stock existing in Idaho, with key spawning habitat in Fish Haven Creek and St. Charles Creek. Since 2002, pelicans have been observed foraging in spring at the mouth of St. Charles Creek, which is the most important spawning tributary for BCT in Bear Lake (IDFG and USFS 2007). Spawning BCT are particularly vulnerable to pelican predation in drought years when tributary flows are below average and Bear Lake elevation is low. These conditions have occurred about 5 of the last 10 years. No direct estimates of pelican predation rate are available for Bear Lake tributaries, but based on extensive experience at Blackfoot IDFG believes that BCT conservation goals may be compromised in some years. The IDFG and other conservation partners have spent considerable effort restoring

and reconnecting stream habitats in both of these important Idaho tributaries. In order to be successful in building spawning runs to viable levels in both tributary systems, pelican predation must be appropriately managed.

Other Sport Fisheries

Avian predation impacts at Blackfoot Reservoir extend beyond native YCT and have also affected other sport fishing opportunity in the reservoir. Teuscher (2004) and Teuscher et al. (2005) documented significant avian predation on stocked rainbow trout. While over 96% of pelican diets was nongame fish (Teuscher 2004), the small proportion of the diet that was composed of rainbow trout amounted to a total weight of 7.6 tons, similar to the total weight of trout stocked during the study. Both pelicans and cormorants opportunistically forage on trout in Blackfoot Reservoir, but predation on rainbow trout was significantly higher immediately following stocking events. Pelican counts near the trout stocking site increased from 21 birds the day prior to stocking to 150 birds the day after stocking. During the first week after stocking, an estimated 27% (150,000) of the newly-stocked hatchery rainbow trout were lost to bird predation (Teuscher et al. 2005). Over the 90-day period, total rainbow trout consumption by pelicans and cormorants was an estimated 7.7 tons, which was 102% of the total weight of hatchery trout stocked in 2003 (7.5 tons). This prompted a change to a fall stocking strategy in 2005 to avoid avian predation. Subsequent fish population monitoring in the reservoir indicates increases in overall hatchery trout abundance since the shift to fall stocking.

Since completion of the 2009-2013 pelican management plan (IDFG 2009), IDFG has examined broader impacts of pelican predation on other fisheries in southern Idaho. Meyer et al. (2016) used fish tagged with Passive Integrated Transponder (PIT) tags to estimate the proportion of stocked hatchery trout consumed by pelicans for 19 stocking events over three years at various southern Idaho waters, and compared rates of pelican predation to angler catch for those same waters (see summary tables and figures in Appendix I). Pelican predation on hatchery trout averaged 17% and ranged from 0-48%, whereas angler catch averaged 20% and ranged from 0% to 82%. Pelican predation rate was inversely proportional to distance from the nearest colony and inversely proportional to angler catch (Appendix I). The highest pelican predation rates observed were generally at waters within 100 km of the nearest nesting colony except at CJ Strike Reservoir, which was over 200 km from the nearest colony yet still received relatively heavy predation pressure by pelicans in some years. Results indicate that in some southern Idaho fisheries, pelicans are exploiting as many or more catchable-sized hatchery trout than anglers catch, and these two entities are in direct competition for this public resource.

Meyer et al. (2016) noted that most hatchery catchable trout fisheries in southern Idaho are within the foraging range of pelicans nesting at colonies other than Minidoka NWR and Blackfoot Reservoir, such as at Island Park Reservoir (northeast Idaho), Gunnison Island (northern Utah), Malheur NWR (eastern Oregon), Badger Island (eastern Washington), and Molly Island (western Wyoming). In October 2014, biologists recovered 11 PIT-tags on Gunnison Island from four of the study waters (up to 231 km away). At the Island Park Reservoir colony, one PIT-tag was recovered from a hatchery catchable trout stocked in Lake Walcott. The number of pelican-consumed PIT-tags recovered at the Lake Walcott and Blackfoot colonies (n = 383) compared to the Gunnison, Molly Island, and Island Park colonies (n = 12) led Meyer et al. (2016) to conclude that little of the pelican predation occurring in southern Idaho hatchery trout fisheries stems from pelicans breeding at colonies other than Lake Walcott and Blackfoot.

Adaptive Management

The goals, objectives, and actions outlined below will be implemented by IDFG with an adaptive management approach in partnership with other state and federal entities, landowners, and other cooperators. While many non-lethal management actions to reduce predation conflicts such as hazing and habitat alteration can be implemented under IDFG authority, any actions resulting in direct take of eggs or birds must be authorized by USFWS through a depredation permit to the state under guidelines developed by the Pacific Flyway Council (2012). The Pacific Flyway Council guidelines (2012) outline expectations to document depredation conflicts, and to investigate and apply non-lethal techniques to the extent practicable before seeking take authority from USFWS to resolve conflicts.

Since 2009 IDFG has evaluated the utility of several potential management approaches to reduce pelican predation conflicts, dismissing some as impractical and implementing others as resources and federal permit authority allow. A brief summary of management actions considered and/or implemented by IDFG is provided below (for more details see Appendix II).

1. **Increase reservoir water levels to provide fish refugia–***deemed infeasible due to state water law, existing federal water contracts, and expense.*
2. **Modify pelican prey composition (stocking additional species)–***feasible, but deemed impractical & unrealistic.*
3. **Modify hatchery trout stocking strategies–** *feasible on a case-by-case basis, implemented in some locations.*
4. **Provide refugia (physical barriers to separate pelicans and fish)–***feasible in site-specific circumstances but impractical to address the broad scope of documented conflicts.*
5. **Install bird lines in foraging areas–***feasible in specific circumstances but high cost; implemented at Blackfoot, then abandoned for more effective measures.*
6. **Haze birds at foraging, loafing and nesting areas–***feasible in some locations, requires high intensity; implemented intensively at Blackfoot, intermittently on other waters.*
7. **Translocations (establish new nesting colonies)–***deemed infeasible and undesirable as long as statewide abundance exceeds objectives.*
8. **Manipulate nesting habitat–***deemed feasible but labor intensive and costly; implemented at Blackfoot.*
9. **Introduce predators to nesting islands–** *feasible but a risk to non-targeted species, and there are other more efficient methods for take; attempted and failed at Blackfoot.*
10. **Harvest season on birds (by public)-** *deemed infeasible due to federal protections in the Migratory Bird Treaty Act. A harvest would require ammendments to international treaties.*
11. **Oil eggs to limit pelican productivity and/ or recruitment–***feasible; implemented at Blackfoot under USFWS permit.*
12. **Remove eggs to limit pelican colony expansion–***feasible; implemented at Blackfoot under USFWS permit but caused more dispersal than desired.*
13. **Site-specific lethal take of adult pelicans–** *feasible; implemented at Blackfoot under USFWS permit; used only in support of hazing.*

Management Goals, Objectives and Actions

This section describes statewide long-term goals and objectives that are further refined into regional objectives tied to near-term and long-term actions. The Intermountain West Waterbird Conservation Plan established a statewide population objective of maintaining or increasing the current (2005) population of 2,770 breeding birds (2,800 birds, rounded to the nearest 100; Ivey and Herziger 2006). In the absence of other state or flyway population objectives from USFWS, IDFG adopted this statewide objective in 2009 (IDFG 2009) and remains committed to maintaining 2,800 breeding pelicans statewide, regardless of the number of colonies. Actions identified to reduced predation impacts are primarily focused on hazing where conflicts occur, and on managing recruitment at existing colonies, rather than lethal take of adult birds. IDFG remains committed to collaboration with USFWS and the Pacific Flyway Council to monitor pelican populations and refine population objectives as new data become available.

This plan is primarily driven by the need to reduce pelican predation on native fish and important recreational fisheries. The statewide population objectives are split between three pelican colonies. In the 2009 Idaho Pelican Management Plan (IDFG 2009), a pelican population objective of 700 breeding birds was established for the Blackfoot Reservoir breeding colony. This objective was presumed to reflect acceptable rates of pelican predation that would not limit YCT recovery in the Blackfoot drainage. The balance of the 2,800 objective for breeding pelicans was then simply allocated to Minidoka, the only other Idaho colony at that time. The breeding colony at Island Park Reservoir subsequently became established in 2012 (first successful in 2014). The Island Park objective is no more than 300 breeding birds which is expected to keep pelican predation impacts relatively low and also preserve important nesting habitat for other species at this location (see Upper Snake Region section). To achieve the statewide objective the Minidoka colony objective is 1,800 breeding birds, roughly similar to estimated abundance in 2003–2005.

Staff will continue to monitor for new colonies or nesting activities in addition to annual breeding bird counts at the three current colonies in Idaho. As long as statewide abundance exceeds objectives, staff will use dissuasion techniques where possible to prevent establishment of new colonies. If statewide abundance declines to 2,800 or fewer due to colony management or other factors, IDFG staff will allow one or more new colonies to establish at sites that serve to disperse the breeding population.

Statewide

Goal

Maintain a viable population of pelicans while reducing impacts of pelicans on public resources throughout Idaho. See regional sections and statewide coordination section for more details on the following statewide objectives.

Objectives

Objective 1: Manage for a total of 2,800 breeding pelicans at nesting colonies in Idaho; discourage establishment of new colonies until this objective is met.
Action: Present and discuss the statewide population objective with the Nongame Technical Committee of the Pacific Flyway Council.

Objective 2: Implement adaptive management actions at pelican foraging areas to reduce predation on native fishes and important sport fisheries throughout Idaho.

Objective 3: Monitor pelican population trends, distribution, and foraging patterns in Idaho.

Objective 4: Work with other Pacific Flyway states to monitor and analyze broader pelican demographic trends and population parameters; develop a population model to evaluate the influence of state population objectives on viability in the western population.

Objective 5: Communicate and coordinate with federal and state agencies as well as the public regarding strategies for managing pelicans and associated conflicts.

Panhandle, Clearwater, and Salmon Regions

There are currently no nesting colonies in these regions, pelican abundance is relatively low, and conflicts with fisheries or other resources have not been identified. The Panhandle and Clearwater regions participated in statewide pelicans counts conducted during the breeding season (late May/early June) in 2010, and 2012-14. In the Panhandle Region, an average of 260 pelicans was observed (range 173-314), nearly all associated with the Chain Lakes (Coeur d'Alene River) and Hepton Lake (St. Joe River) areas. Average pelican count in the Clearwater Region was just 5 birds (range 0–8). Pelicans are rarely observed in the Salmon Region. Each of these regions will continue to participate in coordinated monitoring to document abundance and distribution trends for pelicans, but no additional data collection or management actions are anticipated for the duration of this plan.

Management Objectives and Actions

Objective 1: In coordination with statewide efforts, monitor pelican abundance and distribution every three years beginning in 2017.
Action: Use ground, boat and aerial survey techniques to census pelican populations.

Southwest Region

Pelican Populations and Trends

There is currently no nesting colony in the Southwest Region. Pelican eggs have occasionally been cast on islands within C.J. Strike Reservoir, but no nest structures have been built and no incubation has been observed. Surveys conducted on regional waters during the breeding season (late May/early June) in 2010 through 2014 documented a regional average of 807 pelicans (range 415–1,247). Pelicans are most commonly observed along the Snake River, at C.J. Strike and Cascade reservoirs, and in Lake Lowell, with other small groups observed throughout the region.

Management Issues

Pelicans are locally/seasonally abundant on some regional waters, but predation impacts to fisheries resources are not known in most locations. C.J. Strike and Cascade reservoirs were the only regional waters included in the southern Idaho pelican predation study (Meyer et al. 2016; Appendix I). In C.J. Strike, estimated predation rates on hatchery rainbow ranged from 4% to 48%, suggesting that in some years pelican predation can significantly impact angler harvest opportunity. At C.J. Strike, years with higher predation rates coincided with lower angler catch.

Strategies Implemented

Regional staff have monitored potential nesting habitat on C.J. Strike annually to determine whether the presence of pelicans and some eggs has resulted in the production of fledglings. Based on recent research, staff have also altered the timing of rainbow trout stocking in C.J. Strike Reservoir. Now, the majority of catchables are stocked during the fall to minimize the time that relatively naïve, recently stocked rainbow trout are available to pelicans.

Management Objectives and Actions

Objective 1: In coordination with statewide efforts, monitor pelican abundance and distribution in the Southwest Region every three years beginning in 2017.

Action: Use ground, boat and aerial survey techniques to census pelican populations in the Southwest Region.

Objective 2: Identify conflicts, prioritize locations, and implement actions where pelican predation prevents the achievement of fish management goals.
Action: As available, allocate resources to minimize predation at highest priority conflict locations.
Action: Continue to modify stocking strategies as feasible where conflicts arise to minimize pelican predation.

Objective 3: Monitor regional waters for establishment of new colonies.
Action: Survey potential nesting islands within regional waters at least once per breeding season to determine if pelicans are attempting to nest.

Objective 4: If successful nesting occurs, and total statewide abundance of breeding birds exceeds the 2,800 objective, preclude future nesting attempts.
Action: Employ physical barriers and/or hazing prior to nesting season to prevent establishment of a new colony.

