ENVIRONMENTAL ASSESSMENT

REDUCING DOUBLE-CRESTED CORMORANT DAMAGE IN WISCONSIN

FINAL

Prepared By:

United States Department of Agriculture
Animal and Plant Health Inspection Service
Wildlife Services

in Cooperation with:

United States Department of the Interior
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United States Department of the Interior, Fish and Wildlife Service,
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SUMMARY OF PROPOSED ACTION

The United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (WS), the U.S. Department of the Interior, Fish and Wildlife Service (USFWS), and the Wisconsin Department of Natural Resources (WDNR) propose to conduct a Double-crested Cormorant (DCCO) (*Phalacrocorax auritus*) damage management program in the State of Wisconsin, including the implementation of the Public Resource Depredation Order (PRDO) (50 CFR 21.48) as promulgated by the USFWS. An Integrated Wildlife Damage Management (IWDM) approach would be implemented to reduce DCCO damage to aquaculture, property, and natural resources, and reduce risks to human health and safety in localized situations when it is deemed necessary. Cormorant damage management (CDM) may be conducted on public and private property in Wisconsin when the resource owner (property owner) or manager requests assistance and all necessary permits and authorizations have been obtained. Landowner/resource manager permission would be obtained prior to conducting CDM activities at any site. The IWDM strategy would involve the use of practical and effective methods of preventing or reducing damage while minimizing harmful effects of damage management measures on humans, target and non-target species, and the environment. Under this action, the agencies could provide technical assistance and direct operational damage management, including non-lethal and lethal management methods. When appropriate, physical exclusion, habitat modification, or harassment would be recommended and utilized to reduce damage. In other situations, birds would be humanely removed through use of shooting, egg oiling/destruction, nest destruction, or euthanasia following live capture. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of non-lethal and lethal methods, or there could be instances where the application of lethal methods alone would be the most appropriate strategy. All management activities would comply with applicable Federal, State, Tribal, and Local laws. The USFWS would be responsible for ensuring compliance with the regulations at 50 CFR 21.48, so that the long-term sustainability of regional DCCO populations is not threatened by CDM activities.

ACRONYMS

ADC	Animal Damage Control[1]
APHIS	Animal and Plant Health Inspection Service
AQDO	Aquaculture Depredation Order
AVMA	American Veterinary Medical Association
BBS	Breeding Bird Survey
CDM	Cormorant Damage Management
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
COE	U.S. Army Corps of Engineers
DCCO	Double-crested Cormorant
DATCP	Department of Agriculture, Trade, and Consumer Protection
EA	Environmental Assessment
EIS	Environmental Impact Statement
EJ	Environmental Justice
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement
FY	Fiscal Year
GLIFWC	Great Lakes Indian Fish and Wildlife Commission
IWDM	Integrated Wildlife Damage Management
MBP	Migratory Bird Permit
MBTA	Migratory Bird Treaty Act
MIS	Management Information System
MOU	Memorandum of Understanding
NDV	Newcastle Disease Virus
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NWRC	USDA, APHIS, WS, National Wildlife Research Center
NWRs	USFWS, National Wildlife Refuges, Used to refer to National Wildlife Refuges in Wisconsin under the Management of the USFWS Horicon National Wildlife Refuge
PRDO	Public Resource Depredation Order
ROD	Record of Decision
SOP	Standard Operating Procedure
T&E	Threatened and Endangered
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USFWS	U.S. Fish and Wildlife Service

[1] On August 1, 1997, the Animal Damage Control program was officially renamed to Wildlife Services. The terms Animal Damage Control, ADC, Wildlife Services, and WS are used synonymously throughout this Environmental Assessment.

WDNR	Wisconsin Department of Natural Resources
WEPA	Wisconsin Environmental Policy Act
WS	Wildlife Services

CHAPTER 1: PURPOSE AND NEED FOR ACTION

1.0 INTRODUCTION

Across the United States, wildlife habitat has been substantially changed as the human population expands and more land is used to meet human needs. These human uses often come into conflict with the needs of wildlife and increase the potential for negative human/wildlife interactions. Double-crested Cormorants (hereafter, DCCOs; see Appendix A for Latin names of all species mentioned in the text) are one of the wildlife species with resource needs and behaviors which conflict with human activities and resource uses. Conflicts with DCCOs include but are not limited to DCCO foraging on fish at aquaculture facilities, DCCO foraging on populations of sport fish, damage to vegetation and habitat used by other wildlife species, damage to private property from DCCO feces, and risks of aircraft collisions with DCCOs at or near airports.

Wildlife damage management is the science of reducing damage or other problems associated with wildlife, and is recognized as an integral part of wildlife management (The Wildlife Society 1990). In response to persistent conflicts and complaints relating to DCCOs, in 2003 the United States Department of the Interior, Fish and Wildlife Service (USFWS) in cooperation with the United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (WS) completed a Final Environmental Impact Statement (FEIS) on the management of DCCOs in the United States (USFWS 2003). The selected management alternative included the establishment of a depredation order to address conflicts regarding DCCO impacts on public resources.

> **Public Resource Depredation Order (PRDO)**: The purpose of this order is to reduce the actual occurrence, and/or minimize the risk, of adverse impacts of DCCOs to public resources. Public resources, as defined by the PRDO, are natural resources managed and conserved by public agencies, as opposed to private individuals. Public resources include fish (both free-swimming fish and stock at Federal, State, and tribal hatcheries that are intended for release in public waters), wildlife, plants, and their habitats. It authorizes WS, State fish and wildlife agencies, and Federally-recognized Tribes to control DCCOs without a Federal permit in 24 states (AL, AR, FL, GA, IL, IN, IA, KS, KY, LA, MI, MN, MS, MO, NY, NC, OH, OK, SC, TN, TX, VT, WV, and WI). It authorizes control on "all lands and freshwaters" including public and private lands. However, landowner/manager permission must be obtained before CDM may be conducted at any site.

Wisconsin is one of several states experiencing DCCO damage including DCCO damage to public resources. This Environmental Assessment (EA) evaluates ways by which WS, the USFWS, the Wisconsin Department of Natural Resources (WDNR), and tribes may work together to resolve conflicts with DCCOs in the State of Wisconsin.

1.1 PURPOSE

The purpose of this EA is to analyze the environmental effects of alternatives for use in addressing damage and conflicts involving DCCOs in the state of Wisconsin under the USFWS PRDO and Migratory Bird Depredation Permits (MBPs). Resources protected by such activities are private freshwater aquaculture stocks, public fishery resources, wildlife, plants, property, and human health and safety. This EA considers the potential environmental effects of conducting cormorant damage management (CDM) throughout the state of Wisconsin.

1.2 OBJECTIVES

The goal of this action is to reduce conflicts with DCCOs in the state of Wisconsin. In particular, the objectives are:

1. Coordinate agency efforts in reducing negative impacts of DCCOs on public resources in Wisconsin;

2. Reduce and prevent adverse impacts of DCCOs on vegetation and associated wildlife species by limiting DCCO numbers at existing sites and carefully managing colonization of new nest sites.

3. Reduce adverse impacts of DCCOs on public fishery resources.

4. Minimize potential DCCO damage to private property and risks to human health and safety including damage to boats, buildings, vegetation, and fish (in private ponds and aquaculture facilities), and DCCO hazards at airports.

5. Conduct and support research and monitoring on the impacts of DCCOs on public resources and evaluate the effects of any CDM actions.

1.3 DECISION TO BE MADE

Wildlife Services is the lead agency in the preparation of this EA. The USFWS and the WDNR are cooperating agencies. The WDNR provides for the control, management, restoration, conservation and regulation of birds, fish, game, forestry and all other wildlife resources in the State of Wisconsin. As noted in the introduction, the USFWS has authority for the management of Migratory Birds through the Migratory Bird Treaty Act (MBTA) and the implementation of the PRDO. The USFWS is also charged with the management of the National Wildlife Refuges including Horicon, Green Bay and Gravel Island Refuges which may be or are currently used by DCCO colonies. In addition to the lead and cooperating agencies, the Great Lakes Indian Fish and Wildlife Commission (GLIFWC) was a consulting agency in the preparation of this EA.

The lead and cooperating agencies will work together to address the following questions in the EA.

- How can the lead and cooperating agencies best respond to the need to reduce conflicts with DCCOs covered under the USFWS' PRDO?

- How can the lead and cooperating agencies best respond to the need to address all other forms of DCCO damage not covered by the PRDO?

- What are the environmental impacts of alternatives for dealing with these types of DCCO damage?

- Will the proposed program have significant effects requiring preparation of an EIS?

Although the lead and cooperating agencies have worked together to produce a joint document and intend to collaborate on CDM in Wisconsin, each agency will be making its own decision on the alternative to be selected in accordance with the standard practices and legal requirements applicable to each agency's decision making process. The USFWS will be making two decisions based on this analysis: 1) the type and extent of CDM actions that may be permitted by the USFWS Migratory Bird Office; and 2) the type of CDM, if any, that will be conducted at USFWS National Wildlife Refuges in Wisconsin.

1.4 NEED FOR ACTION

As stated in the USFWS FEIS (USFWS 2003), the recent increase in the North American DCCO population, and subsequent range expansion, has been well-documented along with concerns of negative impacts associated with this expanding population. The need to protect aquaculture, property, natural resources, and human health and safety from damage and conflicts associated with DCCOs is described in the USFWS FEIS (USFWS 2003) and is summarized in the following subsections.

1.4.1 Potential DCCO Impact on Aquaculture

DCCOs can feed heavily on fish being raised for human consumption, and on fish raised for other purposes (USFWS 2003). When this occurs, there is a need to protect aquaculture facilities from DCCO feeding. The principal species propagated in the United States are catfish, trout, salmon, tilapia, hybrid striped bass, mollusks, shrimp, crayfish, baitfish and ornamental tropical fish (Price and Nickum 1995; USDA 2000). In Wisconsin, baitfish, trout, yellow perch, walleye, crappie, bass, white sucker, and muskellunge are also raised in aquaculture facilities.

1.4.2 Potential DCCO Impact on Fishery Resources

DCCOs are opportunistic feeders that prey on a wide diversity of fish species (USFWS 2003). The magnitude of impact of DCCO predation on fish in a given body of water is dependent on a number of variables, but in select circumstances, DCCOs can have a negative impact on recreational fishing on a localized level (USFWS 2003) resulting in a need to reduce these negative impacts. Potentially, most any species of public resource fish could be negatively impacted by DCCO predation in Wisconsin. Three gamefish species of particular current concern in Wisconsin are yellow perch, rainbow (steelhead) trout, and brown trout. Additionally, WDNR fishery biologists are concerned about the total amount of fish biomass that is removed from foraging areas around breeding colonies and the implications of this removal for local fish populations (P. Peeters, WDNR, pers. comm.). For example, removal of a high number of forage fish could have adverse impacts on growth and survival of larger predatory game fish.

1.4.3 Potential DCCO Impact on Wildlife and Native Vegetation, Including T&E Species

DCCOs can have a negative impact on vegetation by both chemical (DCCO guano) and physical means (stripping leaves and breaking tree branches) and are of concern in the Great Lakes region, including Wisconsin (USFWS 2003). DCCOs can displace colonial species such as Black-crowned Night-Herons, Great Egrets, Great Blue Herons, gulls, Common Terns, and Caspian Terns through habitat degradation and nest site competition (USFWS 2003, USDA 2006*a*). When these situations occur, there may be a need to manage the damage to minimize negative DCCO impacts.

1.4.4 Potential DCCO Impact on Property

There is also a need to manage DCCO damage to property. Property damage in Wisconsin associated with DCCOs includes consumption of fish in privately-owned ponds; corrosion caused by the acid in DCCO droppings that damages boats, marinas and other properties found near DCCO breeding or roosting sites; and damage to vegetation on privately-owned land (USFWS 2003).

1.4.5 Potential DCCO Impact on Human Health and Safety

Collisions between aircraft and wildlife are a concern throughout the world because they threaten passenger safety (Thorpe 1996), result in lost revenue and costly repairs to aircraft (Linnell et al. 1996, Robinson 1996), as well as erode public confidence in the air transport industry as a whole (Conover et al. 1995). DCCOs are a particular hazard to aircraft because of their body size and mass, slow flight speeds, and their natural tendency to fly in flocks (Dolbeer and Eschenfelder 2003). Where the potential for DCCO and aircraft collisions exists, there is a need to manage DCCO activity.

1.5 BACKGROUND

1.5.1 Double-crested Cormorants in Wisconsin

Historical records indicate that cormorants nested at isolated lakes in northern and central Wisconsin during the early 1900s (Matteson et al. 1999). The first published reports of colony sites were in 1919 and 1921 with colonies on Lake Wisconsin (known at the time as the Okee Flowage). Between 1919 and the mid 1960s, WDNR records indicate there were a total of 17 known DCCO colony locations in the State, although no more than 7 of these locations were in use in any given year (Matteson 1985, Matteson et al. 1999). In peak years, there were at least several hundred nesting pairs statewide. However, from the 1950's to the 1960's the nesting DCCO population declined sharply, and by 1966 a statewide survey found only 24 nesting pairs in 3 active colony sites. DCCOs were officially listed as an endangered species by the State of Wisconsin in 1972 (Matteson et. al 1999). During the period of 1974 to 1985, a total of 1,199 DCCO nesting platforms were established at 13 locations as part of the WDNR effort to recover the DCCO population (Matteson 1985). Prior to 1980, the inland colonies supported more nesting DCCOs than the colonies on the Great Lakes.

In 1976-1977, the U.S. Army Corps of Engineers (COE) commissioned a survey of colonial waterbirds around the Great Lakes that documented the numbers of various bird species and the vegetative conditions of the islands used for breeding by these species (Scharf 1979). At that time, breeding DCCOs were extremely rare on the Great Lakes. In 1976, there were only 2 breeding colonies in the Wisconsin portion of Green Bay. One of the colonies was located on Fish Island, 6 km east of Washington Island in Lake Michigan. It is an unvegetated cobble reef that was likely selected as a breeding site because it is extremely remote and not subject to human disturbance. From 1988 to present, DCCOs have used this island occasionally for breeding, but it is not a major colony site. The other nesting colony in 1976 was "Cat Island", near the mouth of the Fox River in lower Green Bay. At the time of the COE study, there were about 20 nests present in several large, dead cottonwood trees at this site. The exact identity of this colony site is somewhat vague in the Scharf (1979) report, but observations of this area would seem to indicate that this colony was not on what is today known as Cat Island, rather, it was on a nearby mudflat which has since been lost to erosion during high water years.

Restoration efforts by WDNR in addition to the bans on organochlorine pesticides (DDT) and its metabolite (DDE), resulted in DCCO population increases. By 1982, the state DCCO population had increased to 1,028 pairs in 16 colonies and the state status was reduced to "threatened". Interestingly, some of the earliest complaints about DCCO impacts on fish came in 1982, when commercial fishermen in the Apostle Islands reported losing 30-40% of their pound-net catch of whitefish. Response to the conflict included research into deterrent devices (Craven and Lev 1987) and an eventual switch by fishermen from pound nets to

cage-type nets that were less vulnerable to foraging DCCOs (Matteson et al. 1999).

The WI DCCO population continued to increase through the 1980s. Beginning in 1980, the majority of the State's nesting DCCOs were in Great Lakes colonies, a trend which continues to this day. By 1985, the Wisconsin DCCO population was estimated at 2,213 pairs in 21 nesting colonies. The total DCCO population in 1985 including non-breeding birds was estimated at or above 5,000 birds (Matteson 1985). In 1986, DCCOs were removed from the state list of threatened and endangered species (Matteson 1985, Matteson et al. 1999).

While the overall state DCCO population grew at an annual rate of 25% from 1973 to 1997, the Green Bay and Lake Michigan area has sustained the majority of the growth, accounting for 81% of the breeding population by 1997 (Matteson et al. 1999) and 89% of the breeding population in 2005 (Fig 1-1). Data from the 2005, Wisconsin DCCO survey indicate that DCCO colonies in other regions of the state, with the exception of the East Central Region which includes the new Winnebago Pool colonies, have declined or become inactive during the period of 1997 to 2005 (Figs. 1-1 and 1-2, Table 1-1). There have been no statewide surveys since 2005. However, Figure 1-3 shows that the number of nesting DCCOs in the Green Bay area has continued to increase since the last survey. This increase may be attributable to a statewide increase in the DCCO population or it is possible that some of the increase may result from birds shifting from inland nest sites to sites in the Green Bay area.