Magic Valley Region

Pelican Population and Trends

Pelicans are found seasonally throughout the Magic Valley Region. The abundance of suitable breeding, feeding, and loafing habitat combined with abundant forage make this region suitable for pelican persistence. The greatest concentration of pelicans is associated with the Minidoka NWR nesting colony located on Lake Walcott. Minidoka NWR was established in 1909 as a "preserve and breeding ground for

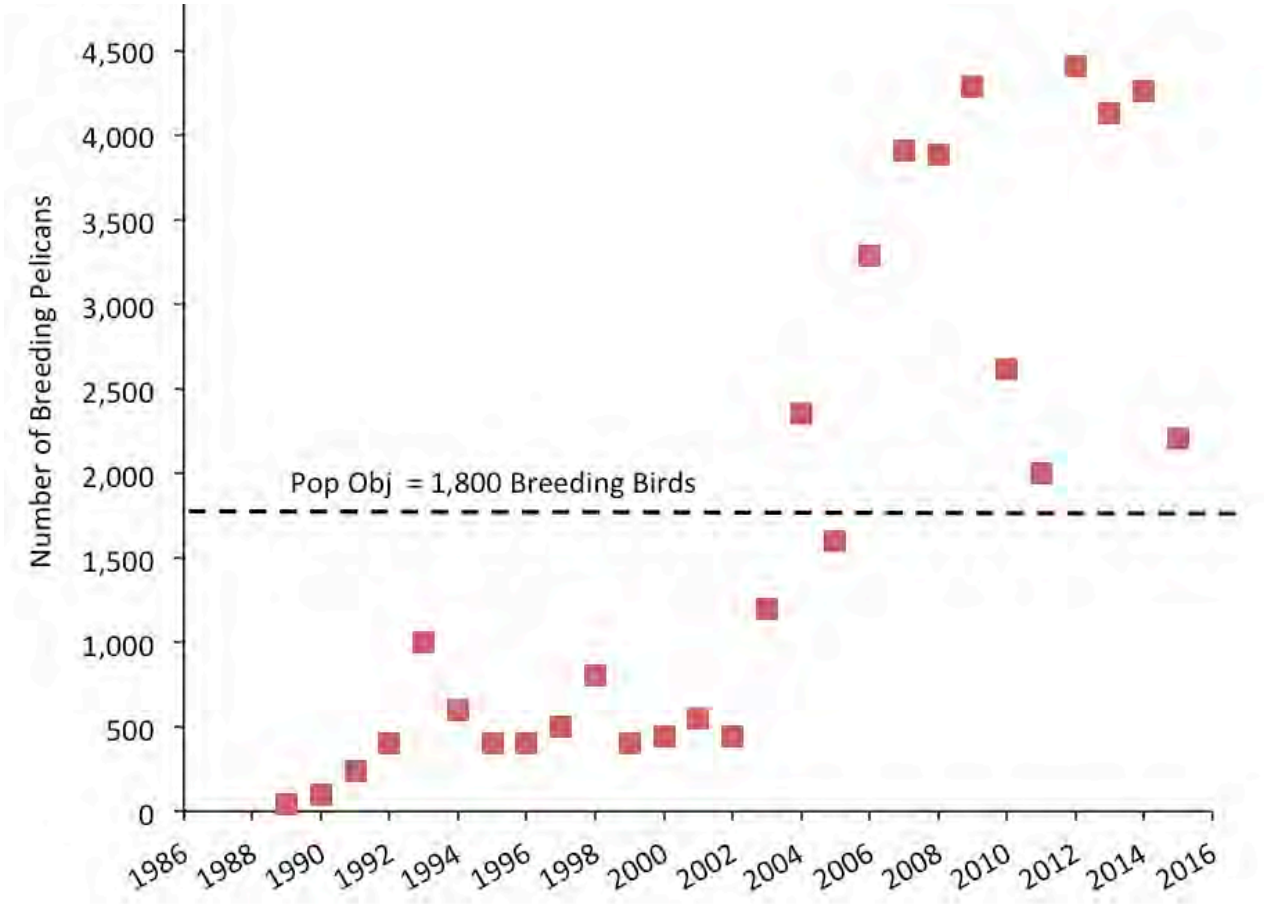

Figure 6. Number of breeding pelicans at Minidoka National Wildlife Refuge, 1989–2015, and the population objective for 2016-2025.

VIDEO STILL CCBY IDAHO FISH AND GAME

Figure 7. Pelican response to mortality disposal at private hatcheries.

native birds". The majority of pelicans generally concentrate along the Snake River corridor; however, birds have been observed in large groups (50-200+ birds) as far north as Anderson Ranch Reservoir and as far south as Salmon Falls Creek and Oakley reservoirs near the Nevada border. It is common to observe large flocks of pelicans thought to be foraging birds associated with the Minidoka NWR colony; however, it is also possible they may originate from other colonies or be non-nesting birds.

The majority of Idaho pelicans are found in the Magic Valley Region during annual spring counts. Both breeding and presumed non-breeding pelicans increased dramatically from 2002 to 2008 and now appear relatively stable. An average of 3,200 pelicans was observed in the region from 2010 through 2014. The breeding bird population objective established in 2009 (2,100 breeding birds) has been exceeded in five of the previous six years (Fig. 6). Despite pelicans exceeding abundance objectives, no specific colony management strategies were developed or implemented from 2009 to present. This was due in part to a lack of data on specific predation impacts, which has since been collected on several regional waters (Meyer et al. 2016).

Management Issues

Increases in pelican abundance over the last two decades have resulted in increasing conflicts at local fisheries. The Magic Valley Region fisheries program includes approximately 60 waters managed with supplemental stocking of hatchery trout. At six of these fisheries included in the Meyer et al. (2016) study, pelican predation rates ranged from 7% to 34% of all stocked trout. In some waters (Lake Walcott, Freedom Park Pond, Magic Reservoir) pelicans were estimated to consume more stocked trout than anglers caught. In general, peak stocking and angling effort in spring and early summer coincides with peak pelican foraging. Impacts to wild fishes are suspected at Anderson Ranch Reservoir (kokanee) and Silver Creek (wild trout). These conflicts are most prevalent near the Minidoka NWR Colony, but are increasing across the region and are a high management priority.

This region has many commercial, State, and Federal aquaculture facilities, most of which are located along the Snake River within 70 miles of the Minidoka colony. Some facilities utilize open mortality pits for daily disposal of dead fish (Fig. 7). This management practice has resulted in pelican scavenging and artificially-high

Table 1. Magic Valley Region fisheries where pelican predation has resulted in management changes and/or has impacted angler opportunity or ability to meet fish management goals.

Fishery	Species[a]	Conflict	Action(s)	Fish mgmt. goals met? (Y/N/Unk.)
Oster Lakes 1–4	Hrbt	Hatchery returns	Increased stocking, hazing	N
Riley Pond	Hrbt/CC	Hatchery returns	Increased stocking, hazing	N
Settling Pond	Hrbt	Hatchery returns	Increased stocking, hazing	N
Filer Ponds	Hrbt	Hatchery returns	Limited hazing	N
Crystal Lake	Hrbt	Hatchery returns	Stopped stocking	N
Anderson Ponds	CC	Hatchery returns	Curtailed catfish stocking	N
Connor Pond	Hrbt	Hatchery returns	Nighttime stocking, reduced stocking, changed stocking season, established warmwater fishery	N
Emerald Lake	Hrbt	Hatchery returns	Nighttime stocking, reduced stocking, changed stocking season, reestablished warmwater fishery	N
Rupert Gun Club Pond	Hrbt	Hatchery returns	Curtailed stocking	N
Freedom Park Pond	Hrbt	Hatchery returns	Reduced stocking	N
Lake Walcott	Hrbt	Hatchery returns	Eliminated fingerlings, changed stocking season	Y
Snake River	Hrbt	Hatchery returns	Increased stocking	Unk.
Magic Res.	Hrbt	Hatchery returns	Changed stocking season	Unk.
Mormon Res.	Hrbt	Hatchery returns	Altered stocking timing, reduced fingerlings	Y
Silver Creek[b]	Nat	Premier wild trout fishery	Limited hazing	Unk.
Salmon Falls Cr. Res.	Hrbt	Hatchery returns	Altered stocking location	Unk.
Anderson Ranch Res.[c]	KoK	Spawner escapement	Limited hazing	Unk.

a Hrbt=Hatchery rainbow trout; Kok=Kokanee; CC=Channel catfish; Nat=Other wild or native fish species.
b Recent increase in number of pelicans on the fishery (past 5 years).
c Pelican predation on spawning kokanee mainly occurs in drought years when kokanee are staged at the mouth of the South Fork Boise River but are unable to ascend the river to spawn. Actual impacts are unknown.

concentrations of birds habituated to this food source. The impacts of these concentrations are not well understood but local conflicts are likely.

Strategies Implemented

There are approximately 17 fisheries in the Magic Valley where fisheries management has been adjusted (mainly stocking) in an effort to avoid or reduce pelican predation (Table 1). When pelicans are present, hatchery personnel haze prior to fish stocking events. On small fishing ponds adjacent to the Hagerman State Fish Hatchery and Wildlife Management Area (WMA), hatchery personnel regularly haze avian predators, including pelicans. In Lake Walcott, stocking of fingerling rainbow trout was discontinued due to poor returns likely associated with avian predation. Lake Walcott is now stocked with fewer catchable-sized rainbow trout late in the season in an attempt to avoid predation. Hatchery trout stocking was discontinued at Emerald Lake and Connor Pond, resulting in a loss of harvest opportunity for anglers in these small ponds. Additionally, channel catfish stocking in Riley Pond was discontinued due to a near complete loss of stocked fish to pelican predation.

Management Objectives and Actions

Objective 1: In coordination with statewide efforts, monitor pelican abundance and distribution in the Magic Valley Region every three years beginning in 2017.
Action: Use ground, boat and aerial survey techniques to census pelican populations in the Magic Valley Region.

Objective 2: Identify conflicts, prioritize locations, and implement actions where pelican predation prevents the achievement of fish management goals.
Action: At high priority waters, implement fish monitoring strategies (Meyer et al. 2016) to assess the predation impacts of foraging pelicans on native fishes and sport fisheries.
Action: As available, allocate resources to intensively haze at highest priority conflict locations (e.g. Silver Creek, Crystal Lake, and Filer Ponds).
Action: Continue to modify stocking strategies as feasible where conflicts arise to minimize pelican predation.

Objective 3: Manage for 1,800 breeding birds at the Minidoka National Wildlife Refuge colony.
Action: Use available data to determine viability of the Minidoka NWR colony under current breeding bird abundance objectives.
Action: Present predation impact data, pelican breeding colony objectives, and management strategies required to meet objectives to USFWS Minidoka Wildlife Refuge staff.
Action: Request and obtain, if possible, authorization from USFWS to implement measures to meet the 1,800 breeding bird objective.
Action: Develop monitoring techniques that are both non-intrusive and effective at monitoring breeding and productivity at the Minidoka NWR colony.

Objective 4: Monitor other regional waters for establishment of new colonies.
Action: Survey potential nesting islands within regional waters at least once per breeding season to determine if pelicans are attempting to nest.

Objective 5: If successful nesting occurs, and total statewide abundance of breeding birds exceeds the 2,800 objective, preclude future nesting attempts.
Action: Employ physical barriers and/or hazing prior to nesting season to prevent establishment of a new colony.

Objective 6: Minimize artificially-high concentrations of scavenging

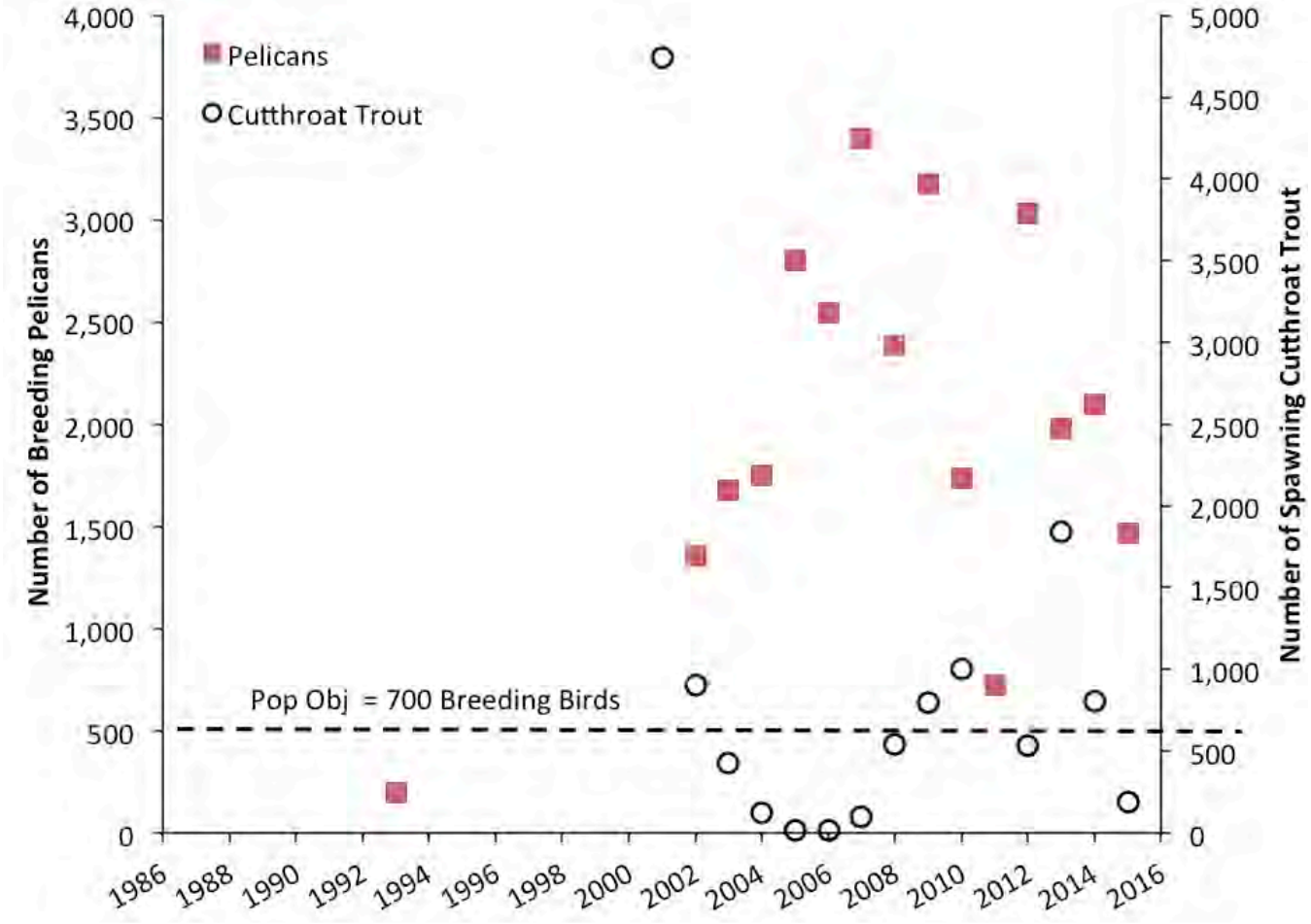

Figure 8. Number of breeding pelicans at Blackfoot Reservoir, 1993 and 2002–2015, and number of spawning cutthroat trout in the Blackfoot River above the Reservoir, 2001–2015.

pelicans which result from open disposal of hatchery mortalities.
Action: Work with private aquaculture facilities to develop best practices for mortality disposal to reduce concentrations of scavenging pelicans.
Action: Assess impacts of implementation on pelican distribution.

Southeast Region

Pelican Populations and Trends

The Southeast Region has one pelican nesting colony, located on Blackfoot Reservoir. Burleigh (1972) reported a nesting attempt in the early 1960s which ended in nest destruction by local anglers. Trost (1985) documented adult birds on Gull Island in the mid-1980s with no evidence of nesting. In 1993, 80–100 nearly-fledged young were observed (Trost and Gerstell 1994). IDFG began annual surveys of the colony in 2002. The number of breeding pelicans increased annually through 2007 when it peaked at 3,418 birds (Fig. 8). Since 2007 the number of breeding birds has fluctuated annually, but with a downward trend.

Management actions to reduce the number of breeding pelicans appear to be having the desired effect on the colony's abundance and the associated potential for predation impacts. In 2010, IDFG began installing nest exclusion fences and flagging to reduce nesting pelican abundance at the Blackfoot Reservoir colony and to restrict nesting to a portion of Gull Island that would accommodate 350 nests. In 2012, IDFG began managing the productivity of nesting pelicans using USFWS-permitted nest destruction. Because pelicans also have attempted to nest on nearby Willow Island and Long Island, IDFG staff have used a variety of dissuasion techniques and nest destruction to restrict use of these islands.

Pelican production (number of pre-fledglings) and productivity (number of pre-fledglings/ nest attempt) has been estimated annually at the Blackfoot Reservoir colony since 2007 (Fig. 9). Productivity averaged 0.39 pre-fledglings/ nest through 2015 but is highly variable from year to year. The highest productivity (0.68) was recorded in 2007 and coincided with the peak number of breeding pelicans. The lowest recorded productivity was 0.13 in 2014, when colony management activities on Long Island resulted in abandonment by other pelicans nesting on that island. Management activities since 2012 to reduce the number of chicks produced at the colony have created some bias in productivity rates estimated by simply dividing number of fledglings by the number of nests initiated. Nest destruction presumably decreases total production compared to an unmanaged colony. Productivity of untreated nests (not oiled nor eggs removed) is substantially higher. For example, since 2012, productivity for untreated nests at Blackfoot averaged 0.60 (range 0.23 to 0.83).

Management Issues

Historically, the upper Blackfoot River Drainage supported angler harvest of tens of thousands of wild YCT. For example, Cuplin (1963) reported harvest of 17,000 and 11,000 cutthroat trout in the upper Blackfoot River in 1959 and 1960, respectively. As the popularity of the fishery increased, angler exploitation became a limiting factor for the population (Labolle and Schill 1988). In 1990, a management plan was implemented to reduce harvest and bolster the wild stock. The first step of that plan was to close harvest on cutthroat trout in the reservoir. In 1998, further protection was afforded by closing harvest of cutthroat trout in the spawning and rearing environments upstream of the reservoir in the Blackfoot River and its tributaries. Over the ensuing decade, the cutthroat trout population responded dramatically. Adult escapement estimates increased from a few hundred spawning fish to an estimated run size of 4,747 in 2001. Despite the early success of harvest closures, the run collapsed to a low of only 16 fish in 2005. Since then, the population has remained low with an average run size of about 650 (range 19 to 1,843). This more recent cutthroat trout

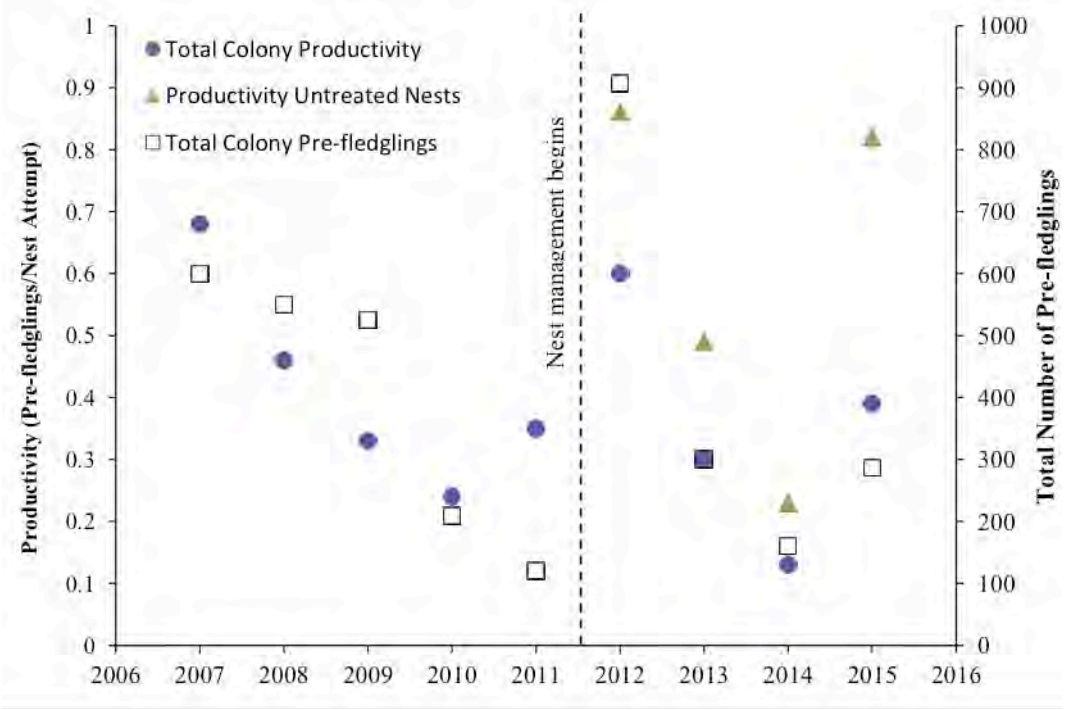

Figure 9. Estimated productivity (pre-fledglings / nest) and production (number of pre-fledglings) at Blackfoot Reservoir, 2007 – 2015. The triangle symbol represents productivity of remaining nests after colony management actions.

collapse coincided with a rapidly expanding pelican breeding colony on Blackfoot Reservoir and increases in pelican use of the Blackfoot River to forage (Teuscher and Schill 2010). Fisheries biologists also began noticing bird scars on migrating adult cutthroat trout. In 2004, 70% of adult cutthroat trout migrants exhibited wounds consistent with pelican attacks (Teuscher and Schill 2010).

In 2010, IDFG began a focused research project to directly quantify the level of pelican predation on Blackfoot River cutthroat trout. During a 4-year study, 4,653 wild cutthroat trout were tagged using a combination of radio-telemetry and PIT tags. Annual predation rate estimates were made by recovering cutthroat trout tags from pelican nesting islands. On-island tag recovery rates were corrected for ingested tags that went undetected during island searches and for tags that were deposited away from the nesting islands. Pelicans consumed tagged cutthroat trout ranging from 150 mm to 580 mm in length and showed no size-selection within that range for their prey. Annual pelican predation rates averaged about 30% for adult and juvenile cutthroat trout, with the highest values above 60% (Teuscher et al. 2015).

Pelicans have been observed foraging on other cutthroat trout runs in southeast Idaho. Since 2002, pelicans have been observed foraging at the mouth of St. Charles Creek, which is the most important spawning tributary for BCT in Bear Lake (IDFG and USFS 2007). Pelicans have also been observed foraging at the mouth of Swan Creek, a Utah tributary to Bear Lake. In 2005, pelicans concentrated at the mouth of Swan Creek below the Utah Department of Natural Resources (UDNR) spawning and egg take trap. To reduce predation losses, UDNR installed bird lines, set up a human effigy, and regularly shot cracker shells at the birds (S. Tolentino, UDNR, pers. comm.).

Pelican predation has also been measured on important sport fisheries in the region. During a repeated study, pelican predation on hatchery rainbow trout stocked in American Falls Reservoir was 30% (Meyer et al. 2016). There were several other waters included in the pelican predation study from the southeast region, but impacts were much lower (Meyer et al. 2016).

Strategies Implemented

Past actions to reduce impacts of foraging pelicans on native YCT in the Blackfoot River include hazing with zon guns, cracker shells and other pyrotechnics, airboat, and installing flagged lines across the river to exclude pelican foraging activity, as well as taking adult birds in conjunction with hazing. At nest islands, attempts have been made to limit the number of nesting birds to achieve the state's population objective of 700 breeding adults. Actions have included installing fencing and fladry on nesting islands to exclude nesting, destroying nests, and hazing adults from nesting islands. As a result, after several years of adaptive approaches using non-lethal methods and implementation of lethal take authority from USFWS, the abundance objective for the Blackfoot colony has been achieved three of the last five years (Fig. 10). Reaching that objective through implementation of non-lethal methods and take authority was a result of extensive coordination and communication between IDFG and USFWS. One product from that coordination was the Bird Conservation Strategy: reducing American white pelican/Yellowstone cutthroat trout conflicts (IDFG 2013). This strategy outlines practicable measures to avoid and minimize pelican take and courses of action to determine when and how take will be employed. The document provides a detailed overview of the conflict, past and ongoing IDFG management practices, and future plans to reduce pelican/YCT conflicts in the Blackfoot River and reservoir while ensuring long-term conservation of pelicans at the Blackfoot Reservoir colony. Management activities, by year, are summarized in Appendix III. Actions to reduce both pelican impacts on migrating adult and juvenile YCT will likely require annual, intensive management efforts.

Hazing and Lethal Reinforcement

IDFG has employed various actions to discourage pelican foraging along sections of the Blackfoot River and its mouth at the Blackfoot Reservoir

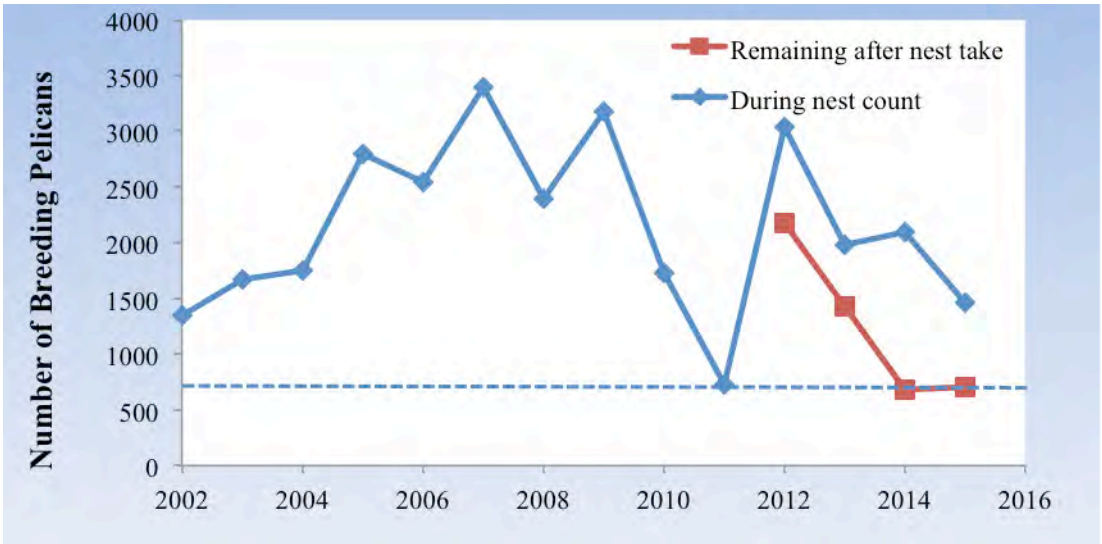

Figure 10. Number of breeding pelicans during nest count in late May/early June and after egg oiling and nest removal actions at Blackfoot Reservoir. A depredation permit was secured for nest destruction in 2012-2015.

during the YCT migration to and from spawning areas. Zon guns, pyrotechnics, boats, ATVs, volunteer and IDFG personnel hazers have been used to varying degrees since 2003. Generally, hazing is conducted twice daily, at peak foraging times, in May and June, with timing depending on the fish spawning run. To enhance effectiveness of hazing the USFWS has issued IDFG scientific collection or depredation permits annually since 2006 for limited take of adult pelicans foraging on the Blackfoot River. IDFG has improved and intensified hazing and take in subsequent years and monitoring information, where a hiatus in hazing results in a subsequent increase in birds observed on the river, suggests we have been able to influence behavior using hazing accompanied by periodic take of foraging birds. The take of pelicans is spread over the spawning run. Generally, 1-6 birds are taken daily depending on the number of birds present. Although hazing does not eliminate pelican presence on the river long-term, even short-term reduction in pelican foraging may have benefits for migrating trout.