1.5.2 Potential DCCO Impact on Aquaculture

A 1998 census revealed that the U.S. domestic aquaculture industry represents slightly over 4,300 farms producing at least $1,000 or more in annual sales, with total sales reaching $1.09 billion (NASS 2007). The frequency of occurrence of DCCOs at a given aquaculture facility can be a function of many interacting factors, including: (1) size of the regional and local DCCO population; (2) the number, size, and distribution of ponds/raceways; (3) the size, distribution, density, health, and species composition of fish populations in the ponds/raceways; (4) the number, size, and distribution of natural wetlands in the immediate environs; (5) the size, distribution, density, health, and species composition of natural fish populations in the surrounding landscape; (6) the number, size, and distribution of suitable roosting habitat; and (7) the variety, intensity and distribution of local damage abatement activities. DCCOs are adept at seeking out the most favorable foraging and roosting sites. As a result, DCCOs rarely are distributed evenly over a given region, but rather tend to be highly clumped or localized. It is not uncommon for some aquaculture producers in a region to suffer little or no economic damage from DCCOs, while others experience exceptionally high losses (Glahn and Bruggers 1995, Glahn et al. 2000b, Glahn et al. 1999, Glahn et al. 2002). Damage abatement activities can

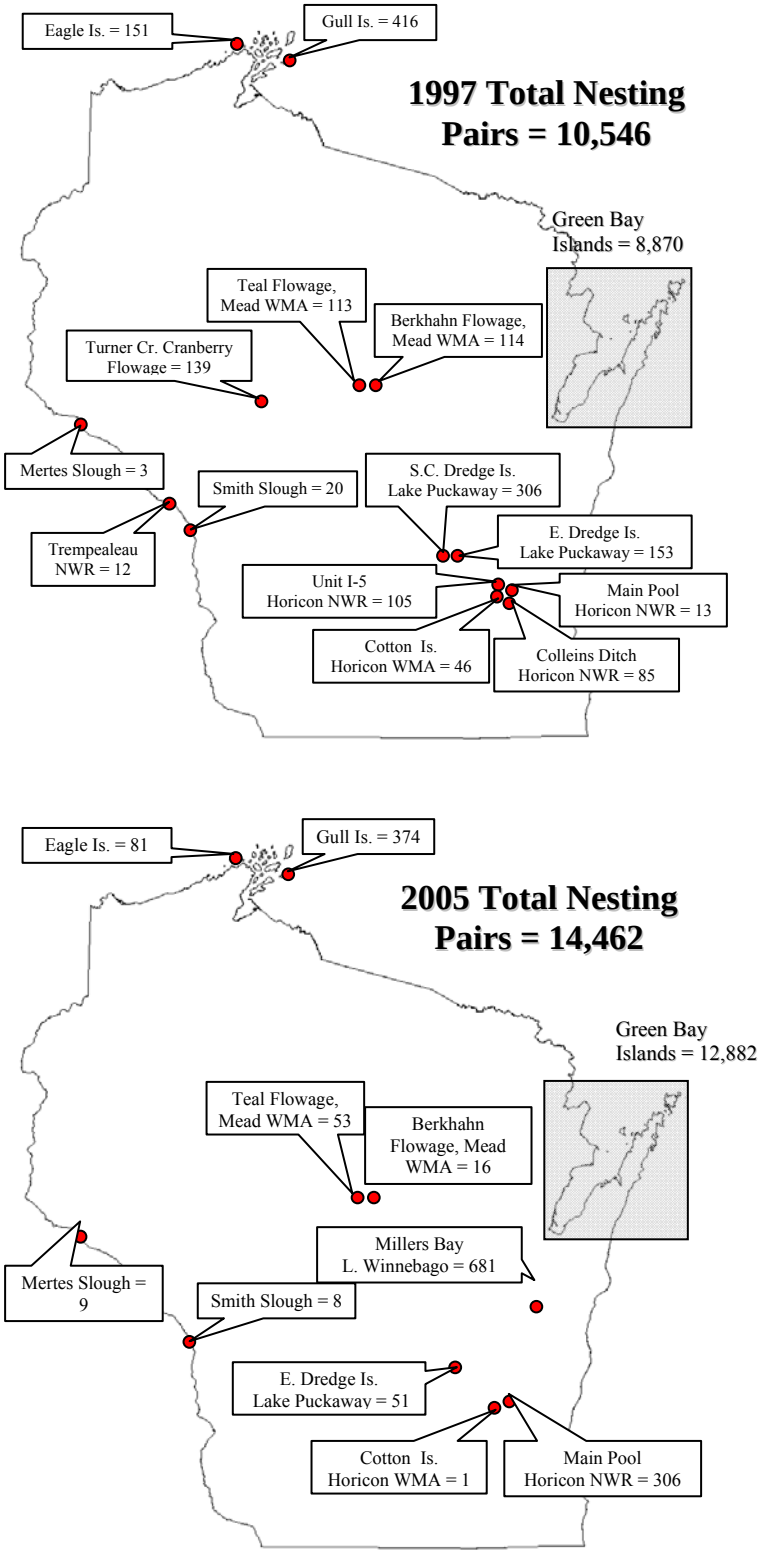

Figure 1-1 Comparison of Double-crested Cormorant nesting colony size and location in Wisconsin between 1997 and 2005.

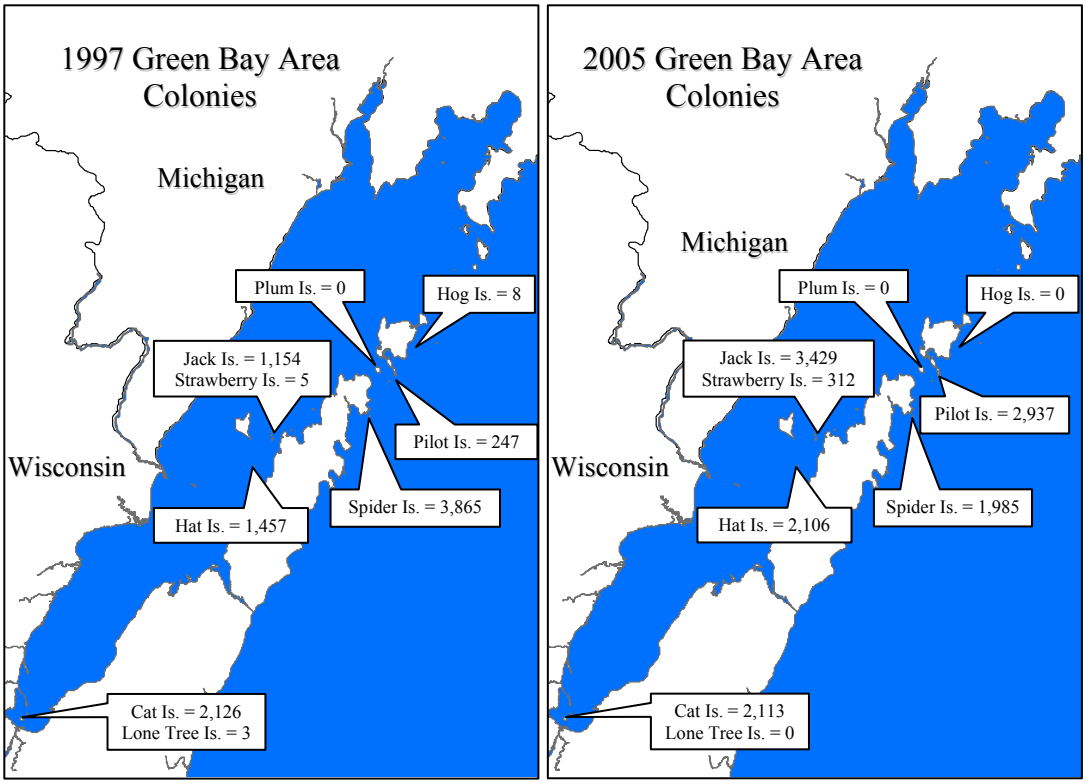

Figure 1-2. Comparison of Double-crested Cormorant nesting colony size and location in Green Bay, Wisconsin between 1997 and 2005.

Table 1-1. Double-crested Cormorant nest counts by region in 1997 versus 2005. Percent of total nests counted is given in parenthesis.

Region	**1997**	**2005**	**% change**
Green Bay Islands	8,870 (84.1)	12,882 (89.1)	45.2
East-Central	708 (6.7)	1,039 (7.2)	46.8
Apostle Islands	567 (5.4)	455 (3.1)	-19.8
Central/North-Central	366 (3.5)	69 (0.5)	-81.1
Upper Mississippi River	35 (0.3)	17 (0.1)	-51.4
Total	**10,546**	**14,462**	**37.1**

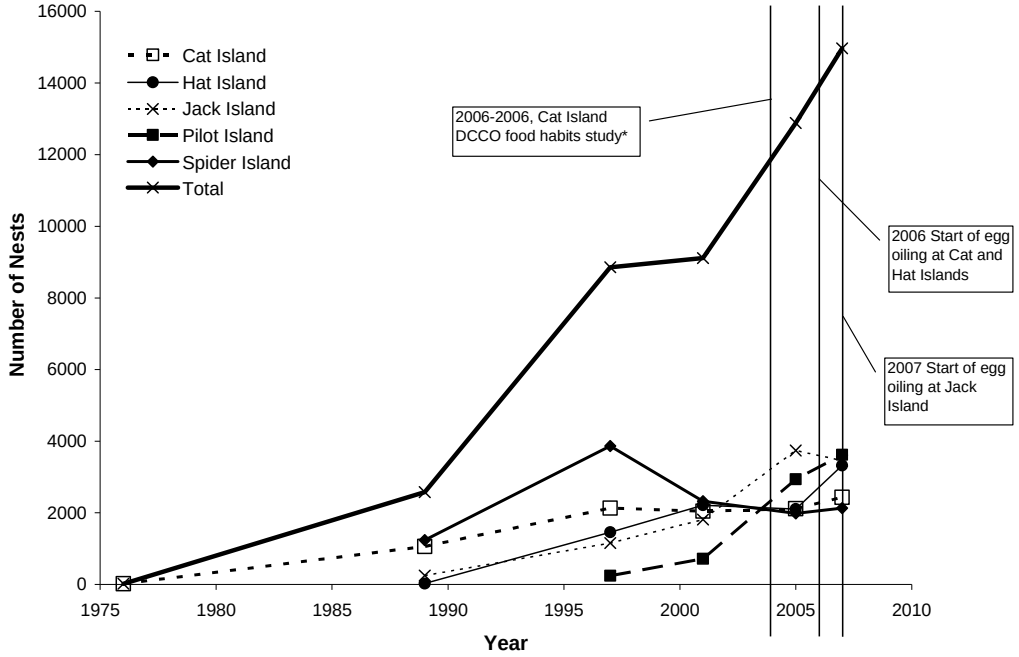

Figure 1-3. Number of nesting DCCOs at Cat, Hat, Jack, Pilot and Spider Islands in the Green Bay, Wisconsin area. Data compiled by K. Stromborg from Weseloh et al. 2006, Trexl 2003, and Wires et al. 2001, with additional USFWS and WS unpublished data for 2007.

shift bird activities from one area to another which does not eliminate DCCO damage but rather moves it to a new location (Aderman and Hill 1995; Mott et al. 1998; Reinhold and Sloan 1999; Tobin et al. 2002).

DCCO Impacts on Aquaculture in Wisconsin

In 2005, 84 commercial fish production facilities in Wisconsin met the aquaculture farm definition of $1,000 or more in aquaculture sales per year, a decrease from 95 farms in 1998. However, total sales in 2005 ($7.02 million) were higher than in 1998 ($5.23 million; NASS 2007). The two most common types of fish production in 2005 were baitfish ($3.89 million) and food fish (fish raised for consumption by humans; $1.94 million). Fathead minnow and golden shiner were the most popular types of baitfish, trout and yellow perch were the most popular foodfish (NASS 2007).

In addition to private aquaculture production, the WDNR operates 13 fish hatcheries and rearing stations, 3 egg collection weirs, and 10 to 15 fish production ponds. From July 1, 2005 to June 30, 2006, these facilities enabled the WDNR to stock over 24.9 million fish including brook, brown and rainbow and lake trout; muskellunge; northern pike; walleye; lake sturgeon; coho salmon, Chinook salmon and splake (WDNR 2007*c*). There are also 7 tribal hatcheries located on Bad River, Lac Courte Oreilles, Lac du Flambeau, Menominee, Mole

Lake, Red Cliff, and St. Croix tribal lands which raise fish for release into public waters (GLIFWC 2001). Additionally, the USFWS runs fish hatcheries in Genoa and Iron River, Wisconsin. It should be noted that while production of fish intended for release into public waters such as that in state, federal and tribal hatcheries is discussed in the section on aquaculture, the fish at these hatcheries meet the PRDO definition of a public resource and management of DCCO damage at these hatcheries may be conducted under the authority of the PRDO.

The magnitude of economic impacts that DCCOs have on the aquaculture industry varies depending upon many different factors including, the value of the fish stock, number of depredating birds present, and the time of year the predation is taking place. DCCO depredation has been a concern at some Wisconsin aquaculture facilities. From 2005-2007, WS has responded to 3, 5, and 7 requests for assistance with damage at aquaculture facilities. WS assistance with aquaculture damage may include technical assistance (advice) on nonlethal and lethal damage management methods and consultations necessary to help landowners obtain migratory bird permits from the USFWS for the use of lethal methods to resolve their damage problems. The number of USFWS permits issued for CDM in Wisconsin and the number of cormorants taken under the permits is provided in Table 1-2.

Table 1-2. USFWS depredation permits issued for cormorant damage management in Wisconsin and the number of birds taken for damage management for 2000-2007. Most permits were issued for the reduction of cormorant predation on fish at aquaculture facilities and private stocked fish ponds.

Year	Permits Issued	Maximum Authorized Take	Reported Take
2000	4	41	2
2001	4	45	7
2002	7	48	2
2003	9	103	6
2004	9	149	31
2005	7	85	29
2006	4	64	18
2007	5 *	114	38

* 1 permit issued for damage to private property

1.5.3 Potential DCCO Impact on Fishery Resources

The rapid increase in DCCO populations over the last 25 years has led to an increase in conflicts between humans and DCCOs including complaints relating to DCCO impacts on sport fisheries (USFWS 2003). DCCOs are opportunistic feeders and therefore feed on a wide diversity of fish species dependant upon location (USFWS 2003). DCCO diet is reflective of the relative abundance and population dynamics of prey species in a specific water body (Belyea et al. 1999

Bur et al. 1997, Rudstam et al. 2004, Meadows 2007). In the Great Lakes, fish species such as the alewife and gizzard shad, appear to be important prey items. Stickleback, sculpins, cyprinids, and yellow perch, and at some localities, burbot, freshwater drum, and lake/northern chub are also important prey fish species (Wires et al. 2001). DCCO foraging can have a negative impact on recreational fishing on a localized level (USFWS 2003). However, review of the literature indicates that the effects of DCCOs on game fish vary from lake to lake, from year to year and even from one time of the year to another in the same lake (Belyea et al. 1999).

The impact of DCCO predation on fish in a given body of water is dependent on a number of variables including the number of birds present, the time of year when predation occurs, prey species composition, abundance and distribution, and physical characteristics of the body of water such as depth or proximity to shore (which affect prey accessibility). Environmental and human-induced factors also affect aquatic ecosystems and fish populations. These can be classified as biological/biotic (overfishing, exotic species, etc.), chemical (water quality, nutrient and contaminant loading, etc.) or physical/abiotic (dredging, dam construction, hydropower operation, siltation, weather induced year-effects, global warming etc.). Such activities and factors may lead to changes in fish species density, diversity, and/or composition due to direct effects on year class strength, survival, recruitment to older age groups, spawning success, spawning or nursery habitat, and/or competition (USFWS 1995).

1.5.3.1 Impacts and Management of DCCOs on Fish in Lower Green Bay, Wisconsin

The yellow perch population in southern Green Bay has been monitored for 27 years by WDNR. WDNR data show a 90% population decline in the yellow perch population over the period from 1980 – 2002. Poor recruitment has likely been a major factor contributing to the decline. Since 1991, only 2 years (1998 and 2003) have produced a strong year class as measured in the fall as age 0+ fish (WDNR 2005). The 2003 perch year class was the largest year-class in 25 years. Over the same period the local DCCO colony on Cat Island increased approximately 19% per year raising concerns among sport and commercial fishers regarding the impacts of DCCOs on the declining yellow perch population (Fig. 1-4). In 2004, in response to public concerns regarding the impact of the increasing Cat Island DCCO colony, the WDNR, in cooperation with the University of Wisconsin Madison, Department of Fisheries and Wildlife and WS initiated a study on the impacts of DCCOs on yellow perch (Meadows 2007). The 2003 yellow perch cohort provided a unique opportunity to examine the impact of DCCO predation on a large year-class of a commercially valuable species as it ages.