Night foraging by pelicans has been reported (McMahon and Evans 1992) and has been documented on the Blackfoot River using remote cameras. It is unknown to what degree if any the daytime hazing efforts affect night foraging by pelicans.

Bird Lines on River

In 2005, monofilament line with flagging attached was installed across portions of the Blackfoot River between the mouth of the Blackfoot Reservoir and the fish trap at Caribou County Sportsman Park. This technique was effective at eliminating pelican foraging within the lined section of the river. However, fluctuating water levels, and the associated hazards and maintenance, makes this technique inappropriate on this portion of the Blackfoot River.

Nesting Island Exclusion and Hazing

Following Commission approval of the 2009 Pelican Management Plan, in 2010, IDFG began the implementation of actions to limit the number of nesting pelicans at Blackfoot Reservoir. These efforts include attempting to exclude nesting from portions of the nesting islands by installing fencing and a network of fladry attached to t-posts in the exclosure. Fencing and flagging techniques have been adapted to reduce impacts to nesting gull, tern, and waterfowl species. Fencing allows for the movement of unflighted nestlings in and out of the exclosure. The lines with flagging are installed at a height and spacing that limits the risk of entanglement of flighted birds. In 2015, IDFG began hazing birds from nesting islands prior to and during nest establishment. The timing, location, and intensity of hazing activities are adjusted annually to

improve effectiveness and minimize disturbance to other species nesting within and near the pelican colony.

Techniques and materials have been modified over time as staff have adapted to conditions and bird behavior. In 2013, a 'conservation area' was established on the east side of Gull Island with the remainder of the island fenced and flagged to exclude nesting. The 'conservation area' was selected to include that portion of Gull Island with nesting snowy egrets (*Egretta thula*), black-crowned night herons (*Nycticorax nycticorax*), great blue herons (*Ardea herodias*) and double-crested cormorants (*Phalacrocorax auritus*), in order to provide additional protection from disturbance to non-target species. Pelicans nested in the 'conservation area' and initially avoided the exclosure on both Gull and Willow islands. However, in 2014, the majority of pelicans attempted to nest on Long Island, an island they had not previously used for nesting. When nests were destroyed on Long Island, nests became established within the enclosure portion of Gull Island shortly thereafter.

The number of pelicans initiating nesting at the Blackfoot Reservoir colony has generally declined since the initiation of fencing and flagging to reduce the availability of nesting habitat. The average number of breeding pelicans at the colony from 2005-2009 was 2,867. Since fencing and flagging has been used, from 2010-2015, the average number of breeding pelicans has been 1,842. This represents a 36% decrease in the average number of pelicans initiating nesting for the 6 years following fencing and flagging as compared to the 5 years prior.

It also should be noted that while the reduction of the number of nesting birds at the Blackfoot Reservoir colony may reduce foraging on YCT on the Blackfoot River, it may not be a proportional relationship. The use of the river by pelicans that are not nesting on the Blackfoot Reservoir is not well understood. A limited radio telemetry study conducted in 2010, found that not all birds captured foraging on the Blackfoot River appeared to be associated with the Blackfoot Reservoir colony.

Nest Destruction

Beginning in 2012, the USFWS issued permits for the destruction of up to 500 pelican nests, to be implemented only if the total number of nests exceeded the IDFG goal of 350 (Fig. 10). IDFG implemented this permit by oiling eggs in 2012 and 2013. Vegetable oil was sprayed onto eggs using a backpack sprayer. Regional staff opted to oil eggs to reduce the potential for possible renesting attempts. We monitored oiled nests to determine effectiveness of this technique. In 2013, a sample of treatment and control eggs was monitored, and no successful hatching was observed for oiled eggs.

In 2014, in coordination with USFWS, nests were destroyed by removing eggs to increase the likelihood pelicans would disperse and leave the conflict area. On Long Island, 474 of 906 nests were destroyed by removing the eggs. Following this action all nests were abandoned on this island, with the exception of fewer than 20 where chicks had already hatched. Immediately following the abandonment of Long Island, almost 200 pelicans began nesting in the exclosure area of Gull Island. It is assumed these were birds moved from Long Island that were attempting to renest.

In 2015, hazing was used to prevent pelican nesting on any island except within the 'conservation area' on Gull Island. This was the first year human disturbance was used as the primary action to dissuade nesting. The island hazing appeared to be successful. No nests were established on Willow or Long islands, and total egg take required to meet objectives was less than the number allowable under USFWS authority.

Management Objectives and Actions

Objective 1: In coordination with statewide efforts, monitor pelican abundance and distribution in the Southeast Region every three years beginning in 2017.
Action: Use ground, boat and aerial survey techniques to census pelican populations in the Southeast Region.

Objective 2: Identify conflicts, prioritize locations, and implement actions where pelican predation prevents the achievement of fish management goals.
Action: Implement fish monitoring strategies (Meyer et al. 2016) to assess the predation impacts of foraging pelicans on native fishes and sport fisheries.
Action: Monitor adult YCT escapement to Blackfoot River fish trap annually.
Action: As available, allocate resources to minimize predation at highest priority conflict locations.
Action: Continue to modify stocking strategies as feasible where conflicts arise to minimize pelican predation.
Action: Document pelican use and intensively haze birds from foraging areas where there is conflict.
Action: Seek annual renewal of USFWS authority as needed to lethally remove foraging pelicans from the Blackfoot River to reinforce non-lethal hazing activities.
Action: Seek additional authority from the USFWS to lethally remove pelicans foraging on specific high-quality, intensively-managed fisheries where deemed necessary.

Objective 3: Manage for 700 breeding birds at the Blackfoot Reservoir colony.
Action: Establish and maintain a 'conservation area' on Blackfoot Reservoir's Gull Island where 700 pelicans (350 nests) are allowed to nest undisturbed by fencing, flagging, and hazing efforts.
Action: Maintain fencing and flagging on Gull Island to restrict nesting area available to breeding pelicans to the 'conservation area'.
Action: Haze pelicans from nesting islands on Blackfoot Reservoir (except within Gull Island 'conservation area') prior to nest establishment.
Action: Seek annual renewal of USFWS authority to remove or oil eggs to meet colony objectives.
Action: Conduct pre-fledgling count to document productivity (fledgling/nest) for the colony.

Objective 4: Monitor other regional waters for establishment of new colonies.
Action: Survey potential nesting islands within regional waters at least once per breeding season to determine if pelicans are attempting to nest.

Objective 5: If successful nesting occurs, and total statewide abundance of breeding birds exceeds the 2,800 objective, preclude future nesting attempts.
Action: Employ physical barriers and/or hazing prior to nesting season to prevent establishment of a new colony.

Upper Snake Region

Pelican Populations and Trends

American white pelican occurrence in the Upper Snake watershed was documented by early European American naturalists and a nesting colony was confirmed at Yellowstone Lake (60 miles from Henrys Lake, Idaho) in 1890 (Schaller 1964). It is likely that pelicans periodically foraged in the Upper Snake Region of Idaho since at least European American settlement. Pelicans were known to use Island Park Reservoir since the 1950s. In the 1990s, pelicans in the Upper Snake Region expanded from scattered, infrequent occurrences to larger, consistently occurring foraging flocks. Since the mid-2000s, pelicans have been commonly observed on most major waters within the Upper Snake Region. From 2010-2014, IDFG staff completed spring aerial pelican surveys to monitor abundance and distribution (Table 2). The total pelican abundance averaged 819, and ranged from 998 in 2011 to 467 in 2012.

Management Issues

IDFG staff have detected concentrated pelican activity on Trude Island in Island Park Reservoir annually since 2010. Nesting was first observed in 2012. Pelicans have nested on Trude Island annually since establishment, although the colony failed to produce fledglings until 2014 (Table 2).

One area of high concern for anglers and the IDFG in the Upper Snake Region is increasing pelican abundance and predation on native fishes and important sport fisheries in the Henrys Fork River, including Henrys Lake and tributaries. Henrys Lake and the Henrys Fork River fisheries collectively support 851 jobs and a total economic output of over fifty million dollars (Loomis 2005).

Henrys Lake is managed as a quality fishery and is supported by IDFG stocking and natural recruitment. For the last fifteen years, IDFG has stocked Henrys Lake with more than 1 million fingerling trout annually. Native YCT spawn in several tributaries to Henrys Lake including Targhee, Duck, Howard and Timber creeks. Pelicans concentrate foraging efforts at tributary mouths during the YCT spring spawning period and also during the summer when trout seek thermal refuge (Buelow 2012 and 2013). Currently, pelican predation does not appear to be limiting this fishery, but continued monitoring of pelican predation is necessary.

The Henrys Fork River is a world-renowned sport fishery comprised of nonnative rainbow and brown trout and limited numbers of native YCT. The majority of this river is managed for wild or native trout while other portions receive supplemental stocking. Impoundments (Island Park and Ashton reservoirs) are supported largely by stocked fish. Since the mid-2000s, pelican predation has been a fish management concern along the upper Henrys Fork River and Henrys Lake. More recently, observations and reports of congregations of foraging pelicans have been associated with spawning runs or concentrations of fish in many parts of the region, prompting additional concerns from managers. The magnitude of pelican predation on native or sportfish populations is unknown. However, fisheries managers and the public have concerns about population-level impacts to fisheries resources at current pelican abundances. Expansion of the existing pelican colony or creation of additional colonies will exacerbate these concerns.

Year	Pelicans Counted in Upper Snake Region Aerial Survey (2010-2014)	Pelican Nests on Trude Island, Island Park Reservoir
2010	859	
2011	998	
2012	467	150*
2013	785	232**
2014	988	163
2015	N/A	316***

*Number of nests is based on a field estimate; Colony failed sometime after nest establishment
** Colony failed sometime after nest establishment
***Pelicans fledged young but no accurate count of fledglings was obtained

Table 2. American White Pelicans counted during spring aerial surveys in the Upper Snake Region from 2010-2014; and pelican nests counted on Trude Island in Island Park Reservoir since 2012.

Strategies Implemented

The Upper Snake regional staff has employed several strategies to better understand pelican use of regional habitats and its potential impacts on fish populations and recreation.

Outreach to Private Landowners–IDFG staff has engaged Trude Island landowners about pelican management.

Monitoring the Island Park Reservoir pelican colony on Trude Island–Since 2010, IDFG staff has monitored the status of nesting birds on the island. IDFG staff estimates pelican nest success when feasible.

Management Objectives and Actions

Objective 1: In coordination with statewide efforts, monitor pelican abundance and distribution in the Upper Snake Region every three years beginning in 2017.
Action: Use ground, boat and aerial survey techniques to census pelican populations in the Upper Snake Region.

Objective 2: Identify conflicts, prioritize locations, and implement actions where pelican predation prevents the achievement of fish management goals.

ADULT PELICAN CCBY IDAHO FISH AND GAME

Action: Implement fish monitoring strategies (Meyer et al. 2016) to assess the predation impacts of foraging pelicans on native fishes and sport fisheries.
Action: As available, allocate resources to minimize predation at highest priority conflict locations.
Action: Continue to modify stocking strategies as feasible where conflicts arise to minimize pelican predation.

Objective 3: Manage for no more than 300 breeding pelicans at the Island Park colony (Trude Island).
Action: Work collaboratively with landowners to maintain the nesting colony on Island Park Reservoir at an appropriate level.
Action: Install fencing and fladry to reduce colony size and discourage pelican colony expansion.
Action: Monitor pelican occupancy and nesting phenology to aid in management decisions.
Action: Haze pelicans attempting to nest outside of the enclosure.
Action: Conduct pre-fledgling count to document productivity (fledgling/nest) for the colony.
Action: Monitor other colonial nesting birds on Trude Island to gauge impacts from pelicans and related management activities.

Objective 4: Monitor other regional waters for establishment of new colonies.
Action: Survey potential nesting islands within regional waters at least once per breeding season to determine if pelicans are attempting to nest.

Objective 5: If successful nesting occurs, and total statewide abundance of breeding birds exceeds the 2,800 objective, preclude future nesting attempts.
Action: Employ physical barriers and/or hazing prior to nesting season to prevent establishment of a new colony.

Statewide Coordination

The actions described before will be implemented largely by regional staff along with partner agencies in accordance with this plan. The Wildlife Bureau will coordinate activities such as statewide pelican counts and nesting colony surveys, pelican banding or tagging studies, and compiling and analyzing data to assess trends in pelican abundance, distribution, and productivity at the state and flyway scale. Annually both the Fisheries Bureau and Wildlife Bureau will work with regional staff and USFWS staff as needed to secure depredation permit authority where necessary to alleviate specific predation impacts. Wildlife Bureau staff will work with regional staff to meet reporting requirements associated with any take authority issued by USFWS.

Pelican Monitoring

IDFG will continue monitoring pelican populations in Idaho, including annual surveys of nesting colonies to estimate breeding bird abundance and productivity, and periodic comprehensive surveys to describe statewide distribution and abundance. Focused studies using marked birds or birds fitted with GPS transmitters will be implemented when feasible to increase understanding of movement and life-history characteristics of Idaho's birds.

Breeding Population Estimates

Estimates of the state breeding pelican population will be necessary to assess the effects of control actions, direct future control efforts, and monitor statewide population viability. The estimated number of breeding birds will be used each year to reassess a five-year average, predict the current trajectory of the breeding population, and help determine the actions required to reach established population objectives.

Methods: Monitoring of the breeding pelican population will be aligned with protocols outlined by the Western Colonial Waterbird Survey (Seto 2008). This survey entails an annual ground-based nest count of each island used by nesting pelicans and occurs in the late incubation/early nestling stage of most of the nesting birds; typically late May–early June. Estimates are typically done with a single walk through the colony to minimize disturbance. This survey has been conducted annually at the Blackfoot colony since 2002, at the Minidoka colony since 2006, and at the Island Park colony since 2012. These surveys are expected to be continued indefinitely; however, annual ground-based counts at Minidoka are contingent upon USFWS approval. The use of aerial photograph counts, perhaps using drones, will be evaluated as a less intrusive alternative. IDFG staff will refine survey timing and methodologies as needed to ensure valid representation of breeding bird abundance and trends.

Statewide Distribution and Abundance

Documenting pelican distribution and abundance across Idaho will help managers assess effects of management actions on pelican populations, and may also help identify and prioritize waters where site-specific predation impacts may be significant or merit further investigation. Previous statewide surveys (2010 and 2012-14) included coordinated aerial counts and ground/boat counts generally conducted over 1-2 days. Counts were summarized by water body and include both breeding and non-breeding birds. Due to variations in weather and other factors, year-to-year variability in counts is high for individual waters and for the statewide total.

Methods: Statewide pelican counts will be conducted during the breeding season (late May/early June) every three years beginning in 2017. This schedule aligns with that proposed

by the Pacific Flyway Council to monitor all breeding colonies in the western population (Pacific Flyway Council 2013). As in previous surveys, counts will be conducted with consistent methods over the same geographic area, primarily by fixed-wing aircraft and supplemented with ground/boat counts in additional waters. The Wildlife and Fisheries bureaus will plan and coordinate this activity with regional staff, and the Wildlife Bureau will compile and report statewide results.

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Production and Productivity

Estimates of pelican production and productivity at Idaho's nesting colonies are important to document continued pelican recruitment in Idaho, and also serve as the primary tool to assess effectiveness of colony management actions, such as physical barriers, hazing, and nest destruction where such actions occur. Productivity monitoring can also help assess other mortality concerns, such as disturbance and disease. While true productivity will be difficult to obtain, an estimate of maximum productivity can be obtained by estimating the number of chicks at the colony just prior to fledging.

Methods: The number of juveniles at breeding colonies will be estimated in late July or early August, just prior to fledging. Juvenile counts can be made during the late summer banding and tagging activities during years that the banding project is conducted. IDFG staff will also explore aerial imagery (e.g. drones) as an option to count fledglings in less intrusive ways.

Marking

The trapping and marking of juvenile birds with patagial tags from Idaho's breeding colonies can provide insight into the post-fledging dispersal, habitat preferences, migration routes, over-wintering habitats, survival rates, age at first reproduction, and fidelity to natal and breeding sites. Understanding these fundamental life-history characteristics will be valuable in assessing the long-term effects of control actions on the pelican population and on reducing the predation pressure imposed by pelicans on Idaho waters. Collection of these data conforms to Strategy 2 under the Population Assessment Objective of the Pacific Flyway framework for white pelican management (Pacific Flyway Council 2012). These data could be combined with similar data from other states and partners in the Pacific Flyway and used to construct a population model that predicts broader flyway-level effects based on state population objectives. From 2007 through 2014, approximately 600

pre-fledging juvenile pelicans (300 each from the Minidoka and Blackfoot breeding colonies Fig. 11) were trapped and marked each year. Each bird received a USFWS metal leg band and a unique alpha-number cattle ear-tag placed in the patagium of the wing. The tag colors were specific to the breeding colony, with red tags for Minidoka birds and black tags for Blackfoot birds. Analysis of band recoveries and re-sighting records resulting from this effort is ongoing and will be completed before this plan lapses in 2025. The need for additional tagging/banding studies will be determined based on information gaps remaining after this analysis.

Fisheries

Pelican Predation Estimates

During this planning period, additional waters may be identified where pelican predation is suspected to significantly impact native fish populations or sport fisheries. Regional and HQ staff will evaluate whether direct estimates of pelican predation rate are necessary to develop specific management strategies or to evaluate effectiveness of those strategies. Where deemed necessary, staff will use the methods of Meyer et al. (2016) to quantify impacts, and will coordinate this work with HQ staff and other partners.

Catch Rates and Return to Creel of Hatchery Trout

IDFG will employ standardized creel surveys and tagging studies at important recreational sport fisheries to assess catch composition, catch rates, and return to the creel of hatchery trout.

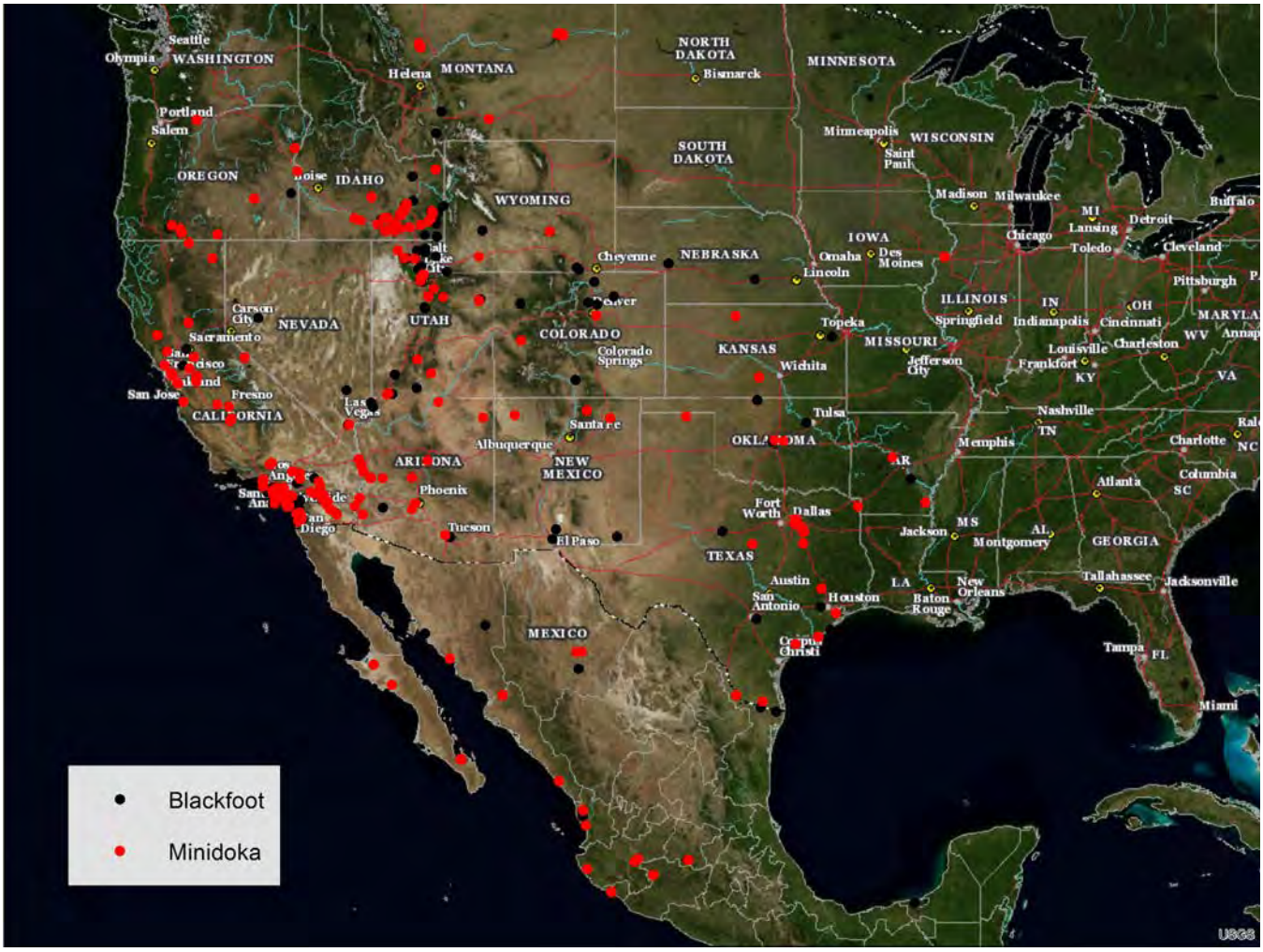

Figure 11. Detections of banded pelicans from the Blackfoot (black dots) and Minidoka (red dots) colonies, 2007-2015.

Statewide Information Needs

a. Analyze pelican population data and 2007-2014 banding data; determine trends in population size and productivity for Idaho and the western population; summarize movement data and update survivorship estimates; develop a model for pelican population viability to validate or adjust current statewide abundance objectives.

b. Determine breeding status and nesting location of pelicans foraging on YCT in the Blackfoot River system through satellite telemetry.

c. Obtain better information on the biology of Idaho's pelicans with specific emphasis on loafing, foraging behavior, home range size, habitat use, and the percent of the overall population that are adult breeders.

Public Outreach

There are two aspects of public outreach associated with the implementation of this plan. First, public input on a draft plan was sought from a variety of user groups and state and federal agencies during a formal 30–day public comment period. Comments were solicited through a variety of avenues including press releases, public meetings, social media, and the IDFG website. Input was compiled and reviewed by staff, and was incorporated as appropriate into the final draft. Lastly, staff requested IDFG Commission approval on May 17, 2016 before the plan took effect.

A second aspect of public outreach associated with this plan includes communicating objectives and actions to stakeholders, and developing educational materials on pelican conservation and pelican-fish conflicts. Where appropriate, staff will engage other agencies and citizen volunteers in pelican monitoring, banding or tagging, and other conflict management actions such as hazing.

JUVENILE PELICANS CCBY IDAHO FISH AND GAME

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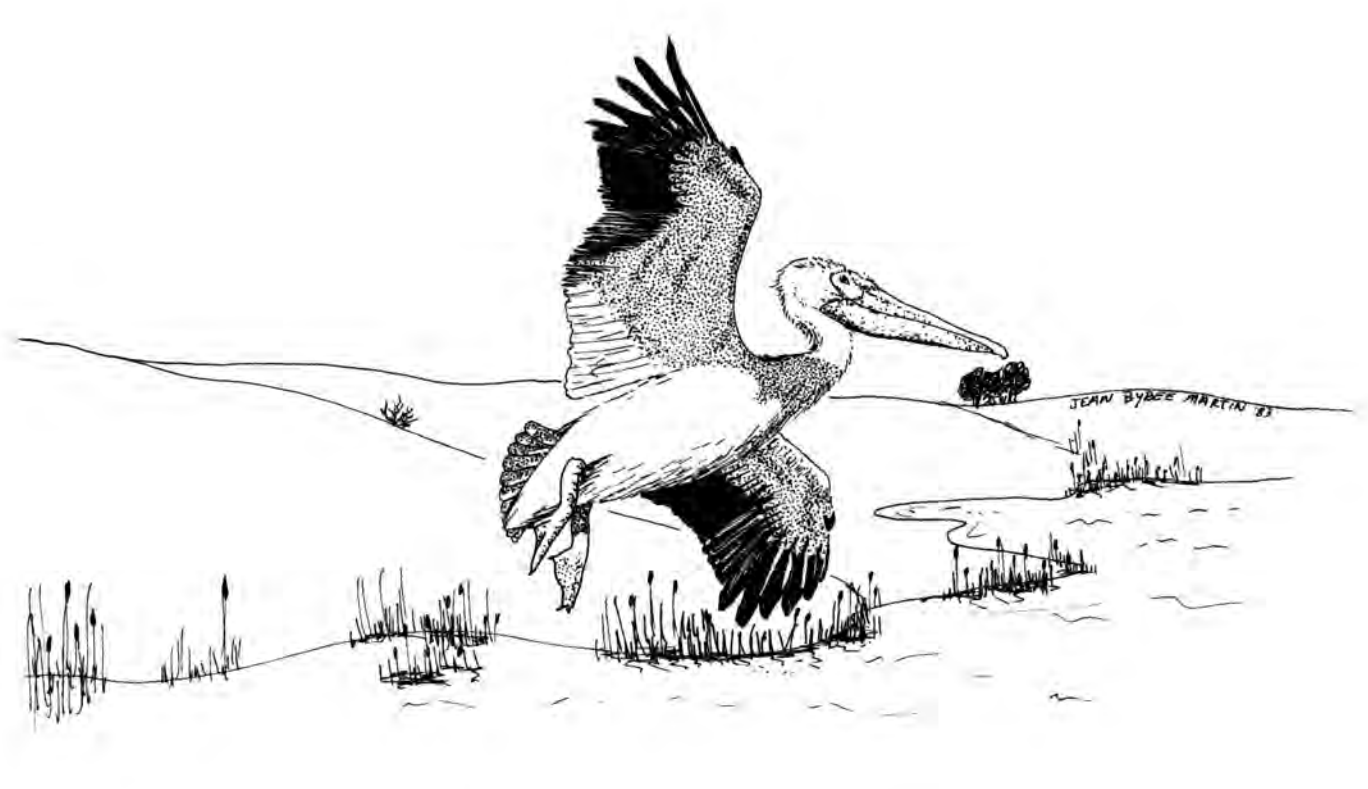


Appendix I. Summary of pelican predation impacts on hatchery rainbow trout fisheries in southern Idaho (from Meyer et al. 2016)

Table A. Distance (km) from study waters where hatchery trout were stocked and (or) fed to American white pelicans, to nearby pelican nesting colonies (from Meyer et al. 2016).