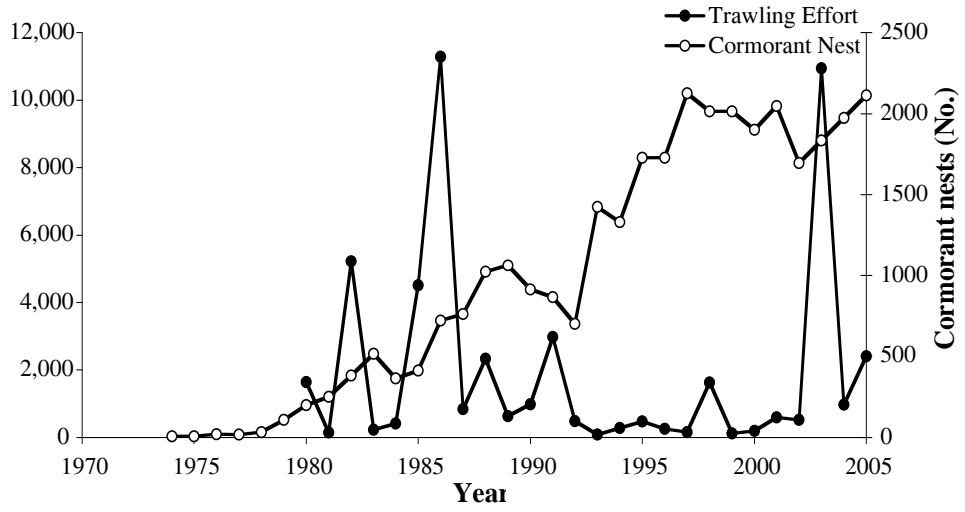

Figure 1-4. Number of Double-crested Cormorant nests on Cat Island (1974-2005) and annual average catch per trawl hour of young of the year (YOY) yellow perch at shallow trawling locations in southern Green Bay, WI. Figure from Meadows (2007)

Stomach-content analysis was conducted on 436 cormorants sampled in 2004, 540 in 2005, and 434 in 2006. Cormorants were collected throughout the period when they were present in Lower Green Bay to monitor for seasonal variation in DCCO diets. A total of 19 fish species were found in the stomachs of cormorants removed from southern Green Bay. White suckers, yellow perch, walleye, and gizzard shad composed the greatest proportion of biomass consumed by cormorants in both 2004 and 2005, although the relative proportions of each prey species in the diet differed between years (Appendix C, Tables 1 and 2). In 2006, round gobies replaced walleye as one of the top four species composing the greatest proportion of total biomass consumed (Appendix C, Tables 3). In order of abundance, the most numerically abundant prey species in the cormorant diet were yellow perch, gizzard shad, round goby, and spottail shiner in 2004; gizzard shad, round goby, yellow perch, and trout perch in 2005; and gizzard shad, round goby, yellow perch and spottail shiner in 2006 (Appendix C, Tables 1-3).

Information on the number and biomass of a fish species in DCCO diets can be difficult to interpret. For example, DCCOs may consume a large number of small individuals of one fish species but never consume as much biomass (weight) of that species as they do a smaller number of individuals of a larger fish species. A model was used to combine information on fish biomass, numbers and frequency of occurrence to determine the relative importance of each fish species in DCCO diets. In decreasing order, the prey species with the highest relative importance indices in 2004 were yellow perch, gizzard shad, white sucker, and round goby/spottail shiner (Appendix C, Table 1). Yellow Perch are an important sport fish, and gizzard shad, white sucker and round goby are part of the forage base in the Green Bay system. In 2005 and 2006, prey species of importance were very similar, but the hierarchy of importance shifted to gizzard shad, white sucker,

yellow perch, and round goby (Appendix C, Tables 2 and 3). In 2004 and 2006, the importance of yellow perch relative to the other three most important prey items increased as the breeding season progressed, peaking during the chick rearing period, and declining to its lowest level during the chick independence/pre-migration period (Appendix C, Figs. 1 and 3). In 2005, however, yellow perch relative importance was highest during the arrival phase and declined across the breeding season, reaching its lowest level during the chick independence/pre-migration period (Appendix C, Fig. 2). The relative importance of round goby and white sucker exhibited no consistent pattern across years, while that of gizzard shad consistently increased as the season progressed, achieving a dramatic peak each year during the chick independence/pre-migration period (Appendix C, Figs. 1-3).

Cormorants consumed 64% and 51% more yellow perch by biomass and 368% and 679% yellow perch by number in 2004 than in 2005 and 2006, respectively. Scale samples indicated that the modal age (yr) of perch consumed in 2004 was 1, whereas the modal age of yellow perch consumed in 2005 was 2. Thus, the 2003 year class made up most of the yellow perch in the cormorant diet during these two years. In contrast, yellow perch consumed by cormorants in 2006 were not composed of any single year class, which tended to vary temporally among breeding periods. As might be anticipated for an opportunistic forager, yellow perch were an important part of DCCO diets when the 2003 year class was most abundant and in a size range preferred by foraging DCCOs.

Information from the DCCO diet study was combined with estimates of DCCO daily metabolic and food requirements to estimate total fish consumption for the breeding adults and chicks associated with the Cat Island DCCO colony during each of the three years. Total fish consumption by the breeding adults and chicks in 2004, 2005, and 2006 was estimated at 624,371 lb, 513,743 lb, and 642,332 lb respectively. The estimated number of fish consumed in 2004, 2005, and 2006 were ~22 million, ~10.5 million and, ~9.3 million, respectively. This estimated weight and number of fish consumed does not include the non breeding adults and sub adults associated with the Cat Island Colony. Although this level of foraging appears substantial, there is no information on the total biomass production or standing stock of fish for Lower Green Bay, and no way to put DCCO consumption in context of its impact on the fish community in general or the yellow perch population.

Although Meadows (2007) demonstrated that the amount of yellow perch in DCCO diets did increase in response to the availability of the 2003 year class and the total amount of yellow perch estimated to be taken does appear to be high, the actual impact of DCCO foraging on the overall fishery in Lower Green Bay is less clear. Foraging by DCCOs may be a least partially compensatory to other forms of mortality (i.e., fish might have died from other causes if they weren't taken by DCCOs). Inserting DCCO consumption data into a model of the perch population developed by the USFWS indicates that while DCCO foraging may have

accounted for as much as 30% of yellow perch mortality in 2004, it does not appear to be jeopardizing the perch population. However, it is possible that DCCO foraging did reduce the magnitude of increase in the yellow perch population that resulted from the 2003 year class. Fisheries survey data from 2006 and 2007 would appear to support this conclusion. Despite the high DCCO population at Cat Island, the yellow perch fishery in Green Bay has improved. The WDNR also reports improved yellow perch year classes in 2002-2007 (WDNR 2006, WDNR 2008). In 2006 the WDNR was able to increase the number of fish that can be taken by licensed sport fishermen in Green Bay. In 2007, the WDNR also increased the yellow perch quota for commercial fishermen.

1.5.3.2 Impacts and Management of DCCOs on Fish in and near Door County, Wisconsin

The impact of an expanding cormorant population on local fish stocks in a complex system like the Great Lakes is difficult to quantify and document. Although it is almost impossible to infer what fish cormorants are eating without detailed diet studies, it is possible to roughly estimate the amount of fish biomass consumed by DCCOs based on literature values. Cormorants consume about 20% of their body weight per day (Dunn 1975*a, b;* Glahn and Bruggers 1995; Gremillet et al. 2000). Adult DCCO are reported to weigh approximately 5 pounds (Rudstam et al. 2004), which equates to an estimated consumption rate of one pound of fish per adult per day. Data from 2007 counts at the DCCO colonies in Green Bay indicate there were approximately 12,536 active DCCO nests in the Door County Area (Hat, Jack, Pilot and Spider Islands). The nest count only provides an estimate of the number of breeding adults. Estimates of 0.6 to 4.0 sub adult and non-breeding adult DCCOs per breeding pair have been used for several populations (Tyson et al. 1999). For our calculations, we use a conservative estimate of 0.6 non-breeders per breeding pair. Cormorants typically arrive in the Green Bay area in early April and depart the area in late September (6 months or 182 days).

We assume that the median hatch date for DCCOs in the Green Bay area is mid-June and nestlings remain in the area through September (107 days). Data from the DCCO food habits study at Cat Island recorded an average of 2 nestlings fledged per nest (Meadows 2007). An individual nestling consumes 73% of an adult's daily consumption (Rudstam et al. 2004) for an 8-week period (56 days) after which these birds are recruited into the adult population (Mendall 1936) and considered to feed at the adult rate for the remainder of the summer (51 days). Based on these figures and assumptions we calculated, by proportional expansion, the annual amount of fish consumed by the five Wisconsin DCCO colonies in the Green Bay area.

Breeding adults

12,536 breeding pairs in the Door County Area in 2007 x 2 adults/pair x 1 lb fish/day x 182 days = **4,563,104 lbs**.

Non-breeding adults

12,536 breeding pairs in the Door County Area in 2007 x 0.6 (non-breeder/breeding pair ratio) x 1 lb fish/day x 182 days = **1,369,004 lbs**.

Nestlings

12,536 breeding pairs in the Door County Area in 2007 x 2 nestlings/nest x 0.73 (Rudstam et al. 2004) x 56 days = **1,024,943 lbs**.

Fledglings

12,882 breeding pairs in the Door County Area in 2007 x 2 nestlings/nest x 1 lb fish/day x 51 days = **1,278,672 lbs**.

Total fish consumption in Door County Area = 8,235,723 lbs.

The conservative estimate of 8.2 million pounds of fish does not account for the consumption of fish by migrating cormorants moving through the area each spring and fall or the additional 7,676 nesting pairs of DCCO just across the border in Michigan waters of Green Bay. If the upper limit ratio of 4 non-breeders/breeding pair is used, then the amount of fish consumption increases to 16.4 million pounds annually. If you add in the additional cormorants nesting on the Michigan waters of Green Bay, the amount of fish consumption increases to over 20 million pounds annually. As with the situation in Lower Green Bay, without information on the total biomass production of the fishery in the Door County Area, the impact of this level of fish removal is unclear. However, at current levels of DCCO foraging, fishery biologists with the WDNR are concerned about potential impacts of DCCO foraging on overall biomass production and the health of the fishery ecosystem. It is noteworthy, that in 1991, the WDNR ended the commercial harvest of alewives which was averaging about 11.1 million pounds (1987-1991) because of concerns regarding the availability of forage fish for salmon.

Without detailed diet studies we can only speculate what species of fish are being impacted. It is logical to assume that DCCO diets in the Door County area will reflect the relative abundance of fish species (i.e. alewives, gizzard shad, sticklebacks, etc are likely to be most common). However, depending on the circumstances, even a species which is not frequently taken by DCCOs may be

adversely impacted by high numbers of DCCOs. The consumption of individual fish by DCCOs in the Door County area is likely to be conservatively in excess of 80 million fish (≥10 fish per pound). Considering that for a species like brown trout which the WDNR stocks to maintain a sport fishery (~0.5 million stocked in (northern) Green Bay and Lake Michigan waters north of Algoma), with no natural reproduction known to occur, cormorants would only have to take one brown trout in every 144 fish to account for all the brown trout stocked in (northern) Green Bay and the Lake Michigan waters north of Algoma. Obviously, cormorants are not taking all of the brown trout stocked by the WDNR; however, the cormorant population has dramatically increased over the last decade, while the number of brown trout harvested in Green Bay and the Door County area of Green Bay and Lake Michigan has decreased sharply (Fig. 1-5). During this same time period, brown trout sport harvest in Wisconsin waters of Lake Michigan away from DCCO concentrations has shown a slight, but much less pronounced decline. An analysis of covariance (ANCOVA) was used to test for possible significant difference in harvest trends between the two locations. Year was entered into the model as a covariate, location was entered as a categorical factor and year/location was entered as the covariate interaction term. The decline was statistically significantly greater for the Northern Green Bay/Door County area than for Sheboygan and South ($F_{[1, 36]} = 12.72$, $P < 0.01$). The survey used to collect information on fish harvest does not include information on the amount of time spent fishing for a particular species, so data on the rate of fish harvest for the two areas is not available. This is in part because an individual may, in theory, be primarily fishing for one species but may catch and keep a different, but still desirable, species. Overall fishing effort along the Lake Michigan coast has been stable or slightly increasing for the 1980's to present (P. Peeters, WDNR, pers. comm.). While it is possible that density dependent factors may be responsible for the observed decline, the WDNR has no reason to believe that these factors should be higher for the Door County area than for locations further south on the Lake Michigan Coast.

DCCO foraging pressure is not evenly distributed throughout the Green Bay area. Research from Wisconsin waters of Lake Michigan indicates that approximately 90% of DCCO foraging flights from Cat and Spider Islands were within 5.4 miles of the colonies (Custer and Bunck 1992). This foraging pattern concentrates foraging pressure in the far south end of Green Bay (Cat Island colony) and in the northern Door County Area (Figure 1-6). In 2001, WDNR began stocking domestic strains of rainbow trout in Lake Michigan and Green Bay in an attempt to improve nearshore fishing. Of the six sites selected for experimental stocking, 2 (Algoma and Sister Bay) happened to be in areas likely to be heavily used by nesting DCCOs and four were south of the City of Manitowoc in an area with lower foraging pressure by nesting DCCOs. Since that time, more than 300,000 fin-clipped rainbow trout have been stocked as part of this study. A preliminary review of data for 2001 through 2004, indicates that approximately nine percent of the fin-clipped fish from this experiment were caught on Green Bay or on Lake

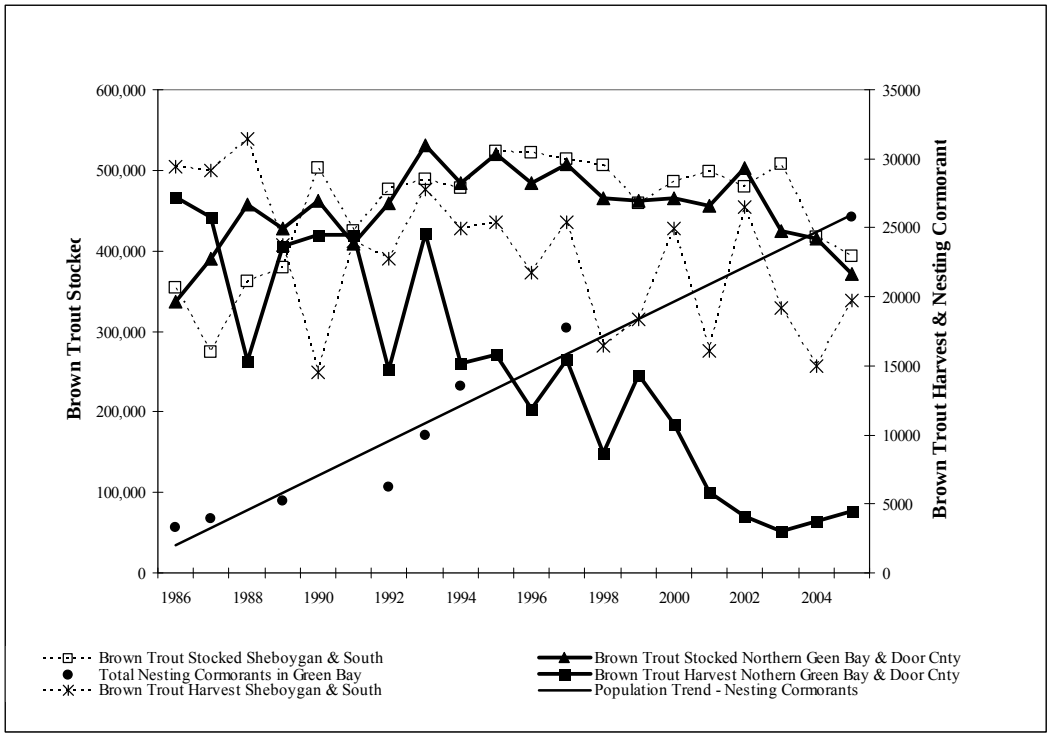

Figure 1-5. Brown trout stocking and harvest for areas with (Northern Green Bay and Door County) and without (Sheboygan and South) high levels of foraging by nesting DCCOs.

Michigan from Algoma northward. For the same period, domestic strains of rainbow trout stocked in southern ports were nearly five times more likely to be caught by anglers than the domestic strains of rainbow stocked from Algoma and north (corrected for numbers of fish stocked). Since all the fish were stocked at a similar time and size, other factors must be influencing their survival and ultimately their catchability. WDNR hoped that the domestic strains of rainbow trout would remain in shallow water areas. However, it is conceivable the same trait could also make them more vulnerable to predation by cormorants. These observations do not document a cause and effect relationship implicating cormorants. The agencies acknowledge that many factors such as predation by other species, introduced species, and changes in factors such as water clarity can impact the success of stocked fish species in complex systems like Lake Michigan. The fact that brown trout harvest rates have been declining slightly even in areas without foraging pressure from nesting DCCOs is indicative of this fact. However, these factors should be similar for areas with and without intensive DCCO foraging. Research has documented that cormorants can adversely impact congregations of recently stocked salmonids (Modde et al. 1996, Ross and Johnston 1999) There is cause for concern that the previously mentioned lower harvest rates for brown and rainbow trout in the Door County area may be attributable to DCCO foraging.

Since the mid-1990s when concerns first surfaced regarding the impact of DCCOs on stocked brown trout, the WDNR has been taking available measures to reduce the impact of cormorant predation. Many of the stocked yearling fish are released under the ice and before the cormorants return in spring. Brown trout fingerling stocking is delayed as late in fall as possible to reduce the amount of time DCCOs have to prey on fish before the DCCOs migrate south. However, these efforts have not produced the desired impact on trout return rates. This may be because stocked brown trout and the domestic rainbow trout strains remain in near shore areas and are exposed to DCCO predation throughout the DCCO breeding and migration periods. A cautious adaptive management approach (e.g., use of egg oiling to reduce DCCO populations gradually over a period of several years,) combined with ongoing monitoring of fish populations would allow the agencies to attempt to address concerns about high DCCO numbers while still maintaining a sustainable DCCO population.

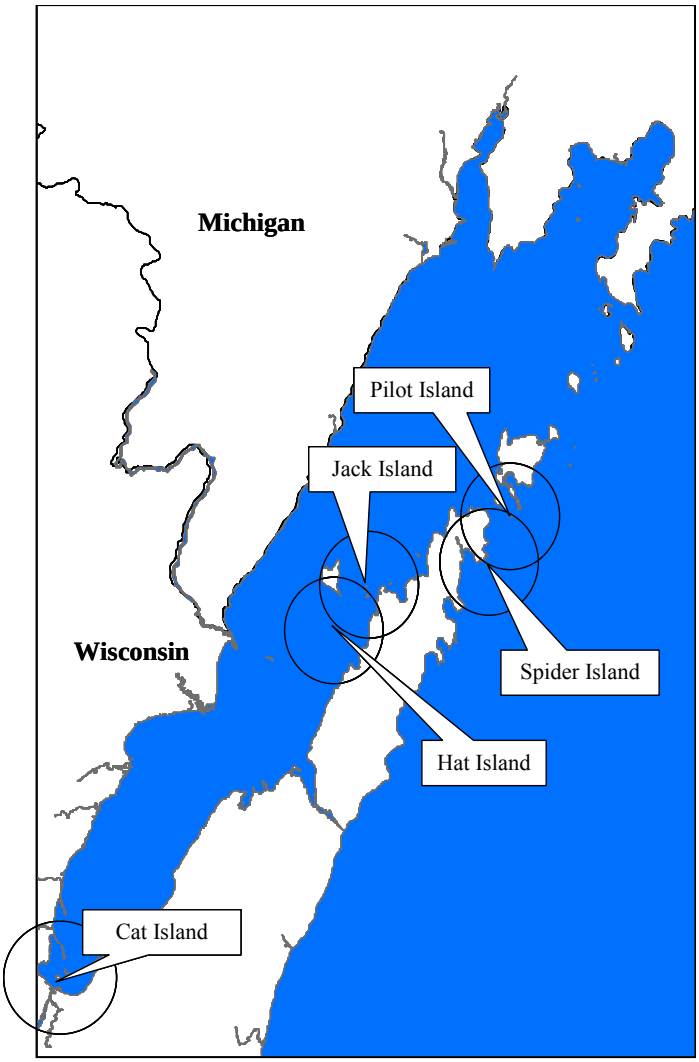

Figure 1-6. Regions of greatest DCCO foraging activity in the Green Bay Area during DCCO breeding season. Circles represent primary foraging area for DCCOs nesting at specific colony sites in the Green Bay Area.

Recreational fishing benefits local and regional economies in many areas of the U.S., with some local economies relying heavily on income associated with recreational fisheries (USFWS 2003). Outdoor recreation, hunting, and sportfishing make up a large part of Wisconsin's economy. The tourism and expenditures by tourists and fishermen helps to create an enhanced quality of life and is a substantial portion of the local economies of the State. Nationally,

Wisconsin ranks second in the number of non-resident fishing days. In 2004, $2.3 billion was generated by sportfishing activities in Wisconsin, with another $100 million generated by state income and sales tax revenues (WDNR 2005).

1.5.3.3 Kewaunee River

The Kewaunee River is an important brood river for collecting salmonid gametes for hatchery production. On a yearly basis, the WDNR stocks approximately 72,000 Chinook salmon, 132,000 coho salmon, 102,000 steelhead and 54,000 brown trout into the Kewaunee River, hoping to imprint them to the Kewaunee River so that when they mature they return there to be captured for egg collection. Brood stock streams gerneally receive a larger stocking quota for each species than other streams to sustain angling and ensure that an adequate number of fish return to the site to produce the next generation of fish. Since trout and salmon imprint to their streams as smolts, if the fish return to the streams is poor, the options for obtaining alternate sources of eggs are limited. Historically, if returns were low the WDNR was able to find some sources of eggs that can be raised at the Kewaunee River facility and imprinted on the site including eggs from other states. However, now that viral hemorrhagic septicemia virus (VHSv) has been documented in Lake Michigan and the states have implemented movement bans for fish, obtaining alternate sources of eggs is increasingly difficult.

WDNR Fisheries has seen a decline in the number of adult salmonids returning to the Kewaunee River (especially coho and steelhead) over the last decade and has concerns that some of the problems may be related to DCCO predation on salmonid smolts after stocking and before emigration to Lake Michigan. The decrease in return rates has occurred during the same time frame that cormorant populations in NE Wisconsin have greatly expanded. Increasing numbers of cormorants have been seen on the lower Kewaunee during the time period (April and May) when salmonid smolts would be migrating to Lake Michigan. The number of salmonids stocked in the Kewaunee River has remained rather consistent during the period of the decline and cannot account for the declines. Water quality/quantity, although poor in some years, does not appear to be responsible for the long-term declining trend. Declines are less consistent for Chinook than for the other species. Salmonid out-migration studies concuted in the early 2000s indicate that the period of time salmonid spend in the river where they are likely to be most vulnerable to DCCO predation is shorter (weeks) than for the other fish species (months). While it is likely that a number of interacting factors have worked together to cause declines in the number of adult salmonids returning to Kewaunee River, the possible impact of predation on recently stocked fish remains.

Table 1-3. Summary of returns to BAFF on the Kewaunee River, 1994-2005.

Year	Spring Steelhead	Fall Steelhead	Coho	Chinook	Brown Trout
1994	2,968	521	746	1,722	316
1995	1,847	540	3,767	2,621	51
1996	2,144	193	3,383	3,193	77
1997	2,144	131	1,162	1,518	46
1998	876	46	2,432	4,005	62
1999	732	145	1,636	5,798	60
2000	340	7	1,629	2,774	8
2001	413	13	168	5,436	6
2002	376	3	242	6,224	0
2003	371	0	266	1,197**	0
2004	735	40	1,600	2,500**	25
2005	443	6	937	3,268**	3

** Chinook salmon were allowed to bypass BAFF and not stopped and counted until Oct. 1.

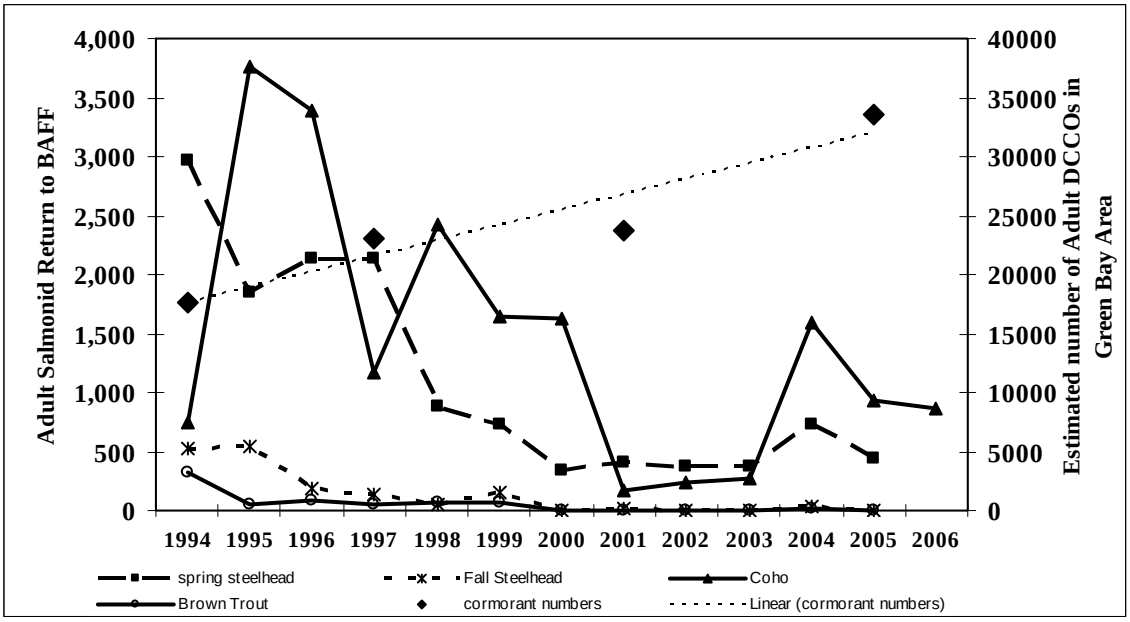

Figure 1-7. Return of adult salmonids to the Besadny Anadromous Fisheries Facility on the Kewaunee River and the estimated number of breeding and nonbreeding adult cormorants in the Green Bay area. Estimates of cormorant numbers were made using methods described in Section 1.5.3.2.

1.5.4 Potential DCCO Impact on Wildlife and Native Vegetation, Including T&E Species

DCCOs can have a negative effect on vegetation through both chemical (DCCO guano) and physical means (stripping leaves and breaking tree branches) and are of concern in the Great Lakes region (USFWS 2003, Hebert et al. 2005, USDA 2006*a*). Accumulation of DCCO droppings (which contain ammonium nitrogen), stripping leaves for nesting material, and the combined weight of the birds and their nests can break branches and kill many trees within 3 to 10 years (Bédard et al. 1995, Korfanty et al. 1999, Lemmon et al. 1994, Lewis 1929, Weseloh et al. 1995, Weseloh and Ewins 1994, Weseloh and Collier 1995, Hebert et al. 2005). Ammonium toxicity may be an important factor contributing to island forest decline (Hebert et al. 2005). Lewis (1929) considered the killing of trees by nesting DCCOs to be very local and limited, with most trees he observed to have no commercial timber value. However, tree damage may be perceived as a problem if these trees are rare species, or aesthetically valued (Bédard et al. 1999, Hatch and Weseloh 1999). For example, concerns about rare Carolinian vegetation communities and state-listed plant species as well as concerns about loss of habitat for tree and shrub-nesting colonial waterbirds prompted the Ohio Department of Natural Resources to initiate CDM activities at West Sister Island National Wildlife Refuge and Green Island in Ohio (USDA 2006*a*).

DCCOs can displace colonial species such as Black-crowned Night-Herons, egrets, Great Blue Herons, gulls, Common Terns, and Caspian Terns through habitat degradation and nest site competition (USFWS 2003). DCCOs have been known to take over heron nests. For example, of 81 nest acquisitions observed by Skagen et al (2001), 57 were instances of DCCOs taking over Great Blue Heron nests. However, it should be noted that in the remaining 24 instances, Great Blue Herons took over DCCO nests. Cuthbert et al. (2002) examined potential impacts of DCCOs on Great Blue Herons and Black-crowned Night-Herons in the Great Lakes and found that DCCOs have not negatively influenced breeding distribution or productivity of either species at a regional scale, but did contribute to declines in heron presence and increases in site abandonment in certain site specific circumstances. A study by Weseloh (2005) reviewed current and historical data on 43 breeding colonies of Black-crowned Night-Herons on Lakes Huron, Erie and Ontario and the Detroit, Niagara and St. Lawrence Rivers. Eleven of the sites also had nesting Great Egrets and eight also had nesting Great Blue Herons. Nesting Cattle Egrets and Snowy Egrets were present at two and one colonies, respectively. The study assessed trends in each species nesting relative to changes in co-nesting DCCO populations. Thirty-eight percent of Black-crowned Night-Heron colonies were not affected, 23% showed potential or probable conflict and 39% showed nest take-overs or colony decline/ abandonment. At least nine Black-crowned Night-Heron colonies appear to have been abandoned after nest take-overs by DCCOs. More than half of Great Egret and Great Blue Heron colonies showed probable (or higher) threat from cormorants. All Black-crowned Night-Heron colonies under threat were located between Lake Erie and

the St. Lawrence River. Weseloh (2005) recommended that managers monitor DCCO nest placement when DCCOs nest with herons and assess if threats occur.

DCCOs can have a negative impact on vegetation that provides nesting habitat for other birds (Jarvie et al. 1999, Shieldcastle and Martin 1999) and wildlife, including State and federally-listed threatened and endangered species (Korfanty et al. 1999). Cuthbert et al. (2002) did find that DCCOs have negative effects on normal plant growth and survival on a localized level in the Great Lakes region. Wires and Cuthbert (2001) identified vegetation die off as an important threat to 66% of the colonial waterbird colony sites identified as priority conservation sites in the U.S. Great Lakes. Of the 29 priority conservation sites reporting vegetation die off as a threat, Wires and Cuthbert (2001) reported DCCOs present at 23. Based on survey information provided by Wires et al. (2001), biologists in the Great Lakes region reported DCCOs as having an impact to herbaceous layers and trees. Damage to trees was mainly caused by guano deposition, and resulted in tree die off at breeding colonies and roost sites. Impacts to the herbaceous layer were also reported due to guano deposition, and often this layer was reduced or eliminated from the colony site. In addition, survey respondents reported that DCCO impacts to avian species were mainly through habitat degradation and competition for nest sites (Wires et al. 2001). Although loss of vegetation can have an adverse impact on many species, it should be noted that some colonial waterbirds such as pelicans, Common Terns, and potentially Caspian Terns prefer sparsely vegetated substrates.

Hebert et al (2005) conducted a study of the relationship between DCCO density and vegetation on East Sister Island and Middle Island in Lake Erie. In 2000, the year prior to their study, there were 5,485 DCCO nests on the 37.5-acre East Sister Island and 5,202 nests on the 45-acre Middle Island. In their study, the spatial use of nesting DCCOs was negatively correlated with forest cover. Whole island tree cover on East Sister Island decreased 15% in six years concurrent with trends in DCCO use of the island. The largest decline in tree cover occurred in one transect in Middle Island that was heavily used by DCCOs. Tree cover at the site declined from 92% in 1995 to 40% in 2001. Although the results of the study were correlational in nature and cannot prove that damage by DCCOs caused the decline in vegetation, review of other potential factors including pests, disease, human disturbance and weather did not provide any trends or data that would explain the observed declines. The authors also observed that DCCOs tended to prefer live trees for nesting and abandoned dead trees. There appeared to be a pattern of expanding habitat loss that developed as trees used by DCCOs died and DCCOs moved on to healthy, more stable nesting sites.

Just as fishing is an important source of revenue for Wisconsin, non-consumptive uses of wildlife such as wildlife watching and birding, also contribute significantly to the state economy. In a 2001 survey 2,444,000 individuals including 283,000 nonresidents, participated in wildlife watching activities in Wisconsin (Caudill 2003). For purposes of the survey, wildlife watching

activities were those activities which were conducted primarily for the purpose of observing, feeding and photographing wildlife but did not include visits to zoos, circuses, aquariums, museums and for scouting game, nor did it include activities for which wildlife watching was a secondary purpose of the trip/activity. Wisconsin was one of the top 10 states for economic output related to wildlife watching with an estimated economic output in 2000 of over $2.4 billion. The large DCCO breeding colonies and associated colonial waterbirds such as gulls and American Pelicans can be a valuable viewing opportunity for birding enthusiasts.