Study Waters	Water size (ha)	Molly Island (Yellowstone National Park)	Island Park Reservoir[a]	Blackfoot Reservoir	Minidoka NWR	Gunnison Island
Cascade Reservoir	10,994	459	363	412	304	448
CJ Strike Reservoir	3,035	483	385	354	201	313
Riley Creek Pond	7	415	323	274	118	231
Filer Pond	1	403	314	252	95	202
Magic Reservoir	1,569	366	268	231	111	230
Freedom Park Pond	1	346	272	181	32	154
Rupert Gun Club Pond	4	347	271	181	32	156
Lake Walcott	3,335	315	248	148	0	152
American Falls Reservoir	22,369	259	199	95	56	170
Chesterfield Reservoir	504	213	174	27	119	187
Foster Reservoir	52	275	252	84	140	111
Glendale Reservoir	82	275	253	83	141	113

[a] Pelican nesting was attempted but no offspring were produced at this location during the study.

Appendix I. Continued.

Table B. Initial numbers of hatchery Rainbow Trout (with PIT tags and anchor tags) fed to pelicans or stocked in study waters and subsequently recovered from American white pelican nesting colonies or other loafing areas in Idaho, as well as estimates of pelican predation and angler catch (from Meyer et al. 2016).

Water	Year	Distance to Nearest Colony	Initial PIT tags at large		Recovered tags assigned to: Pelicans		Cormorant		Other Cormorant Recoveries	Pelican Predation		Predicted Pelican Predation	Angler Catch	
			Fed	Stocked	Fed	Stocked	Fed	Stocked		Estimate	90% CI		Estimate	90% CI
Cascade Reservoir	2012	304	104	393	0	0	-	0	-	0.00	-		0.02	0.02
Cascade Reservoir	2013	304	125	450	0	0	-	0	-	0.00	-		0.09	0.03
CJ Strike Reservoir	2012	201	100	399	6	1	-	0	-	0.04	0.07		.32	0.07
CJ Strike Reservoir	2013	201	100	400	2	2	-	0	-	0.25	0.32		0.09	0.05
CJ Strike Reservoir	2014	201	95	400	2	4	-	0	-	0.48	0.67		0.10	0.10
Riley Creek Pond	2012	118	64	100	16	2	-	0	-	0.08	0.09		0.82	0.20
Riley Creek Pond	2013	118	39	100	24	4	-	0	-	0.07	0.05		0.06	0.07
Riley Creek Pond	2014	118	10	99	2	3	-	0	-	0.15	0.16		0.69	0.69
Filer Pond	2012	95	0	100	-	3	-	0	-			0.26	0.68	0.18
Magic Reservoir	2014	111	0	449	-	4	-	0	-			0.12	0.04	0.04
Freedom Park Pond	2013	32	0	100	-	16	-	3	-			0.29	0.31	0.16
Rupert Gun Club Pond	2013	32	0	99	-	16	-	2	-			0.29	0.00	-
Lake Walcott	2013	0	91	397	44	65	-	17	-	0.34	0.09		0.00	-
Lake Walcott	2014	0	81	208	53	41	-	22	-	0.30	0.09		0.04	0.04
American Falls Reservoir	2013	56	101	396	9	11	-	0	-	0.31	0.22		0.00	-
American Falls Reservoir	2014	56	83	398	12	17	-	0	-	0.30	0.17		0.03	0.03
Chesterfield Reservoir	2013	27	80	385	19	5	-	96	52	0.05	0.04		0,02	0,02
Foster Reservoir	2013	84	0	293	-	0	-	0	99			0.00	0.03	0.07
Glendale Reservoir	2013	83	0	399	-	0	-	0	20			0.00	0.30	0.07
Total			1,073	5,565	189	194	-	140	171					

Appendix I. Continued.

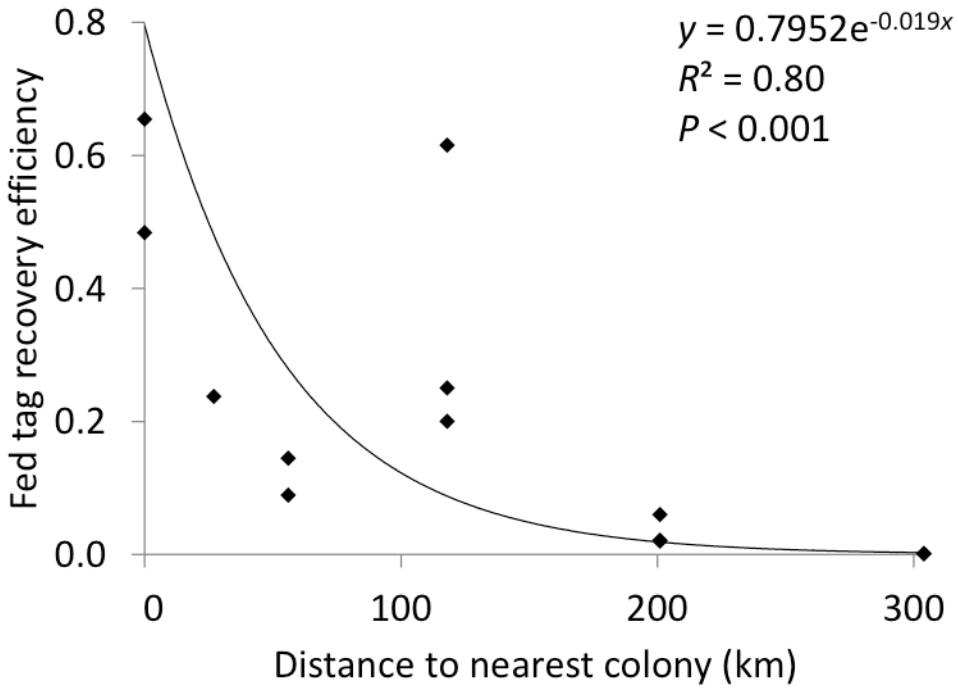


Figure A. Relationship between a study waters' distance from the nearest American white pelican colony and the recovery efficiency (at the nearest colony) of PIT tags implanted in hatchery Rainbow Trout and fed directly to pelicans at that study water. The line and equation depict an exponential relationship fit to the data.

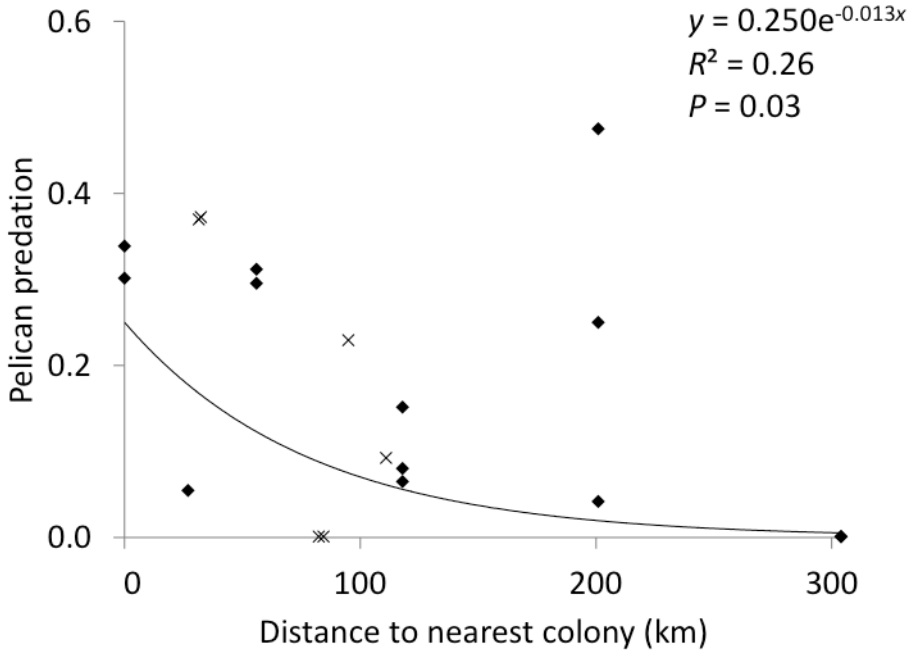


Figure B. Relationship between a study waters' distance to the nearest American white pelican nesting colony and the pelican predation rate on hatchery Rainbow Trout stocked at that water. Predation rates for the waters labeled with an "x" were predicted based on the relationship in Figure A. The line and equation depict an exponential relationship fit tothe data.

Appendix I. Continued.

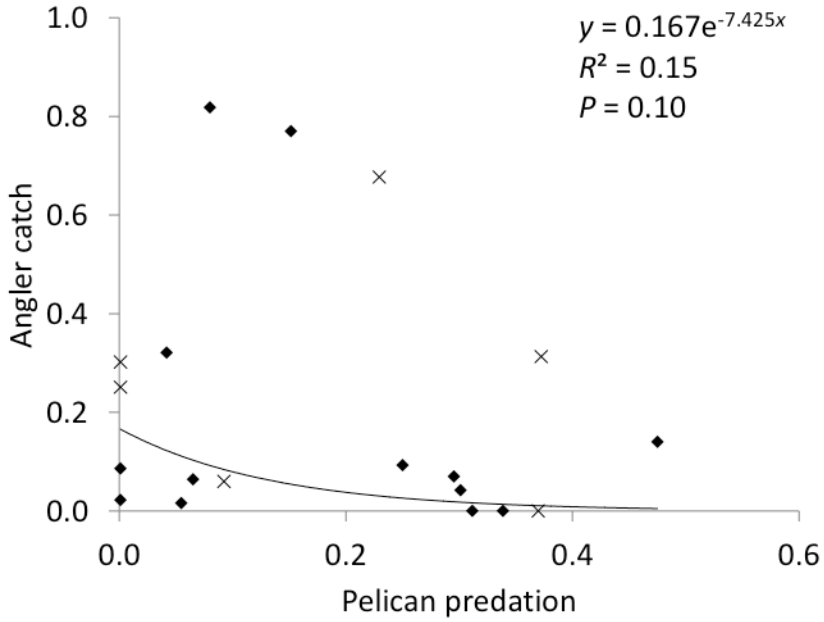
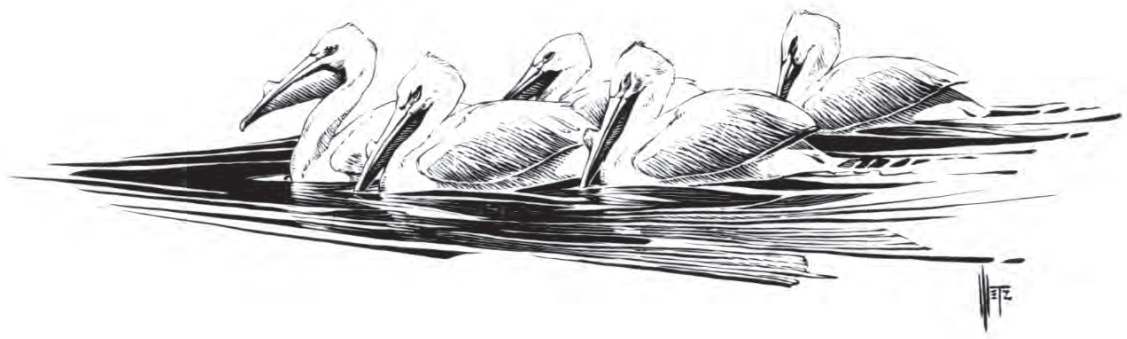


Figure C. Relationship between estimates of American white pelican predation and angler harvest in select Idaho waters where pelicans have been known to congregate. Predation rates for the waters labeled with an "x" were predicted based on the relationship in Figure A.



Appendix II. Description and analysis of 12 potential management actions considered to address impacts of pelicans on fish in Idaho.

	Action Description	Biological Impact–Birds	Biological Impact–Fish	Practical Logistical Considerations	Social Impact	Cost Analysis	Regulatory Constraints	Likelihood of success
Increase Reservoir Water Levels	Maintain reservoir water at levels that provide adequate refugia for fish at times and/or locations needed Would require cooperation with water users and associated water management agencies	Decrease forage opportunity by reducing shallow water foraging habitat Decrease nesting habitat by reducing surface area of island(s) Could displace foraging pelicans to other bodies of water	Increased loss of prey species at other fisheries from displaced pelicans Reduced loss of prey species at treatment waters due to an increase in refugia Potential increase in the survival and/or recruitment of prey species because of stable water levels Fish impacts unknown – depends on timing and duration of flow changes	Not practical because the demand for water resources is too high (i.e., energy, agriculture, commercial, and residential needs) Multiple users and diverse demands for water would make coordination complicated	There would likely be a divided public reaction	Although direct costs of withholding water might be low, the indirect costs to water users and the potential cost of mitigation may be high Currently in-stream flow or in-reservoir use are not currently recognized under water rental rules and further discussion would need to occur with the Idaho Water Resource Board No cost estimate possible at this time	Potential federal, state, and tribal constraints	Unpredictable level of success associated with treatment waters only

Appendix II. Continued.