1.5.4.1 DCCO Impacts on Vegetation – Lower Green Bay

There is no published study linking island vegetation changes with changes in DCCOs in the Wisconsin waters of Green Bay. However, vegetation changes have been dramatic and photographic evidence is available for at least some of the islands affected.

During the 1980s, the 2.5 acre island currently known as Cat Island consisted of a distinct island with a clay substrate and a dense overstory of mature, live cottonwoods with a distinct understory of shrubs (Figs. 1-8 and 1-9). During the mid to late 1980s, DCCOs nested in the cottonwoods; Black-crowned Night-Herons, Snowy Egrets, Great Egrets, and Cattle Egrets nested in the shrubby understory; and Herring Gulls and various waterfowl nested on the ground.

By the end of the 1980s, there were approximately 1,000 DCCO nests in the overstory cottonwoods of Cat Island (Matteson et al. 1999). These trees were beginning to die, and by 1993, most of the cottonwoods were dead and no longer produced leaves (K. Stromborg, unpublished data). In 1993, many of the DCCOs began to nest on the ground and this trend accelerated as the limbs of the dead cottonwoods began to break off and finally, even the trunks toppled. Today, Cat Island is largely devoid of standing cottonwoods and little understory remains (Fig. 1-10). Birds currently nesting on Cat Island include DCCOs, American White Pelicans, Herring Gulls, Great Egrets and, occasionally, Mallards.

Lone Tree Island is in close proximity to Cat Island. Lone Tree Island is a man-made island constructed for navigational purposes. It is approximately 1 acre in size and supports a handful of mature trees with a limited amount of shrubby and herbaceous vegetation. The island is currently used as a nesting site for American White Pelicans, Great Egrets and Black-crowned Night-Herons. No DCCO nests were recorded on the island in 2005 and a small, but unknown, number of birds successfully raised young in 2006. In 2007, the WDNR and WS worked to prevent successful DCCO nesting on Lone Tree Island through the use of nest and egg destruction/removal. Three trips to destroy eggs on Lone Tree Island were coordinated with Cat Island visits with a follow-up visit to record success of the nesting prevention efforts. Although the project appeared to be successful in

preventing most DCCO nesting, approximately 12 nests with 24 young were too high in the trees to be reached.

Figure 1-8. Cat Island, Wisconsin approximately 1987, before cormorants damaged the vegetation.

Figure 1-9. Cat Island, Wisconsin 1990.

Figure 1-10. Cat Island, Wisconsin 2003.

1.5.4.2 DCCO Impacts on Vegetation – Door County Area

Jedziewicz (2001) provided a review of flora and vegetation of the Grand Traverse Islands (Lake Michigan) including islands in the Door County area. The study provides historical information in the vegetation on the islands as well as the results of the most recent survey conducted from 1997-1999. The author noted that all the islands were experiencing a "crunch" of negative factors including: deer herbivory on large islands and invading colonial waterbirds on small (less than about 25 acre) islands. Jedziewicz (2001) categorized these small islands as "bird islands" and noted that since 1980 these islands have lost most of their arboreal vegetation. The author attributes the loss to the urea of nesting colonial waterbirds, principally Herring and Ring-billed Gulls and DCCOs although no quantitative data documenting this impact is provided. Prior to this period the islands were typically forested with white cedar, white birch, balsam fir and basswood. After the tree loss, berried, bird-dispersed shrubs become dominant including red-berried elder, red raspberry, red-osier dogwood, wild black currant, juneberries, and bittersweet nightshade. The under story shifts to plant communities dominated by rank native and exotic species such as catnip, motherwort, lamb's quarters, cheeses, nettles, fringed bindweed, thistles and some grasses such as fowl meadowgrass. Spider, Hat, Jack, and Pilot islands in the Door County area all fall within this general category.

Good photographic evidence of vegetation changes during the time of rapid DCCO population increases also exists for Spider Island. Twenty-three acre

Spider Island is part of the Gravel Island National Wildlife Refuge located at the mouth of Rowley's Bay, in Lake Michigan on the east side of the Door Peninsula. This island was the site of a major USFWS study of Red-breasted Merganser breeding biology in 1977/78 (Haseltine et al. 1981, Heinz et al. 1983). A 1905 report by Milwaukee Public Museum botanists noted that the island was dominated by white cedar, tamarack and white birch with understory species such as blueflag iris, wood lily and Indian paintbrush (Jedziewicz 2001). Jedziewicz states that Herring Gull and Ring-billed Gull numbers started increasing by 1966. In the mid- to late-1970s, Spider Island was still heavily vegetated with a mature hardwood forest (Scharf 1979, Fig. 1-11). By the mid-1980s, DCCOs were one of the dominant breeding birds at Spider Island and most of the overstory trees were dead. In 1983, Gary Fewless recorded a flora dominated by non-native herbs with a few remnant shrubs such as Canada yew and wild black current (Jedziewicz 2001). A few scattered dead white cedars remained standing, but today, all but one of those has fallen. Figure 1-12 is a very close geographic match to Figure 1-11.

Another island supporting DCCOs in this area is Pilot Island. In 2007, 3.7 acre Pilot Island was added to the Green Bay National Wildlife Refuge. This is the site of a formerly occupied lighthouse and contains a variety of native and ornamental vegetation. Prior to colonization by DCCOs, the center of the island was open and park-like, the north end of the island was formerly covered with a dense stand of white cedar and the south was fringed with various hardwoods and a dense understory of shrubs (Figs. 1-13, 1-14). In 1991 and 1992, there were just a few DCCO nests in the cedars, but in 1993, there were more than 250 DCCO nests. In 1994, there was a large nesting DCCO colony in the cedar trees and all the cedars were dead (Fig. 1-15). Jedziewicz (2001) reported that in 1999, the forest was “skeletal” and the understory was dominated by red-berried elder, red raspberry chokecherry, motherwort and catnip. Today, DCCOs nest on the ground throughout the formerly forested parts of this island and all the overstory trees are dead in these areas (Fig. 1-16).

Figure 1-11. Spider Island, Wisconsin 1977.

Figure 1-12. Spider Island, Wisconsin 2002

Figure 1-13. Pilot Island, Wisconsin 1977.

Figure 1-14. Pilot Island, Wisconsin, understory, 2000.

Figure 1-15. Dead Cedars, Pilot Island, Wisconsin 2001.

Figure 1-16. Pilot Island, Wisconsin, 2001.

The two islands supporting DCCOs in the northern bay of Green Bay, Hat (8 acres) and Jack (5.8 acres) Islands, have histories similar to Pilot and Spider Islands. Neither of these islands was densely wooded before DCCOs became established, but both islands had scattered hardwood trees in the mid-1980s. Jedziewicz (2001) reported that by 1998, Hat Island was heavily used by breeding gulls and cormorants and that all the trees were dead. Red raspberry, wild black currant, chokecherry, and red-berried elder were the most common shrubs while invasive species such as motherwort and catnip dominatedthe ground layer. To date, Hat Island is mostly barren. In 1998, the cottonwoods on Jack Island were dead, and the primary shrubs were red-osier dogwoods and red-berried elders with abundant motherwort and catnip in the ground layer (Jedziewicz 2001). Some understory vegetation currently persists on Jack Island around the periphery of the DCCO colony. A third island in the northern portion of Green Bay which occasionally has nesting DCCOs is Little Strawberry Island. This island is adjacent to Jack Island and a small number of DCCOs nests there in some years. The landowner has harassed DCCOs here for years in an attempt to keep them from killing the trees. When harassment has been conducted, the landowner has been successful in these efforts. However, in 2005 the landowner was not able to successfully implement his harassment program and some DCCOs did nest on the site. This island is densely wooded today, but there has been overstory tree mortality in the small area occupied by nesting DCCOs.

1.5.4.3 Lake Winnebago

A manmade island owned by the city of Oshkosh within Miller's Bay in Lake Winnebago, sometimes called "Monkey Island", has experienced a rapidly growing colony of DCCOs. DCCOs initially were found nesting on the island in 2000 with 681 nests counted during the Great Lakes Binational DCCO survey in 2005 (Ziebell, unpublished data). In 2005, this island also supported thousands of colonial waterbirds with nesting species including Black-crowned Night Herons (448 nests), Great Egrets (300 nests), Ring-billed Gulls (8,247 nests), Herring Gulls (78 nests), and Cattle Egret (1 nest) (Tom Ziebell and Tim Lizotte, pers. comm.). This island, combined with others within the Lake Winnebago basin, support the largest Great Egret nesting colony within the state, excluding the Mississippi River populations (Tom Ziebell and Tim Lizotte, pers. comm.). In 2007, the number of DCCO nests had increased to 1,114 nests, and the other colonial waterbirds had decreased to 3,884 Ring-billed Gull nests, 60 Herring Gull nests, 108 Black-crowned Night-Heron nests, and 58 Great Egret nests. A number of factors may be contributing to the decline in colonial waterbirds at the island. A pair of Great-horned Owls has been nesting on the island and are believed to have been feeding extensively on Ring-billed Gulls. Additionally, a third of the vegetation has been cleared and the brush has been scattered around to discourage the Ring-billed Gulls because of all the gull complaints the city receives. At present, reductions in Black-crowned Night-Heron and Great Egret nesting appear to be related to the loss of mid-level vegetation due to plant succession and maturity (Tom Ziebell and Tim Lizotte, pers. comm.).

Concerns regarding the potential negative impact of the growing population of DCCOs on other nesting colonial waterbird species, particularly the Black-crowned Night-Herons and Great Egrets, prompted the WDNR to selectively remove larger trees preferred by DCCOs. The intent of removing the larger trees was to promote shorter, shrubby habitat preferred by some of the other tree-nesting species and, recently, to discourage nesting by DCCOs. Tree removals were conducted during the winter for a few years beginning in the early 2000's with effectiveness of this management unclear (Tim Lizotte, WDNR, pers. comm.).

Privately owned Long Point Island, located in Lake Winnebago approximately 10 miles south of Miller's Bay, was recently colonized by DCCOs beginning in 2006 (Tom Ziebell, pers. comm.). This island is vegetated by large mature trees and supports a similar mix of bird species as the Miller's Bay Island while also including Great-blue Herons (Tom Ziebell, pers. comm.). In 2007, the second year of DCCO use on the island, 589 DCCO, 216 Great Egret, 247 Black-crowned Night-Heron, and 9 Great-blue Heron nests, 5 Cattle Egret nests, 1 Herring Gull nest, and 1 Green Heron nest were counted (Ziebell, unpulished data).

1.5.5 Potential DCCO Impact on Property

Birds can damage structures with fecal contamination. Corrosion damage to metal structures and painted finishes, including those on automobiles and boats, can occur because of uric acid from bird droppings. Accumulated bird droppings can reduce the functional life of some building roofs by 50% (Weber 1979).

DCCO Impacts on Property in Wisconsin

Property losses in Wisconsin associated with DCCOs include impacts to fish in privately-owned ponds; damage to boats and marinas or other properties found near DCCO breeding or roosting sites; and damage to vegetation on privately-owned land (USFWS 2003). Damage to vegetation is discussed in Section 1.5.3.

WS has provided technical assistance to 2-5 private property owners each year with DCCO damage. Usually the damage is associated with DCCO damage to trees on private lake property, mainly island property, resulting from DCCO nesting or roosting activities and accumulated bird droppings. WS provides property owners with technical assistance (advice) on nonlethal and lethal means of resolving damage problems, and, where appropriate, assists the private property owner in applying for a USFWS migratory bird depredation permit by providing supporting documentation to the USFWS (WS Form 37). If the USFWS issues a permit, the property owner may then take a limited number of DCCOs on their own, reimburse WS for assistance or pay another appropriately qualified and designated agent. The first WI WS operational assistance project

(e.g. WS conducts the CDM) to protect property was conducted in 2007 for the protection of vegetation on private property.

1.5.6 Potential DCCO Impact on Human Health and Safety

The primary risk to human health and safety from DCCOs in Wisconsin is the risk of a DCCO collision with an aircraft. Collisions between aircraft and wildlife are a concern throughout the world because they threaten passenger safety (Thorpe 1996), result in lost revenue and costly repairs to aircraft (Linnell et al. 1996, Robinson 1996), and erode public confidence in the air transport industry as a whole (Conover et al. 1995). All birds are potentially hazardous to aircraft and human safety. The magnitude of the hazard depends on the physical, biological, and behavioral characteristics of each bird.

DCCOs are a particular hazard to aircraft because of their body size and mass, slow flight speeds, and their natural tendency to fly in flocks. Blockpoel (1976) states that birds with slow flight speeds can create increased hazards to aircraft because they spend relatively greater lengths of time in aircraft movement areas. There is a very strong relationship between bird weight and the probability of plane damage (Anonymous 1992; Dolbeer 2000). For example, there is a 90% probability of plane damage when the bird weighs 70 or more ounces (4 1/3 pounds) versus a 50% probability of plane damage for a six ounce (1/3 pound) bird (Anonymous 1992). Adult DCCOs can weigh up to 96 ounces (six pounds; Terres 1980).

According to the Federal Aviation Administration's (FAA) Bird Strike database there were 51 wildlife strikes involving DCCOs to civil aircraft in the U.S. from 1990 – October 2007 (FAA National Wildlife Strike Database; http://wildlife-mitigation.tc.faa.gov/public_html/index.html). Twenty-one of the 31 strike reports which provided information on damage indicated that the aircraft had sustained minor to substantial damage. Nine reports indicated that the aircraft had sustained substantial damage. Examples of DCCO strikes include a May 2002 strike at Minneapolis-St.Paul International Airport (Twin Cities, MN), in which a DC-9-30 struck a flock of DCCOs during takeoff, immediately returned and landed, with minor damage to one wing (FAA National Wildlife Strike Database). In October 2002, at Logan International Airport (Boston, MA), a B-767 struck a flock of DCCOs, resulting in an engine shut down, precautionary landing, and damage to the engine and landing lights. The aircraft was out of service for 3 days, and repairs cost $1.7 million (Wright 2004). At Chicago O'Hare International Airport (Chicago, IL) in Aug. 2004, a B-737-800 ingested a DCCO in one engine when approximately 5 miles from the airport. A precautionary landing was made due to engine vibrations. Fluids were leaking from the engine and 6 fan blades had to be replaced. Cost of repairs was estimated at $61,000. Also at Chicago O'Hare International Airport, in September 2004 a MD-80 struck a flock of DCCOs. Several birds were ingested causing an engine failure and fire, with engine debris falling onto a suburban Chicago neighborhood. The aircraft

made an emergency landing and repairs cost $186,000 (Wright 2004). It is estimated that only 20 - 25% of all bird strikes are reported (Conover et al. 1995; Dolbeer et al. 1995; Linnell et al. 1996; Linnell et al. 1999), and the number of strikes involving DCCOs is likely greater than Federal Aviation Administration records show.

DCCO Impacts on Human Health and Safety in Wisconsin

WS recognizes that the risk to aircraft safety associated with DCCOs is low. To date, there have been no DCCO collisions with aircraft reported for Wisconsin and the ongoing WS program to reduce aircraft/wildlife conflicts at General Mitchell International Airport, Milwaukee, Wisconsin, has not reported any conflicts with DCCOs. However, because DCCO roosting and feeding sites may sometimes be found in close proximity to airports and military airbases in Wisconsin, it is possible that WS may receive requests for assistance with DCCO hazards to aircraft in the future.

1.5.7 Wisconsin DCCO Coordination Group

Decisions about DCCO control under the PRDO are currently being made on a case by case basis after consultation with the involved action agencies (WDNR, WS) and the USFWS. These Federal and State entities have established an informal DCCO Coordination Group to exchange information on DCCO management and discuss sites where there may be a potential need to apply the DCCO PRDO in Wisconsin. To date, there have been no requests to conduct work under the PRDO from the Tribes or the Great Lakes Indian Fish and Wildlife Commission (GLIFWC), but these entities are welcome to participate in the Wisconsin DCCO Coordination Group. The agencies comprising the Wisconsin DCCO Coordination Group have agreed that they will strive to work cooperatively, rather than independently, on DCCO management issues in Wisconsin. However each agency retains its own authority to make management decisions. The lead and cooperating agencies have agreed that decisions on future PRDO CDM projects will be made only after consulting with the DCCO coordination group.

1.5.8 Proposed Initial DCCO Population Management Objectives for Breeding Colonies In and Near Green Bay.

1.5.8.1 General Objectives for DCCO Damage Management in Wisconsin

To protect natural resources including co-nesting species, vegetation, and fishery resources in Wisconsin, the Cormorant Coordination Group is proposing the following general objectives relative to implementation of the PRDO:

1) Prevent establishment of new DCCO colonies in the Green Bay/Door County Area, with special emphasis on protection of areas with existing vegetation[2] and tree and shrub-nesting colonial waterbirds and/or sensitive bird species such as state or federally-listed threatened and endangered species and species of concern.