	Action Description	Biological Impact–Birds	Biological Impact–Fish	Practical Logistical Considerations	Social Impact	Cost Analysis	Regulatory Constraints	Likelihood of success
Modify Prey Composition	Stock game and/or nongame fish species to diversify pelican prey base	Additional stocked prey species may increase foraging opportunity in treatment waters Potential increase in fecundity / survival of piscivorous birds associated with treatment waters May attract piscivorous birds to treatment waters	Potentially reduce predation impacts to a single species, but could increase impacts if pelicans are drawn to increased foraging opportunities Potential negative effect on other fish species through interspecific competition	Sources of additional fish species may be difficult to acquire due to state hatchery Viability of stocked fish uncertain and may require continued supplementation	Divided public if fishery quality is compromised	The estimated cost of stocking hatchery-reared rainbow trout to feed one adult pelican consuming only rainbow trout would be between $15–50 / day The estimated cost of modifying prey composition by introducing non-native fishes or “rough fish” (i.e., carp) would be approximately $500 / day The delayed cost realized through loss of a quality fishery or treatment to recover a quality fishery (both common scenarios occurring following introduction of non-native / undesired species) could be thousands to millions of dollars	IDFG – seven step process for new species introductions	Unpredictable level of success Dependant on current fishery diversity, bird behavior, and stocking viability

Appendix II. Continued.

	Action Description	Biological Impact–Birds	Biological Impact–Fish	Practical Logistical Considerations	Social Impact	Cost Analysis	Regulatory Constraints	Likelihood of success
Modify Fish Stocking Strategies	Distribute stocking location(s) in time (seasonal / daily) and space - Alter time of stocking from spring to fall (after pelicans have migrated) - Increase the number of stocking locations to reduce predation risk - Change stocking time from day to dusk Reduce fish stocking at some locations - May be applicable in some cases, either temporarily or permanently	May affect short-term foraging opportunities for birds by reducing availability of hatchery fish May change location and/or time of pelican foraging	May reduce predation mortality of hatchery fish May increase mortality of hatchery fish from other causes - Changing stocking time from spring to fall could affect overwinter survival of hatchery fish - Longer retention of hatchery fish in trucks could affect survival - Increased handling mortality possible	Fall release more difficult due to lower water levels Hatchery constraints due to production timing and needs	Mixed public opinion because this action could change quality of fishery	Expensive due to changes in hatchery production only if species, size, and numbers change Changes in angler use could affect local economies (up or down) No significant change in costs if species, size, and numbers similar	None	Depends on action taken, characteristics of stocking location, and adaptability of pelicans to changes in foraging opportunities - Changing stocking time from spring to fall more likely to be successful than simply changing time of day or number of release sites - Fall stocking more likely to be successful in larger lakes / reservoirs - More likely to be successful if pelicans slow to adapt foraging behavior in response to release of fish

Appendix II. Continued.

	Action Description	Biological Impact–Birds	Biological Impact–Fish	Practical Logistical Considerations	Social Impact	Cost Analysis	Regulatory Constraints	Likelihood of success
Provide Refugia for Fish	Create physical barriers to separate pelicans and fish: -Floating rope -Anchored wood or plastic platforms	Little to no physical impact to birds Risk of bird entanglement Platforms could provide perches for birds	IReduced fish loss under barriers Fish resting areas under barriers Could reduce foraging in refugia areas Could concentrate and increase foraging in non-refugia areas Could reduce loss in areas of fish concentration, i.e., spawning streams, mouths of tributaries, etc.	Difficult and labor intensive to maintain Reduced fishing opportunity for anglers, i.e., areas under the barriers would be unavailable to anglers Hindrance to navigation (boating hazard) Potential entanglement liability	May be unpopular with public due to creating areas unavailable to anglers Unsightly	Potentially expensive to install and maintain dependent on method -Floating rope- $1,000 for materials to protect 100 x 50 ft area; $1,400 in manpower to implement through spawning run; $2,400 total cost -Floating platforms $100 in materials; $1,750 in manpower during spawning run; $1,850 total cost	Unknown; Permitting may be required by Corps of Engineers	May prove effective in localized areas (e.g., immediately below weirs or other fish passage barriers) Difficulty of maintenance may limit long-term effectiveness on a large scale Overall likelihood of success low Potentially moderate to high likelihood of success in very localized area depending on physical constraints of site
Install Bird Lines	Install lines across waterways where birds concentrate to forage Use flagging for increased visibility, with line spaced at 20 yard intervals String lines 2–3 ft above water	May reduce foraging opportunities May cause mortality by entanglement in lines. Fluctuating water levels can inundate lines and increase risk of entanglement	May reduce bird predation on migrating cutthroat trout and other concentrated fish species	Limited by area covered and water levels. If reservoirs are filling, lines become inundated and require increased maintenance	Socially acceptable	Materials are relatively inexpensive (~$600 / mile) Labor intensive to set up and maintain (daily maintenance) estimated at about $8,600 / mile Estimated total cost about $9,200 / mile	May cause navigable water conflicts if implemented in popular boating areas	Very effective for short-river reaches with high concentrations of birds, but may not work for long river reaches and wide rivers Fluctuating water levels can inundate bird lines making them ineffective

Appendix II. Continued.

	Action Description	Biological Impact–Birds	Biological Impact–Fish	Practical Logistical Considerations	Social Impact	Cost Analysis	Regulatory Constraints	Likelihood of success
Haze Birds	Haze only foraging or loafing birds (no hazing on nesting islands) Methods could include: -Harassment by air boat, motor boat or aircraft -Harassment by human presence and/or dogs -Harassment by crackers shells, zon guns, or pyrotechnics -Disturbance by lasers or strobe lights -Disturbance by human presence or effigies	Displacement Lost foraging opportunity at hazing site May cause regurgitation of stomach contents, requiring additional predation to meet dietary demands	Reduced predation at hazing site May move birds and predation issues to areas of greater biological significance to native fish populations May move birds and predation issues to areas of greater economic importance (see Table 4)	Labor intensive depending on method and scale Human safety issues if boats or aircraft are used	Divided public	Expensive depending on method, intensity, and scale Volunteers should be considered to implement hazing Labor costs $20 / hour; haze twice per day for 3-hr time periods totaling 6 hrs / day; $120 / day @ 45 days = $5,400 Costs about $2,700 / mile	None – as long as injury or take does not occur	Variable depending on scale High likelihood of success if hazing is intense and at an appropriate scale May be more effective in areas around weirs or tributary mouths

Appendix II. Continued.

	Action Description	Biological Impact–Birds	Biological Impact–Fish	Practical Logistical Considerations	Social Impact	Cost Analysis	Regulatory Constraints	Likelihood of success
Translocations (Establish New Nesting Colonies)	Capture adult birds on nesting islands Translocate adult birds to alternate nesting locations to reduce bird numbers at original colony while establishing new colonies or supplementing bird numbers at existing colonies Could require wing clipping of translocated adults to prevent their return to the capture site Could require use of wing-clipped decoy birds at new site	May break pair bonds Unknown survival prediction for translocated birds Release sites may have unknown factors such as high levels of predation or human disturbance that limits adult survival Transport may stress birds to the point of reduced survival Reduced chick survival if breeding adults moved during incubation, nestling or fledgling period	Unknown long-term impact Immediate impact on fish if bird capture and removal occurred at targeted problem areas (hazing associated with bird removal, and the actual removal of birds will reduce immediate foraging) Reduction in local pelican population may reduce fish predation but may not improve overall trout numbers if predation is compensatory	Should question why birds have not naturally colonized the areas we would move them to	May give the appearance that we are expanding distribution of the pelicans so we can use more aggressive management alternatives (e.g., oiling eggs, shooting adults) in problem areas such as Blackfoot Reservoir Translocations would demonstrate our dedication to maintaining numbers in Idaho, particularly in light of aggressive management approaches such as oiling eggs	No guarantee of success and no experience to model efforts Costly -Capture is labor intensive -Transport is costly due to transport vehicle and personnel needs Monitoring at release site could be labor intensive, difficult, and potentially very ineffective Scale of removal necessary to make a measurable impact on local populations may be prohibitive	Would require special permit from USFWS	May reduce the numbers of birds at predation site temporarily but it may simply move the problem elsewhere Will not reduce the problem in any given area for very long unless a very large number of birds are moved and do not return No guarantee the birds won't come back

Appendix II. Continued.

	Action Description	Biological Impact–Birds	Biological Impact–Fish	Practical Logistical Considerations	Social Impact	Cost Analysis	Regulatory Constraints	Likelihood of success
		Capture of adults without a nest or young could not be guaranteed unless capture and translocation was conducted prior to nesting If colony is space-limited, removal of adult birds at a colony may open up space for new birds that come in from outside areas (e.g., Great Salt Lake) in effect increasing statewide numbers May establish new breeding colonies, thereby increasing abundance in the future			Anglers at release sites may see pelican translocations as simply a distribution of the problem	Estimated total cost per day @ $7,440 includes boats, horse trailers, vehicles, manpower, and fencing supplies Handling 75 birds / day would amount to $100 / bird		

Appendix II. Continued.

	Action Description	Biological Impact–Birds	Biological Impact–Fish	Practical Logistical Considerations	Social Impact	Cost Analysis	Regulatory Constraints	Likelihood of success
Manipulate Nesting Habitat	Reduce nesting habitat available for pelicans Techniques include: -Manipulate habitat (i.e., add vegetation or large rock) -Remove habitat (i.e., blasting) -Erect fence, physical barriers to break-up island surface area	Potential displacement of nesting birds Potential reduced productivity if the available nesting substrate is a limiting factor Potential negative effects on other island nesters (cormorants, herons, egrets, etc.)	May reduce the loss of fish to pelicans on short-term (less chicks to be fed) and/or long-term (reduced pelican numbers) if fewer young pelicans result from treatment	Logistically feasible and highly practical dependent on technique (e.g., planting vegetation may be easily accomplished; however, deposition of rock or the use of heavy machinery may be economically and logistically difficult)	Divided public -A reduced productivity and/or population size of pelicans would likely be acceptable to public with fish concerns but may not be for public with bird concerns	Planting willow cuttings at 1 shrub / yd2 would cost an estimated $4,000 / acre An excavator would cost an estimated $1,200 / week to modify or remove suitable habitat or add rock Blasting costs range from $2–6 / ft^2 depending on accessibility The nesting islands range in size from 13,000–200,000 ft^2	Would likely require approval and permitting by federal, and/or state entities Depends on island ownership	Moderate short-term dependent on the effects of productivity of pelicans (fewer chicks to be fed) and behavior of displaced pelicans Potentially high long-term dependant on pelican population impacts Unpredictable level of success

Appendix II. Continued.

	Action Description	Biological Impact–Birds	Biological Impact–Fish	Practical Logistical Considerations	Social Impact	Cost Analysis	Regulatory Constraints	Likelihood of success
Introduce Predators to Nesting Islands	Translocate native mammalian predators to islands used for nesting (i.e., badgers, raccoons, foxes, coyotes)	May reduce pelican population May reduce reproductive success May reduce cohort contribution to future production Pelicans may abandon nesting colony May cause disturbance and predation on other colonial nesting bird species	Chick mortality may reduce predation demand for fish May reduce local pelican population and associated foraging demand If other colony nesters decline, fish predation may also be reduced A portion or the entire colony may relocate to an area with similar fish predation concerns	Feasible Predators may leave and need to be reintroduced annually Predators can be removed if necessary A predator may select smaller colonial nesting species rather than pelican May lose control of ability to manage pelican colony size	Mixed public opinion	Relatively inexpensive Unknown effectiveness Trapping costs about $120 / predator Transport and release about $280 / predator Total cost about $400 / predator Assuming no more than 10 predators released / year the approximate annual cost would be ~$5,000 / year	Investigated with USFWS through development of the Bird Conservation Strategy (IDFG 2013) IDFG has authority to capture and release predators	Unknown and high probability of impacting the other colonial nesting birds

Appendix II. Continued.

	Action Description	Biological Impact–Birds	Biological Impact–Fish	Practical Logistical Considerations	Social Impact	Cost Analysis	Regulatory Constraints	Likelihood of success
Harvest Season on Birds (By the Public)	Lethal take of birds in problem areas through IDFG-regulated harvest season Controlled hunt or quota hunt	Potential disturbance to other species May break pair bonds if breeding adults is harvested, in turn reducing overall productivity Reduced chick survival if breeding adult harvested during incubation, nestling or fledgling period Immediate reduction in pelican abundance if harvest is effective	Immediate reduction on predation of fish if harvest was targeted at problem areas Reduction in local pelican population may reduce fish predation but may not improve overall trout numbers if predation is compensatory	Pelicans are not classified as game birds by state or federal wildlife management agencies	Possible conflict between anglers and hunters Conflict between consumptive and non-consumptive user groups Potentially disruptive to other user groups in immediate area	Unknown cost for ammending Migratory Bird Treaty Act (MBTA) A portion of the costs related to pelican management could be supported by pelican tag sales Enforcement of harvest regulations and land use restrictions could be costly to the IDFG enforcement bureau Development of harvest protocol ~ $2,000; tag fees ~ 400 tags @ $10.50 generates $4,200; law enforcement personnel time @30 days ~$5,250; net costs $3,050 Depends on public participation	Pelicans are federally protected under MBTA, are not considered game birds, and thus would not be considered for hunting seasons without modification to MBTA Modifications to MBTA would require ammendments to international treaties with both Canada and Mexico	Low given regulatory constraints

Appendix II. Continued.