2) Preserve viable DCCO colonies in the Green Bay Area including Cat, Hat, Jack, Spider, and Pilot Islands.

3) Where existing data are adequate to indicate cause for concern, work to minimize adverse impacts of DCCOs on public fishery resources.

4) Manage colonization or increase of inland sites on a case-by-case basis. Historically, several inland sites supported DCCO colonies that were higher than current levels without reports of adverse impacts of DCCOs. CDM activities may result in movement of some DCCOs to existing, historic or new inland sites. It seems likely that opportunities exist for the establishment or increase of inland colonies which would allow for increased opportunities to view and enjoy DCCOs without necessarily having the adverse impacts that are currently being addressed at large colonies in the Lower Green Bay/Door County Area. However, as noted for Lake Winnebago, some management of inland colonies may also be needed.

5) Support research and monitoring on the impacts of DCCO's on public resources and evaluate the effects of CDM actions.

All CDM would be conducted using an adaptive management approach that would combine use of existing information on CDM from the literature and data on DCCOs and CDM from actions in Wisconsin to continually reevaluate need for action, methods used for CDM, and impacts of CDM on target and nontarget species. New information would be reviewed by the individual agencies and the Wisconsin DCCO Coordination Group. Management objectives and techniques would be adjusted as appropriate based on these reviews.

1.5.8.2 WDNR Management Objectives

In addition to the general objectives, the WDNR has established the following management objectives for cormorant colonies in the Lower Green Bay and Door

[2] Protection of vegetation under the PRDO would be warranted if: the damage is deemed significant by the agency responsible for management of the vegetation; the vegetation comprises a unique or ecologically special vegetative community type (e.g., Carolinian forest); the vegetation provides important habitat for wildlife species of concern; the vegetation is important in preventing island erosion; and/or the vegetation includes Federal- or State-listed threatened or endangered plants. Projects for the protection of vegetation on private property that do not meet this definition of a public resource would require a Migratory Bird Depredation permit.

County areas based on concerns regarding DCCO impacts on vegetation, fisheries and co-nesting waterbirds.

Lower Green Bay

The proposed goal for Lower Green Bay is to reduce the breeding population and associated demands on food resources and/or nest space to minimize incentives for DCCO expansion from 2.5 acre Cat Island onto Lone Tree Island and other forested habitat in Lower Green Bay. No new DCCO colonies are desired in this area. At the current population level, there have been attempts to colonize nearby Lone Tree Island in 2006 and 2007. To this end, it is the goal of the WDNR to reduce the number of nesting DCCOs at Cat Island from 2007 nest count of 2,480 nests to 1,000 active nests. This management objective was established by the WDNR after WDNR consultation with agency and other biologists. It would allow for a viable DCCO population[3], should reduce DCCO demands on food resources and nesting space and should leaving ample nesting space for use by other colonial waterbirds such as American Pelicans. The WDNR intends to achieve this reduction over a period of several years primarily through the use of egg oiling.[4] Most vegetation at this site has already been lost, and the WDNR has no plans to revegetate this site. Consequently, the WDNR has determined that the more gradual population reduction that would result from egg oiling is appropriate to address concerns regarding the DCCO colonization of new breeding sites. However, lethal methods may be used if egg oiling is not sufficient to meet management objectives.

Door County Area

Management goals for this area have been established to reduce DCCO demands on food resources and nesting space at existing colonies and minimize incentives for DCCO expansion onto new colony sites in the Door County Area. Goals for this area have also been established to reduce DCCO foraging pressure on near-shore fisheries, specifically brown and rainbow trout (Section 1.5.2.2). The proposed goal for the Door County Area is to reduce the total number of breeding pairs in the Door County area to 5,000 active nests. To help maintain a healthy viable DCCO population on these islands, the total number of nests in any of these islands colonies would not be reduced below 500. The goal of 5,000 active nests was selected based on correlational data (Figure 1-5) indicating that this population level predates steep declines in brown trout harvest rates in the Door County Area. This was also a period where concerns regarding DCCO impacts on vegetation were relatively low.

As with Lower Green Bay, the goal is to primarily use egg oiling to gradually achieve the desired reduction in DCCO numbers at existing colony sites over a period of several years. Most vegetation at the existing colonies (Hat [8 acres],

[3] The number of breeding pairs nesting at Cat Island increased from 1,063 pairs in 1989 to 2,129 pairs in 1997 (Fig. 1-3).

[4] When egg oiling is used, it may take at least 3-5 years before the cohort from the eggs that were oiled joins the breeding population and there are noticible reductions in the number of breeding birds.

Jack [5.8 acres], Pilot [3.7 acres, managed by the USFWS] and Spider [3.7 acres, managed by the USFWS] islands) has already been lost and the WDNR and USFWS (Section 1.5.7.3) have no plans to revegetate these sites. Consequently the WDNR determined that the more gradual population reduction that would result from egg oiling is appropriate to address concerns regarding impacts on fisheries and DCCO colonization of new nesting sites. Use of egg oiling will have the immediate advantage of reducing foraging pressure on fish populations by reducing the need for adults to feed offspring and can, over time, eventually lead to reductions in the number of adult birds using the islands (Ridgway et al. 2006*a,* 2006*b*). All CDM would be conducted in a manner intended to minimize DCCO abandonment of sites with CDM for sites without CDM. However, lethal methods may be used if egg oiling is not sufficient to meet management objectives.

It should be noted that this objective can only be met if the USFWS concurs that a reduction in DCCO numbers is warranted on NWR lands. If the USFWS does not concur that current data warrants reduction of DCCO numbers on refuges established to provide protection for colonial waterbirds and disruption of ongoing long-term cormorant research (Section 1.5.8.3), then the minimum population that could be achieved, would be the DCCO population on Pilot and Spider Islands (5,753 nests in 2007) plus 500 nests on Hat Island and 500 nests on Jack Island for a total of 6,753 nests.

New Colony Sites

As noted in the general objectives, the agencies plan to act to prevent DCCO colony expansion to new areas with existing vegetation and colonies of other colonial waterbirds. DCCO numbers at new colony sites can increase relatively rapidly as can damage to vegetation. Unlike CDM efforts proposed for Cat Island and the Door County area, the full range of applicable CDM methods, including lethal removal, may be used to stop DCCO colonization of new sites as quickly as possible.

Four islands are of particular concern to the WDNR, Little Strawberry Island near the Jack Island colony, Lone Tree Island near the Cat Island Colony, and the NWRs Hog and Plum Islands (discussed below). Little Strawberry Island still supports a diverse plant community. There are records of DCCO use of Little Strawberry Island in 1997 (5 nests) and in 2005 (312 nests). The landowner typically uses 2 noise-making propane cannons each year to reduce DCCO nesting at the site. In 2005 the cannons were not used in time to prevent DCCO nesting. In 2006 the nest material was gathered up and burned in the spring and the cannons were used early enough that the DCCOs have not returned. Despite the use of cannons, the island is still used by Black-crowned Night-Herons, Canada Geese, and gulls. Lone Tree Island (< 1 acre) still supports some cottonwoods and surrounding bushes. The island is currently used by Black-crowned Night-Herons, Herring Gulls, Great Egrets and American White

Pelicans. There were no DCCO nests in 2005, less than 100 nests in 2006 and 224 nests in 2007.

1.5.8.3 National Wildlife Refuges

Gravel Island and Green Bay National Wildlife Refuges were established and are currently administered by the USFWS for the preservation of breeding grounds for native birds. The refuges support two large DCCO colonies, one on Spider Island (Gravel Island NWR) and one on Pilot Island (Recently transferred to the Fish and Wildlife Service as part of the Green Bay NWR). Most vegetation has been lost from these islands and the NWRs do not plan to revegetate these locations, so there is no need to rapidly act to protect/restore plant communities. Consistent with the Refuges' purpose to protect and enhance waterbird populations, refuge staff feel it is important to have some sites in the Green Bay area where CDM is not conducted. There is also concern that CDM would impact the other colonial nesting species, especially the Black-crown Night Herons. Spider Island has been the site of a mark-recapture DCCO demographic study since 1988 with funding continued in 2008. In 2008, the Fish and Wildlife Service is expanding the demographic study to include Pilot Island to investigate the issue of inter-colony movement. Addressing this issue will contribute valuable information to the Regional DCCO Management Strategy to make informed management decisions in the future. It is the USFWS' desire to protect Spider and Pilot Islands from any form of disturbance which would jeopardize the study. The study results provide valuable information on DCCO population dynamics and may serve as a baseline to determine the impacts of CDM programs on DCCO breeding populations in the Great Lakes. The Service recognizes there is a degree of disturbance of birds associated with the research work conducted. There are some concerns that disturbance associated with research may be sufficient to cause birds to leave the sites but it is considered minor within context of CDM activities and disturbance is well within normal limits for similar DCCO studies.

<u>New Colony Sites</u>
The USFWS recognizes the need to protect sensitive plants and plant communities and to provide habitat for tree and shrub-nesting waterbirds. Like the WDNR, the USFWS does not want new DCCO colonies at sites with existing vegetation and colonies of other colonial waterbirds and plan to use an integrated approach to prevent the establishement of new DCCO colonies in these areas. Two Islands, Plum Island and Hog Island in the the Green Bay NWR, are of particular concern.

Hog Island, has been used sporadically by nesting DCCOs since 1986. DCCO nest success at this island has been low and DCCOs have never established a permanent colony. This 1.8 acre island remains vegetated with an overstory of hardwoods, a shrubby layer, and even some ground yew. This island often supports breeding colonies of Great Blue Herons, Black-crowned Night-herons,

Herring Gulls, and Red-breasted Mergansers. Great Black-backed Gulls have also been seen at the island although their breeding status is unknown (letter from P. Meyers, USFWS, to J. Pritzl, WDNR, 2007). The vegetation of this island is relatively healthy and a DCCO colony could cause substantial damage. State-listed Western fescue and elk sedge occur on the island. In 2006, a DCCO colony comprised of approximately 65 nests was observed on the island, raising concerns that successful nesting could lead to DCCO colony growth and subsequent vegetation loss in future years. In response, In response, refuge staff made multiple visits to Hog Island during the 2007 and 2008 breeding seasons and observed DCCOs initiating nesting at later dates than those at other islands. The number of attempted nests increased two-fold from 2007 to 2008. Staff used nest and egg destruction/removal to successfully prevent DCCO reproduction on the island.

Plum Island is 325 acres in size and was recently transferred to the Fish and Wildlife Service as part of the Green Bay NWR. It has an interior dominated by a sugar maple and basswood forest. White cedar is the dominant species near the coast. There is also a 5 acre wetland area surrounded by a 10 acre sedge meadow. Several state listed plant species and the federally-listed dwarf lake Iris are found on the island. No DCCO have been observed nesting on this island. It is desirable to preserve the vegetation by keeping cormorants from establishing on this island.

1.5.8.4 Lake Winnebago

The City of Oshkosh has requested CDM on Miller's Bay Island to preserve existing vegetation for use by colonial waterbirds and for aesthetic reasons. The City also wishes to reduce DCCO numbers in order to minimize potential for adverse interactions/competition between DCCOs and other colonial waterbirds at the site. Of particular concern are the Great Egrets which are a state-listed threatened species. The goal is to use a combination of lethal and nonlethal (nest destruction) methods to reduce the population approximately 50% to approximately 600 pairs and monitor the resulting impact on co-nesting birds and vegetation. The target number of DCCOs on the Island may be further reduced if reduction to 600 DCCO pairs still results in vegetation loss and declines in co-nesting species.

1.5.8.5 Kewaunee River

A DCCO hazing project is proposed for the lowest 4 mile stretch of the Kewaunee River during the months of April and May as a way to keep migrating and staging DCCOs from concentrating foraging on vulnerable salmonid smolts. Hazing may be conducted by WS and/or the WDNR with assistance from a select group of trained volunteers. Pyrotechnics and chasing with boats are the primary harassment methods that will be used. However, WDNR or WS may also use a low level of shooting (no more than 100 birds) to augment harassment efforts.

Stomach contents and tissue samples may be taken from birds killed duirng CDM for DCCO diet studies.

1.5.8.6 Future PRDO Projects

The management objectives discussed above have been established to address current concerns regarding impacts of DCCOs on public resources. The presence and size of DCCO colonies in Wisconsin can and has changed over time. Future actions to reduce DCCO damage to public resources may be conducted at sites in addition to those listed above. As noted in Section 1.5.6, action agencies will consult with each other through the Wisconsin DCCO Coordination Group prior to initiating new CDM projects under the PRDO, and will comply with USFWS notification and review requirements for implementation of the PRDO.

This EA anticipates potential expansion in CDM activities and analyzes the impacts of such efforts as part of the program. Depending upon the alternative selected, additional PRDO efforts would be permitted under this EA so long as cumulative environmental impacts from the addition of the proposed action will not exceed parameters proposed in this EA. The impacts of CDM efforts, if any, conducted under the alternative selected in this EA will be monitored annually to determine if the analysis in the EA sufficiently addresses impacts of CDM efforts. If it is determined that an additional EIS is not needed, this EA would remain valid until WS, USFWS, and WDNR along with other appropriate agencies, determine that new needs for action, changed conditions, and/or new alternatives having different environmental effects must be analyzed. At that time, this analysis and associated decision would be supplemented pursuant to NEPA.

1.5.9 Examples of Cormorant Damage Management Activities in Wisconsin.

Minimizing Adverse Impacts on Private Property

Cormorant damage management activities in Wisconsin have included WS assistance for hatcheries and private property owners on methods to reduce DCCO predation on fish. Some projects included assisting the landowner/manager with application for a USFWS depredation permit for the lethal take of DCCOs to address damage problems.

Research Projects

From 2004 – 2006, WS assisted the University of Wisconsin Madison with DCCO collection for the diet study evaluating the impacts of DCCOs on yellow perch in Lower Green Bay.

In 2007-Present, the WDNR and WS are working with research biologist at the NWRC on a project to deterime if fatty acids profiles from DCCO tissue can be used to identify fish species that may be in DCCO diets, especially hatchery-reared fish. Fatty acid profiles from hatchery fish and other fish species collected

in the Door County Area.

Protection of Natural Resources

In 2006-2008, WS assisted the WDNR with egg oiling activities at Cat Island to reduce the Cat Island breeding population and associated demands on nesting space and minimize associated incentives for DCCO expansion onto Lone Tree Island and other forested habitat in Lower Green Bay.

In 2006 - 2008, WS assisted the WDNR with egg oiling activities at Hat Island to reduce the Jack Island breeding population and associated demands on nesting space and minimize associated incentives for DCCO expansion onto Little Strawberry Island and other forested habitat in the Door County Area. It was also hoped that egg oiling would reduce DCCO foraging pressure on near-shore fish populations, specifically brown trout.

In 2007 WS assisted the WDNR with egg oiling activities at Jack Island to reduce the Jack Island breeding population and associated demands on nesting space and minimize associated incentives for DCCO expansion onto Little Strawberry Island and other forested habitat in the Door County Area. It was also hoped that egg oiling would reduce DCCO foraging pressure on near-shore fish populations, specifically brown trout.

In 2007 and 2008, egg and nest removal/destruction activities were conducted at Lone Tree and Hog Islands (WS and USFWS, respectively) to prevent establishment of nesting DCCO colonies and protect vegetation for use by colonial waterbirds and other birds.

1.6 WS RECORD KEEPING REGARDING REQUESTS FOR CDM ASSISTANCE

WS maintains a Management Information System (MIS) database to document assistance that the agency provides in addressing wildlife damage conflicts. MIS data are limited to information that is collected from people who have requested services or information from WS. It does not include requests received or responded to by local, State or other Federal agencies, and it is not a complete database for all wildlife damage occurrences. The number of requests for assistance does not necessarily reflect the extent of need for action, but these data do provide an indication that needs exist.

The database includes, but is not limited to, the following information: species of wildlife involved; the number of individuals involved in a damage situation; tools and methods used or recommended to alleviate the conflict; and the resource that is in need of protection. WS MIS data on CDM is provided in Table 1-4.

Table 1-4. WS cormorant damage management technical and operational assistance projects in Wisconsin.

Year	Resource Protected/Type of Project				
	Aquaculture Private (Public)	Property	Natural Resources[1]	Health and Safety	Research Project
2005	1(2)	0	0	0	1
2006	3(1)	0	4	1	1
2007	2(2)	4	6	0	0

[1] Includes surveillance and monitoring for disease in wildlife such as West Nile Virus and Newcastle Disease.

1.7 RELATIONSHIP TO OTHER ENVIRONMENTAL DOCUMENTS

ADC Programmatic Environmental Impact Statement. WS has issued a FEIS on the national APHIS/WS program (USDA 1997, Revised). Pertinent and current information available in the EIS has been incorporated by reference into this EA. The FEIS may be obtained by contacting the USDA, APHIS, WS Operational Support Staff at 4700 River Road, Unit 87, Riverdale, MD 20737-1234.

Final Environmental Impact Statement: Double-crested Cormorant Management in the United States. The USFWS has issued a Final EIS (FEIS) and Record of Decision (ROD) (68 Federal Register 58022) on the management of DCCOs (USFWS 2003). WS was a formal cooperating agency in the preparation of the FEIS and has adopted the EIS to support WS' program decisions for its involvement in the management of DCCO damage throughout the United States. WS completed a ROD on November 18, 2003 (68 Federal Register 68020). This EA is tiered to that FEIS. Pertinent and current information available in the EIS has been incorporated by reference into this EA. The FEIS, final ruling and PRDO may be obtained by contacting the Division of Migratory Bird Management, U.S. Fish and Wildlife Service, 4401 North Fairfax Drive, MBSP-4107, Arlington, Virginia 22203 or by downloading it from the USFWS website at http:// fws.gov/migratorybirds.fws.gov/issues/ cormorant/cormorant.html. The WS ROD may be viewed at http://www.aphis.usda.gov/ws/pubs.html.

Environmental Assessment: Bird Damage Management in Wisconsin. WS, in cooperation with the USFWS, WDNR, U.S. Department of Transportation, Federal Aviation Administration, and the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP), prepared an EA on bird damage management in Wisconsin (USDA 2004). The scope of the EA included all CDM except the protection of public resources. To facilitate analysis of cumulative impacts of CDM activities on the DCCO population, coordinate agency actions, and clearly communicate the type and scope of CDM activities in Wisconsin, we are including all types of cormorant damage management in the current EA on cormorant damage management in Wisconsin. Once the cormorant damage

management EA is completed, it will supersede analysis on CDM in the 2004 Wisconsin bird damage management EA.

1.8 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT

1.8.1 Actions Analyzed

This EA evaluates the impacts of alternatives for CDM by WS and the cooperating agencies (USFWS and WDNR) to protect aquaculture, property, natural resources, and human health and safety on private and public land or facilities within the State of Wisconsin wherever such management is requested or deemed necessary.

1.8.2 Period for which this EA is Valid

If it is determined that an additional EIS is not needed, this EA would remain valid until WS, USFWS, and WDNR along with other appropriate agencies, determine that new needs for action, changed conditions, and/or new alternatives having different environmental effects must be analyzed. At that time, this analysis and associated decision would be supplemented pursuant to National Environmental Policy Act (NEPA). Review of the EA would be conducted each year to ensure that the need for action, actions taken and environmental impacts are within parameters analyzed in the EA.

1.8.3 Native American Tribes and Land

Currently, WS does not have DCCO management MOUs with any Native American tribes in Wisconsin. Depending upon the alternative selected, WS could enter into an Agreement for Control with tribes interested in CDM on tribal lands. A WS Work Plan (Cooperative Service Agreement) would be completed prior to conducting CDM activities on tribal lands.

Other Native American tribes may chose to work with all or some of the cooperating agencies on DCCO damage management at a later date. Any participating Tribes would need to make their own decision regarding the management alternative they wish to implement on tribal lands. Memorandum of Understanding (MOU)s, agreements and NEPA compliance would be conducted as appropriate before conducting CDM on any other tribal lands in Wisconsin.

1.8.4 Site Specificity

The geographic scope of the proposed action includes areas in and around public and private facilities and properties and at other sites where DCCOs may roost, loaf, feed, nest or otherwise occur. Examples of areas where CDM activities could be conducted include, but are not necessarily limited to: aquaculture

facilities; fish hatcheries; lakes; ponds; rivers; swamps; marshes; islands; communally-owned homeowner/property owner association properties; boat marinas; natural areas; wildlife refuges; wildlife management areas; and airports and surrounding areas. The proposed action may be conducted on properties held in private, local government, state, federal, or tribal ownership once landowner permission has been obtained. The lead and cooperating agencies could conduct CDM at any of the areas where DCCOs cause damage or risks to health and safety in the state including any of the breeding sites currently identified throughout the state with landowner permission including, but not limited to, properties identified in Appendix E. Because many of these DCCO breeding sites are mixed species colonies where control measures have the potential to negatively impact other colonial nesting waterbirds, such as Great Egrets, Great Blue Herons and Black-crowned Night Herons, mixed species colonies will be assessed very carefully before any control measures are recommended.

This EA analyzes potential effects of WS and cooperating agency (USFWS, WDNR) CDM activities that will occur or could occur at private and public property sites or facilities within Wisconsin. Because the proposed action is to reduce damage and because the program's goals and directives are to provide services when requested and considered necessary, within the constraints of available funding and workforce, it is conceivable that additional CDM efforts could occur. This EA anticipates this potential expansion and analyzes the impacts of such efforts as part of the program (Chapter 4).

Planning for CDM must be viewed as being conceptually similar to Federal or other agency actions whose missions are to stop or prevent adverse consequences from anticipated future events for which the actual sites and locations where they will occur are unknown but could be anywhere in a defined geographic area. Although some of the sites where DCCO damage will occur can be predicted, all specific locations or times where such damage will occur in any given year cannot be predicted. For the most part, the issues that pertain to the various types of DCCO damage and resulting management are the same wherever they occur, and are treated as such. The standard WS Decision Model (Slate et al. 1992) is the routine thought process that is the site-specific procedure for determining methods and strategies to use or recommend for individual actions conducted by the USFWS, WS and the cooperating agencies. See USDA 1997 (Revised) and Chapter 2 for a more complete description of the WS Decision Model as well as examples of its application. All projects covered by this EA will be in accordance with any mitigation measures and standard operating procedures described herein and adopted or established as part of the final agency decisions.

The analyses in this EA are intended to apply to any action that may occur *in any locale* and at *any time* and by the lead and cooperating agencies and their authorized agents within Wisconsin. In this way, WS and USFWS believe they meet the intent of NEPA with regard to site-specific analysis and that this is the

only practical way to comply with NEPA and still be able to accomplish its mission.

1.8.5 Summary of Public Involvement

Issues related to the proposed action were initially identified by natural resource staff within WS, USFWS, and WDNR. In 2007, the WDNR conducted 3 public meetings to discuss the state's proposed DCCO management objectives. WS attended all three meetings and reviewed comment letters received by the WDNR. Issues identified at the meetings and in letters were incorporated into this analysis.

The USFWS DCCO FEIS (2003) was used to further define the issues and identify preliminary alternatives. As part of this process, and as required by the Council on Environmental Quality (CEQ), APHIS-NEPA, and USDI implementing regulations, this document and the subsequent Decision will be made available to the public through "Notices of Availability" published in local media, direct mailings of Notices of Availability to parties that have specifically requested to be notified, and through agency news releases and web sites. New issues or alternatives raised during public involvement periods will used in determining whether the EA should be revised and in the final determination of the alternative to be selected and its associated impacts.

1.9 AUTHORITY AND COMPLIANCE

Each of the cooperating agencies has specific roles and responsibilities relative to the management of DCCO damage in the state of Wisconsin. The degree and nature of each agency's involvement varies depending on the location and nature of the damage problem. The following table summarizes agency roles in addressing DCCO damage in WI and provides information on the ability of others to address DCCO damage.

Table 1-5. Roles and responsibilities for DCCO damage management in Wisconsin

Management Entity	Activities Covered by the PRDO	DCCO Take Not Covered by the Depredation Orders[1]
U.S. Fish and Wildlife Service -Migratory Bird Office	Provides limited technical assistance. Has authority to deny approval for projects proposing to take of more than 10% of local colony. Monitors impacts of local, regional and national DCCO damage management efforts. Provides oversight to ensure action agency compliance with the PRDO regulations.	Provides limited technical assistance. Issues scientific collecting and depredation permits[1]. Monitors DCCO take under permits. Monitors regional DCCO populations.
U.S. Fish and Wildlife Service - Refuges	Approves/authorizes take of birds on USFWS property. Takes birds as agents of WDNR or Wildlife Services. Aids in monitoring local DCCO population.	May take birds for research under scientific collecting permits. Provides limited technical assistance.
Wisconsin Department of Natural Resources	Provides technical assistance. Takes birds (less than 10% of local colony) after notifying USFWS. Takes birds (more than 10% of local colony) with approval of USFWS. Monitors state and local DCCO populations. Lead agency for monitoring and documenting impacts on fish populations	Provides technical assistance. May take DCCOs under scientific collecting or depredation permits. Monitors statewide DCCO populations.

Management Entity	Activities Covered by the PRDO	DCCO Take Not Covered by the Depredation Orders[1]
Wildlife Services	Takes birds at request of landowners/ managers. Provides technical assistance. Takes birds (less than 10% of local colony) after notifying USFWS and WDNR. Takes birds (more than 10% of local colony) with approval of USFWS and WDNR. Aids in monitoring state/local DCCO populations.	Provides technical assistance. Consults with depredation permit applicants regarding non-lethal and lethal alternatives for damage management[1]. Provides Form 37 for USFWS consideration when issuing depredation permits. May take DCCOs under federal scientific collecting and depredation permits.
Tribes	Provides technical assistance. May use lethal and non-lethal techniques to reduce DCCO damage to public resources on lands under tribal jurisdiction.	Provides technical assistance. As appropriate, may take DCCOs under scientific collecting permits and depredation permits.
Others[2]	Not applicable.	May take DCCOs under federal scientific collecting permits. May use non-lethal techniques to reduce DCCO damage without a depredation permit. May take DCCOs causing damage under federal depredation permits.

[1] Includes DCCOs taken under scientific collecting permits and DCCOs taken under federal depredation permits.for damage to property and management of risks to human health and safety.
[2] Airports, private citizens with property damage, disease surveillance, university researchers, etc.

1.9.1 Authority of Each Lead and Cooperating Agency in CDM in Wisconsin[5]

Wildlife Services Legislative Authority[3]. The USDA is authorized by law to protect American agriculture and other resources from damage associated with wildlife. The primary statutory authority for the Wildlife Services program is the

[5]See Chapter 1 of USDA (1997 Revised) for a complete discussion of Federal laws pertaining to WS.

Act of March 2, 1931 (46 Stat. 1468; 7 U.S.C. 426-426b) as amended, and the Act of December 22, 1987 (101 Stat. 1329-331, 7 U.S.C. 426c).

WS is a cooperatively funded, service-oriented program. Before any operational wildlife damage management is conducted, an *Agreement for Control* or similar document must be completed by WS and the landowner/administrator. WS cooperates with other Federal, State, Tribal, and local government entities, educational institutions, private property owners and managers, and with appropriate land and wildlife management agencies, as requested, with the goal of effectively and efficiently resolving wildlife damage problems in compliance with all applicable Federal, State, and local laws.

U.S. Fish and Wildlife Service (USFWS). The mission of the USFWS is: "Working with others to conserve, protect, and enhance fish, wildlife, plants and their habitats for the continuing benefits of the American people". While some of the USFWS's responsibilities are shared with other Federal, State, Tribal, and local entities, the USFWS has special authorities in managing the National Wildlife Refuge System; conserving migratory birds, endangered species, certain marine mammals, and nationally significant fisheries; and enforcing Federal wildlife laws. The MBTA gives the USFWS primary statutory authority to manage migratory bird populations in the U.S. The USFWS is also charged with implementation and enforcement of the Endangered Species Act of 1973, as amended and with developing recovery plans for listed species.

Wisconsin Department of Natural Resources (WDNR). The WDNR, under the direction of a Governor appointed Natural Resources Board, is specifically charged by the Legislature with the management of the State's wildlife resources. Although legal authorities of the Natural Resources Board and the WDNR are expressed throughout Wisconsin Administrative Code (WAC), the primary statutory authorities include establishment of a system to protect, develop and use the forest, fish and game, lakes, streams, plant life, flowers, and other outdoor resources of the state (s. §§23.09 Wis. Stats.) and law enforcement authorities (s. §§23.10, s. 23.50, s. 29.001 and s. 29.921 Wis. Stats.). The Natural Resources Board adopted mission statements to help clarify and interpret the role of WDNR in managing natural resources in Wisconsin. They are:

- To protect and enhance our natural resources: our air, land and water; our wildlife, fish and forests and the ecosystems that sustain all life[6].
- To provide a healthy sustainable environment and a full range of outdoor opportunities.
- To ensure the right of all people to use and enjoy these resources in their work and leisure.

[6] Primary control of deer disease prevention resides with the WDNR calling into question the value of any Federal process in planning and decision-making for this aspect of the program. Still, an educated and involved citizenry can help inform planners and decision-makers at all levels of government. In the circumstances, the best way in which to involve and educate citizens consistent with the State's timeframe of need is through the public NEPA process.

- To work with people to understand each other's views and carry out the public will.
- And in this partnership consider the future and generations to follow.

Wisconsin Act 287 directs the WDNR to manage DCCOs so as to reduce damage by DCCOs.

1.9.2 Compliance with Other Laws, Executive Orders, Treaties, and Court Decisions.

A number of other Federal laws, treaties, and court decisions authorize, regulate, or otherwise affect WS wildlife damage management. The cooperating agencies comply with all applicable laws, and consult and cooperate with other agencies as appropriate.

National Environmental Policy Act (NEPA). All Federal actions are subject to NEPA (Public Law 91-190, 42 U.S.C. 4321 et seq.). NEPA sets forth the requirement that Federal actions with the potential to significantly affect the human environment be evaluated in terms of their impacts for the purpose of avoiding or, where possible, mitigating and minimizing adverse impacts. WS and the USFWS prepare analyses of the environmental effects of program activities to meet procedural requirements of this law. This EA meets the NEPA requirement for the proposed action in Wisconsin for both WS and USFWS.

Ordinarily, individual actions on the types of sites encompassed by this analysis may be categorically excluded under the APHIS Implementing Regulations for compliance with the National Environmental Policy Act (NEPA) (7 CFR 372.5(c)). APHIS Implementing Regulations also provide that all technical assistance furnished by WS is categorically excluded (7 CFR 372.5(c)) (60 Federal Register 6,000, 6,003 (1995)). However, WS, the USFWS, and WDNR, have decided to prepare this EA to assist in planning CDM activities and to clearly communicate with the public the analysis of cumulative effects for a number of issues of concern in relation to alternative means of meeting needs for such management in the State, including the potential cumulative impacts on DCCOs and other wildlife species. With the exception for certain projects covered by the PRDO described in Sections 1.8.2 and 1.8.4, this analysis covers current and future CDM actions by the USFWS, WS and the cooperating agencies wherever they might be requested or needed within the State of Wisconsin.

Endangered Species Act (ESA). It is federal policy, under the ESA, that all federal agencies shall seek to conserve threatened and endangered (T&E) species and shall utilize their authorities in furtherance of the purposes of the Act (Sec.2(c)). WS conducts Section 7 consultations with the USFWS to use the expertise of the USFWS to ensure that "any action authorized, funded or carried out by such an agency . . . is not likely to jeopardize the continued existence of any endangered or threatened species . . . Each agency shall use the best scientific and commercial data available" (Sec.7 (a)(2)).

As part of the DCCO FEIS (USFWS 2003), the USFWS completed an intra-Service biological evaluation and informal Section 7 consultation on the management of DCCOs in the U.S. and this resulted in specific provisions for T&E species protection in the regulations implementing the PRDO at 50 CFR 21.48 (see section 4.1.2). An additional Section 7 consultation was completed specifically on the risks to T&E species from the actions proposed in this EA.

Bald and Golden Eagle Protection Act (16 USC 668): Congress enacted the Eagle Protection Act (16 U.S.C. 668) in 1940, thereby making it a criminal offense for any person to "take" or possess any bald eagle or any part, egg, or nest. The Act contained several exceptions which permitted take under select circumstances. Since its original enactment, the Act has been amended several times to increase protections for eagles and/or provide exemptions for specific types of activities. For example, the amendment in 1962 was designed to give greater protection to immature bald eagles, and to include golden eagles. The 1962 amendment also created two exceptions to the Act: first, it allowed the taking and possession of eagles for the religious purposes of Indian tribes and second, it provided that the Secretary of the Interior, on request of the governor of any State, could authorize the taking of golden eagles to seasonally protect domesticated flocks and herds in that State.