	Action Description	Biological Impact–Birds	Biological Impact–Fish	Practical Logistical Considerations	Social Impact	Cost Analysis	Regulatory Constraints	Likelihood of success
Oil Eggs to Limit Pelican Productivity and/or Recruitment	Spray vegetable oil on incubating eggs, which suffocates the embryo May require multiple application of vegetable oil	May reduce pelican population May reduce reproductive success May reduce cohort contribution to future production Potential disturbance to other colonial nesting species Pelicans will continue to incubate eggs rather than renest May increase the incubation period, which could reduce	May reduce predation on fish, because adult pelicans are not feeding young Predation impacts by nesting adults may be maintained until adults abandon nests Oiling eggs may impact the length of time adults will tend nests and how adults will disperse after nest abandonment	Relatively easy to implement Can be selective for pelican nests and specific treatment goals can be identified	Mixed public opinion	Relatively inexpensive Very effective at reducing production May require several years of treatment to reduce predation conflicts Materials $460; labor and transportation $900; total costs ~$1,360 / year	Consider IDFG policy regarding fertility and predator control Federal permit required	High expectation of reducing impacts of pelicans on fish

Appendix II. Continued.

	Action Description	Biological Impact–Birds	Biological Impact–Fish	Practical Logistical Considerations	Social Impact	Cost Analysis	Regulatory Constraints	Likelihood of success
Remove eggs to limit pelican colony expansion	Selectively remove incubating eggs	May reduce pelican production and colony productivity May reduce cohort contribution to future production Increased time required may cause colony abandonment Potential disturbance to other colonial nesting species Pelicans may attempt to renest	May reduce predation on fish, because adult pelicans are not feeding young Predation impacts by nesting adults may be maintained until adults abandon nests	More difficult to implement than oiling; requires off-site disposal of eggs Can be selective for pelican nests and specific treatment goals can be identified	Mixed public opinion	Relatively inexpensive Very effective at reducing production May require several years of treatment to reduce predation conflict Materials $460; labor and transportation $900; total costs ~$1,360 / year	Consider IDFG policy regarding fertility and predator control Federal permit required	High expectation of reducing impacts of pelicans on fish

Appendix II. Continued.

	Action Description	Biological Impact–Birds	Biological Impact–Fish	Practical Logistical Considerations	Social Impact	Cost Analysis	Regulatory Constraints	Likelihood of success
Site-specific lethal take of adult pelicans	Use agency staff to shoot adult birds at high impact areas to actively manage pelican depredation, enhance hazing, and/or to target individuals that have habituated to specific sites	May reduce pelican reproductive success if control occurs during the nesting season	May reduce fish predation	Feasible Very species-specific and locations of concern can be targeted	Mixed public opinion	Given a specific depredation conflict, this method can be an effective management tool Materials (ammunition) $1,000 / 200 birds; labor and transportation $3,600 for 30 days; NEPA work $500	USFWS approval required	High if financial resources are committed

Appendix III. Summary of management actions to reduce AWPE foraging on the Blackfoot River and nesting at the Blackfoot Reservoir colony, 2003-2015.

Year	Hazing at Blackfoot River	Adult Take at Blackfoot River	Bird Lines at Blackfoot River	Exclusion Fencing/Fladry at Nesting Islands	Nest/egg Destruction	Hazing at Nest Islands
2003	Propane cannons (zon guns) and pyrotechnics were used intermittently to haze AWPE along the Blackfoot River between the Blackfoot Reservoir mouth and the Caribou County Sportsman Park. Birds quickly habituated to zon guns; While hazing moved birds from the area the affect was not long-term.	Not used	Not used	Not used	Not used	Not used
2004	Propane cannons (zon guns) and pyrotechnics were used intermittently to haze AWPE along the Blackfoot River between the Blackfoot Reservoir mouth and the Caribou County Sportsman Park. Birds quickly habituated to zon guns. While hazing moved birds from the area the affect was not long-term Used air boat to haze birds from the Blackfoot River. Birds could be moved from river with boat, however they readily returned, so this technique was abandoned.	Not used	Not used	Not used	Not used	Not used
2005	Not used	Not used	Flagged lines were installed across portions of the Blackfoot River between the Blackfoot Reservoir mouth and the Caribou County Sportsman Park. Birds avoided using the flagged river segments.	Not used	Not used	Not used

Appendix III. Continued.

Year	Hazing at Blackfoot River	Adult Take at Blackfoot River	Bird Lines at Blackfoot River	Exclusion Fencing/ Fladry at Nesting Islands	Nest/egg Destruction	Hazing at Nest Islands
			However water level fluctuations created maintenance and safety problems.	Not used	Not used	Not used
2006	Pyrotechnics were used intermittently to haze AWPE along the Blackfoot River between the Blackfoot Reservoir mouth and the Caribou County Sportsman Park. While hazing moved birds from the area the affect was not long-term	USFWS permit was used to take 13 pelicans in conjunction with nonlethal hazing.	Not used	Not used	Not used	Not used
2007	Pyrotechnics were used intermittently to haze AWPE along the Blackfoot River between the Blackfoot Reservoir mouth and the Caribou County Sportsman Park. While hazing moved birds from the area the affect was not long-term	Not used	Not used	Not used	Not used	Not used
2008	Volunteers used pyrotechnics and ATV to haze AWPE along the Blackfoot River between the Blackfoot Reservoir mouth and the Caribou County Sportsman Park. Hazing was done twice daily from mid-May through mid-June. While hazing moved birds from the area the affect was not long-term.	USFWS permit was used to take 10 pelicans in conjunction with nonlethal hazing. Pelicans continued to use Blackfoot River.	Not used	Not used	Not used	Not used
2009	Volunteers used pyrotechnics and ATV to haze AWPE along the Blackfoot River between the Blackfoot Reservoir mouth and the Caribou County Sportsman Park. Hazing was done twice daily from mid-May through	USFWS permit was used to take 50 pelicans in conjunction with nonlethal hazing. Wildlife Services	Not used	Not used	Not used	Not used

Appendix III. Continued.

Year	Hazing at Blackfoot River	Adult Take at Blackfoot River	Bird Lines at Blackfoot River	Exclusion Fencing/ Fladry at Nesting Islands	Nest/egg Destruction	Hazing at Nest Islands
	mid June. While hazing moved birds from the area the affect was not long-term.	personnel implemented the take permit.				
2010	Not used – due to a fisheries research project and pelican trapping for radio tagging.	Not used - due to a fisheries research project and pelican trapping for radio tagging.	Not used	An exclosure area was constructed on the north half of Willow Island. Materials included orange construction barrier fencing attached to t-posts with an interior fladry network installed on t-posts. AWPE did not nest within the exclosure area.	Not used	Not used
2011	Not Used – due to fisheries research project.	Not Used – due to fisheries research project.	Not used	An exclosure area was constructed around the perimeter of Willow Island. Materials included orange construction barrier fencing attached to t-posts with an interior fladry network installed on t-posts. High water levels inundated the fencing and the island. No nesting occurred on Willow Island due to flooding caused by high reservoir levels. Orange construction barrier fencing and fladry was placed on a portion of Gull Island, however it was destroyed by winds, so pelicans used the area for nesting.	Not used	Not used

Appendix III. Continued.

Year	Hazing at Blackfoot River	Adult Take at Blackfoot River	Bird Lines at Blackfoot River	Exclusion Fencing/ Fladry at Nesting Islands	Nest/egg Destruction	Hazing at Nest Islands
2012	Volunteers used pyrotechnics and ATV to haze AWPE along the Blackfoot River between the Blackfoot Reservoir mouth and the Caribou County Sportsman Park. Hazing was done twice daily from mid-May through mid-June. While hazing moved birds from the area the affect was not long-term.	Not used	Not used	No fencing and flagging was installed on Willow Island because it was anticipated to flood again during the spring run off as it had the previous year. An exclosure area was constructed on a portion of Gull Island. Materials included small mesh welded wire fencing attached to t-posts with an interior fladry network installed on t-posts. Limited nesting occurred within the exclosure area.	USFWS permit allowed for the destruction of up to 500 nests with eggs. A total of 461 nests were destroyed by spraying eggs with vegetable oil. Nests were destroyed on both Gull and Willow islands. Gull Island eggs were oiled once and Willow Island eggs received two treatments. There was no obvious difference in hatch rates of the islands, but nest marking with paint was unreliable for adequate assessment.	Not used
2013	Volunteers and IDFG personnel used pyrotechnics and ATV to haze AWPE along the Blackfoot River between the Blackfoot Reservoir mouth and the Caribou County Sportsman Park. Hazing was done twice daily from mid-May through mid-June. Hazing was more effective when combined with lethal take.	USFWS permit allowed for the take of 50 adults on the Blackfoot River from the Lanes Creek-Diamond Creek confluence to the Blackfoot Reservoir, from 15 April to 1 July. A total of 43 birds were taken in association with nonlethal hazing efforts.	Not used	An exclosure area was constructed around the perimeter of Willow Island. The entire perimeter of Gull Island was fenced with the exception of a 'conservation area' on the east side of the Island. The 'conservation area' is an approximately 1 acre area set aside for AWPE nesting, so it has no fencing, flagging, or disturbance beyond annual nest counts. Materials included cattle panels to t-posts with an interior fladry network attached to t-posts.Limited nesting occurred within the exclosure. Nesting occurred outside of the exclosure on Willow Island, in an area thought to have vegetation too dense for nesting or expected to be inundated by reservoir water level.	USFWS permit allowed for the destruction of up to 500 nests with eggs. A total of 382 nests were destroyed by spraying eggs with vegetable oil. Nest destruction occurred on both and Gull and Willow islands. Monitoring of oil treated and non-treated eggs showed one treatment with oil was effective at reducing hatching success. No hatching of treated eggs was observed.	Not used

Appendix III. Continued.

Year	Hazing at Blackfoot River	Adult Take at Blackfoot River	Bird Lines at Blackfoot River	Exclusion Fencing/ Fladry at Nesting Islands	Nest/egg Destruction	Hazing at Nest Islands
2014	IDFG personnel used pyrotechnics and ATV to haze AWPE along the Blackfoot River between the Blackfoot Reservoir mouth and the Caribou County Sportsman Park. Hazing was done twice daily from mid-May through mid-June. Hazing was more effective when combined with lethal take.	USFWS permit allowed for the take of 75 adults on the Blackfoot River from the Lanes Creek-Diamond Creek confluence to the Blackfoot Reservoir, from 15 April to 1 July. A total of 69 birds were taken in association with nonlethal hazing efforts.	Not Used	An exclosure area was constructed around a wider perimeter of Willow Island to account for lower reservoir levels. The entire perimeter of Gull Island was fenced with the exception of a 'conservation area' on the east side of the Island. The 'conservation area' is an approximately 1 acre area set aside for AWPE nesting, so it has no fencing, flagging, or disturbance beyond annual nest counts. Materials included cattle panels to t-posts with an interior fladry network attached to t-posts. No AWPE nesting occurred on Willow Island. Nesting occurred for the first time on Long Island. Initially, AWPE nested only in the 'conservation area' on Gull Island. Following abandonment of Long Island nesting occurred in the exclosure area on Gull Island.	USFWS permit allowed for destruction of up to 500 nests with eggs. Nest destruction occurred by removing eggs from nests. Eggs were removed from 26 and 474 nests on Gull and Long islands, respectively. Following egg removal, the birds on Long Island abandoned their nests. It appeared some of these birds moved to the Gull Island exclusion area and began renesting attempt.	Not Used

Appendix III. Continued.

Year	Hazing at Blackfoot River	Adult Take at Blackfoot River	Bird Lines at Blackfoot River	Exclusion Fencing/ Fladry at Nesting Islands	Nest/egg Destruction	Hazing at Nest Islands
2015	IDFG personnel used pyrotechnics and ATV to haze AWPE along the Blackfoot River between the Blackfoot Reservoir mouth and the Caribou County Sportsman Park. Hazing was done twice daily from mid-May through mid-June. Hazing was more effective when combined with lethal take.	USFWS permit allowed for the take of 75 adults on the Blackfoot River from the Lanes Creek-Diamond Creek confluence to the Blackfoot Reservoir, from 15 April to 1 July.	Not used	An exclosure area was constructed around the entire perimeter of Gull Island with the exception of a 'conservation area' on the east side of the Island. The 'conservation area' is an approximately 1acre area set aside for AWPE nesting, so it has no fencing, flagging, or disturbance beyond annual nest counts. Materials included cattle panels to t-posts with an interior fladry network attached to t posts. The exclusion area on Willow Island was not maintained this year. Hazing was implemented in lieu of constructing barriers on Willow and Long islands.	USFWS permit for destruction of up to 500 nests with eggs.	Nonlethal hazing of adult AWPE began on April 10. Pyrotechnics were used to reinforce hazing. Hazing was conducted at Willow and Long Islands, as well as the west side of Gull Island. All nests initiated on both Long and Willow islands were destroyed prior to egg laying.

Management Plan for the Conservation of

American White Pelicans

in Idaho 2016-2025