While Bald Eagles were federally listed as a threatened species, the Endangered Species Act was the primary regulation governing the management of Bald Eagles in the lower 48 states. Now that Bald Eagles have been removed from the federal list of threatened and endangered species, the Bald and Golden Eagle Protection Act is the primary regulation governing Bald Eagle management. For purposes of this Act, "take" is defined as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, or molest or disturb." If an APHIS action could potentially affect either bald or golden eagles in any of these ways, APHIS must consult with USFWS. If these species are found in a location where a proposed action will be carried out, APHIS must ensure that its actions do not impact eagles in a way that fits the definition of “take”. When there is the potential to affect eagles, it is advisable to coordinate with FWS to assure actions avoid “take.” WS has consulted with the USFWS regarding potential risks to Bald Eagles from the proposed actions and methods to reduce impacts on eagles.

Fish and Wildlife Coordination Act (16 U.S.C. 661-667e). The Fish and Wildlife Coordination Act obligates all Federal agencies to consult with State resource agencies on actions related to wildlife conservation, including but not limited to actions "minimizing damages from overabundant species".

Coastal Zone Management Act of 1972, as amended (16 USC 1451-1464, Chapter 33; P.L. 92-583, October 27, 1972; 86 Stat. 1280). This law established a voluntary national program within the Department of Commerce to encourage coastal states to develop and implement coastal zone management

plans. Funds were authorized for cost-sharing grants to states to develop their programs. Subsequent to Federal approval of their plans, grants would be awarded for implementation purposes. In order to be eligible for federal approval, each state's plan was required to define boundaries of the coastal zone, to identify uses of the area to be regulated by the state, the mechanism (criteria, standards or regulations) for controlling such uses, and broad guidelines for priorities of uses within the coastal zone. In addition, this law established a system of criteria and standards for requiring that federal actions be conducted in a manner consistent with the federally approved plan. The standard for determining consistency varied depending on whether the federal action involved a permit, license, financial assistance, or a federally authorized activity.

All WS CDM actions conducted in the state require a permit from the WDNR. The WDNR participated as a cooperating agency in the preparation of this EA. Therefore, the lead and cooperating agencies have determined that the proposed action would be consistent with the State's Coastal Zone Management Program.

Migratory Bird Treaty Act of 1918 (16 U.S.C. 03-711; 40 Stat. 755), as Amended. The Migratory Bird Treaty Act provides the USFWS regulatory authority to protect families of birds that contain species which migrate outside the United States. The law prohibits any "*take*" of these species by any entities, except as permitted or authorized by the USFWS. The Migratory Bird Treaty Reform Act of 2004 clarifies the original purpose of the Migratory Bird Treaty Act as pertaining to the conservation and protection of migratory birds native to North America and directs the USFWS to establish a list of bird species found in the United States which are non-native, human-introduced species and therefore not Federally protected under the MBTA. The USFWS is undergoing the review and approval process for this list.

The USFWS issues permits to requesters for reducing migratory bird damage in certain situations. WS provides on-site assessments for persons experiencing migratory bird damage to obtain information on which to base damage management recommendations. Damage management recommendations could be in the form of technical assistance or operational assistance. In severe cases of migratory bird damage, WS provides recommendations to the USFWS for the issuance of depredation permits to private entities or other agencies. The ultimate responsibility for issuing such permits rests with the USFWS.

Executive Order 13186 of January 10, 2001 "Responsibilities of Federal Agencies to Protect Migratory Birds." This Order states that each federal agency, taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations, is directed to develop and implement, a MOU with the USFWS that shall promote the conservation of migratory bird populations. WS has developed a draft MOU with the USFWS as required by this Order and is currently waiting for USFWS approval. WS will abide by the MOU once it is finalized and signed by both parties.

The Native American Graves and Repatriation Act of 1990. The Native American Graves Protection and Repatriation Act require Federal agencies to notify the Secretary of the Department that manages the Federal lands upon the discovery of Native American cultural items on Federal or tribal lands. Federal projects would discontinue work until a reasonable effort has been made to protect the items and the proper authority has been notified.

National Historic Preservation Act (NHPA) of 1966 as amended. The NHPA of 1966, and its implementing regulations (36 CFR 800), requires federal agencies to: 1) determine whether activities they propose constitute "undertakings" that has the potential to cause effects on historic properties and, 2) if so, to evaluate the effects of such undertakings on such historic resources and consult with the Advisory Council on Historic Preservation (i.e. State Historic Preservation Office, Tribal Historic Preservation Officers), as appropriate. WS actions on tribal lands are only conducted at the tribe's request and under signed agreement; thus, the tribes have control over any potential conflict with cultural resources on tribal properties.

The CDM methods described in this EA that might be used operationally by WS do not cause major ground disturbance, do not cause any physical destruction or damage to property, do not cause any alterations of property, wildlife habitat, or landscapes, and do not involve the sale, lease, or transfer of ownership of any property. In general, such methods also do not have the potential to introduce visual, atmospheric, or audible elements to areas in which they are used that could result in effects on the character or use of historic properties. Therefore, the methods that would be used by WS under the proposed action are not generally the types of activities that would have the potential to affect historic properties. If an individual activity with the potential to affect historic resources is planned under an alternative selected as a result of a decision on this EA, then site-specific consultation as required by Section 106 of the NHPA would be conducted as necessary.

There is potential for audible effects on the use and enjoyment of a historic property when methods such as propane exploders, pyrotechnics, firearms, or other noise-making methods are used at or in close proximity to such sites for purposes of hazing or removing birds. However, such methods would only be used at a historic site at the request of the owner or manager of the site to resolve a damage or nuisance problem, which means such use would be to benefit the historic property. A built-in mitigating factor for this issue is that virtually all of the methods involved would only have temporary effects on the audible nature of a site and can be ended at any time to restore the audible qualities of such sites to their original condition with no further adverse effects. Site-specific consultation as required by Section 106 of the NHPA would be conducted as necessary in those types of situations.

Environmental Justice and Executive Order 12898 - "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." Executive Order 12898, promotes the fair treatment of people of all races, income levels and cultures with respect to the development, implementation and enforcement of environmental laws, regulations and policies. Environmental justice (EJ) is the pursuit of equal justice and protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status. EJ is a priority within the USDA (WS) and USDI (USFWS). Executive Order 12898 requires Federal agencies to make environmental justice part of their mission, and to identify and address disproportionately high and adverse human health and environmental effects of Federal programs, policies and activities on minority and low-income persons or populations. APHIS implements Executive Order 12898 principally through its compliance with NEPA. All WS and USFWS activities are evaluated for their impact on the human environment and compliance with Executive Order 12898. Both agencies' personnel use only legal, effective, and environmentally safe wildlife damage management methods, tools, and approaches. It is not anticipated that the proposed action would result in any adverse or disproportionate environmental impacts to minority and low-income persons or populations.

Protection of Children from Environmental Health and Safety Risks (Executive Order 13045). Children may suffer disproportionately from environmental health and safety risks for many reasons. CDM as proposed in this EA would only involve legally available and approved damage management methods in situations or under circumstances where it is highly unlikely that children would be adversely affected. Therefore, implementation of the proposed action would not increase environmental health or safety risks to children.

Wisconsin Environmental Policy Act (WEPA). The Wisconsin Environmental Policy Act is a state law designed to encourage environmentally sensitive decision-making by state agencies. Signed into law in 1972, WEPA spells out the state's environmental policy and requires the DNR and other state agencies to consider the environmental effects of their actions to the extent possible under their other statutory authorities. It also establishes the principle that broad citizen participation should be part of environmental decision-making. WEPA imposes procedural and analytical responsibilities on the DNR and other agencies but does not provide authority to protect the environment. WEPA applies only to the actions of state agencies. It does not apply to local governments or private parties unless their actions involve state agency regulation or funding. WEPA requires the DNR and other state agencies to gather relevant environmental information and use it in their decision-making. Agencies must also look at appropriate alternatives to the particular course of action they are proposing. This EA and associated NEPA process meets state requirements for environmental analysis under WEPA.

Wisconsin Act 287 – Management of Double-crested Cormorants. The act was passes by the Wisconsin Senate and Assembly and Signed by the Governor April 8, 2006. The Act directs the WDNR, in cooperation with federal agencies, and compliance with the USFWS PRDO, to administer a program to control and manage DCCOs in order to reduce wildlife damage caused by DCCOs.

CHAPTER 2: ISSUES

2.0 INTRODUCTION

Chapter 2 contains a discussion of the issues relevant to the analysis, including issues that will receive detailed environmental impact analysis in Chapter 4 (Environmental Consequences), issues that have driven the development of mitigation measures and/or standard operating procedures, and issues that will not be considered in detail, with rationale.

2.1 SUMMARY OF ISSUES

The following issues have been identified as areas of concern requiring consideration in this EA. These will be analyzed in detail in Chapter 4:

- Effects on DCCO populations
- Effects on other wildlife (and plant) species, including T&E species
- Effects on human health and safety
- Effects on aesthetic values
- Humaneness and animal welfare concerns of the methods used

2.1.1 Effects on DCCO Populations

A common concern among members of the public is whether wildlife damage management actions, in particular the use of lethal control and techniques like egg oiling and nest/egg destruction that affect reproduction, will adversely affect the long-term sustainability of DCCO populations. The NEPA requires that Federal agencies consider the cumulative impacts of their proposed actions and other known impacts on the affected environment. Cumulative impacts on the regional DCCO population are addressed in the USFWS FEIS and impacts on DCCO populations in Wisconsin will be addressed in Chapter 4 of this EA. One impact affecting DCCO populations common to all the alternatives is the impact of disease on DCCO populations.

Impacts of West Nile Virus and Newcastle Disease on bird populations

West Nile Virus (WNV) has emerged in recent years in temperate regions of North America, with the first appearance of the virus in North America occurring in New York City in 1999 (MMWR 2002, Rappole et al. 2000). Since 1999 the virus has spread across the United States and was reported to occur in 44 states and the District of Columbia in 2002 (MMWR 2002). WNV is typically transmitted between birds and mosquitoes. The most serious manifestation of WNV is fatal encephalitis in humans, horses, and birds. WNV has been detected in dead bird species of at least 138 species, including DCCOs (CDC 2003).

Although birds infected with WNV can die or become ill, most infected birds do survive and may subsequently develop immunity to the virus (CDC 2003, Cornell University 2003). In some bird species, particularly Corvids (crows, blue jays, ravens, magpies), the virus causes disease (often fatal) in a large percentage of infected birds (Audubon 2003, CDC 2003, Cornell University 2003, MMWR 2002). In 2001, WNV virus surveillance/monitoring programs in Wisconsin documented the first-time occurrence of WNV in the state. Current data from the WDNR indicate that while DCCOs can be infected with WNV, they likely are not a major reservoir for the virus. At present, given the small number of birds testing positive for WNV (4 in the last 2 years) and current population trends for DCCOs in Wisconsin, there is no evidence indicating that the virus has had an adverse impact on the statewide DCCO population.

Newcastle Disease Virus (NDV) is a contagious and fatal viral disease affecting all species of birds, including domestic poultry and wild birds. Newcastle Disease Virus is spread primarily through direct contact between healthy birds and the bodily discharges of infected birds. The disease is transmitted through infected birds' droppings and secretions from the nose, mouth, and eyes. In DCCOs, nerological signs and mortality from NDV are generally only found in young of the year and older birds appear to be resistant to the disease (Glaser et al. 1999). In 1992, the first record of NDV causing mortality in wild birds in the U.S. were made when sick and dead juvenile DCCOs testing positive for NDV were reported in 7 states in the northern U.S. including North Dakota, South Dakota, Nebraska, Minnesota, Wisconsin, Michigan, and New York (Glaser et al. 1999). Estimated mortality of juvenile DCCOs in affected colonies in the Great Lakes during the 1992 outbreak ranged from 1 – 37%. Although the 1992 epizootic marked the first records from the U.S., the detection of DCCO eggs with positive antibody titers to NDV in 1991 prior to the 1992 epizootic and subsequent NDV outbreaks are an indication that NDV is likely maintained in DCCOS (Glaser et al. 1999).

An outbreak of NDV on Gull Island in the Apostle Islands in 1992 resulted in death of 262 cormorant young (Matteson et al. 1999). The colony increased from 520 nesting pairs in 1991 to 583 nesting pairs in 1993 despite the mortality in juvenile birds in 1992, illustrating the ability of DCCO populations to rebound from disease outbreaks such as NDV. Individual dead birds submitted to the U.S. Department of the Interior, Geological Survey, National Wildlife Health Center in Madison, Wisconsin from the Green Bay area periodically since the 1992 outbreak. Recently, higher levels of NDV mortality have been diagnosed in birds from Cat Island in 2003 (total mortality – 100 birds) and birds from Pilot Island in 2006 (estimated total mortality – 39 birds including 5 gulls (species unspecified)). The dead birds submitted from Pilot Island were also diagnosed with West Nile Virus, Aspergillosis and Salmonellosis. However given increasing trends in the state DCCO population during this period, NDV has not caused substantial reductions in the WI DCCO population.

2.1.2 Effects on other Wildlife and Fish Species, Including Threatened and Endangered Species

A common concern among members of the public and wildlife professionals, including the lead and cooperating agencies, is the impact of CDM methods and activities on nontarget species, including T&E species. Of particular concern are the potential impacts on co-nesting colonial waterbirds (i.e. Great Egrets, Great Blue Herons, Black-crowned Night-Herons, American White Pelicans and Common Terns; Appendix F). Impacts of the proposed action on co-nesting colonial waterbirds may be positive because they reduce DCCO competition for nesting sites and DCCO damage to vegetation, or it is possible that actions taken to reduce DCCO activity at the site may also adversely affect other species because of disturbance to nesting birds. WS will consult with the USFWS, WDNR, and involved Tribes before undertaking DCCO control activities at any of the sites in Wisconsin where DCCOs co-nest with other colonial waterbirds. Standard operating procedures (SOPs) for the EA (Chapter 3) include measures intended to mitigate or reduce the effects of CDM on nontarget species populations. To reduce the risks of adverse effects to nontarget species, the lead and cooperating agencies would select damage management methods that are as target-selective as practicable and apply CDM methods in ways to reduce the likelihood of capturing or killing nontarget species.

Of the Federally-listed animals in Wisconsin, only the Piping Plover could potentially occur at or near control sites and might be impacted by CDM activities. Bald Eagles were federally-listed as a threatened species at the time the DCCO FEIS was completed. Although Bald Eagles are no-longer a federally-listed species, they continue to receive the protections of the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Federally-listed plants which might occur on Door County area islands were WS may be asked to work to prevent DCCO colonization include dune thistle and dwarf lake iris. As part of the DCCO FEIS (USFWS 2003), the USFWS completed an Intra-Service Section 7 Biological Evaluation on the management of DCCOs in the U.S. WS has also consulted with the USFWS regarding the specific impacts of the proposed alternatives on federally-listed species. All conservation measures recommended by the USFWS for the protection of T&E species will be implemented by the agencies as needed depending upon the alternative selected.

State-listed animal species in the area where CDM activities could be conducted and which may be impacted by CDM actions include the Piping Plover, Common Tern, Caspian Tern, Forster's Tern, Trumpeter Swan, Snowy Egret, Great Egret and Yellow-crowned Night-Heron. State listed plants which might occur on Door County area islands were WS may be asked to work to prevent DCCO colonization include Western fescue, elk sedge, thickspike, dune goldenrod, dwarf lake iris, dune thistle, small-flower grass-of-parnassus and sticky false-asphodel. Similar to the situation with Federally-listed species, WS has initiated

consultation with the WDNR regarding potential impacts on state-listed T&E species from the alternatives proposed in this EA. All conservation measures recommended by the WDNR for the protection of state-listed T&E will be incorporated in agency actions as needed depending upon the alternative selected.

2.1.3 Effects on Human Health and Safety

2.1.3.1 Effects on Human Health and Safety from CDM Methods

Some people may be concerned that agency use of CDM methods, such as firearms and pyrotechnic scaring devices, could cause injuries to people. Agency personnel occasionally use rifles and shotguns to remove or scare DCCOs that are causing damage. Shotguns may also be used on airports to scare or remove birds which pose a threat to aircraft or air passenger safety. Pyrotechnics are commonly used in noise harassment programs to disperse or move birds. There is some potential fire hazard to agricultural sites and private property from pyrotechnic use. To minimize fire hazards and potential risks to human safety, all WS persosonnel using pyrotechnics are specifically trained in the safe and effective use of this method (WS Directive 2.625).

Firearm use is a very sensitive issue and a concern because of issues relating to the safety and potential misuse of firearms. To ensure safe use and firearms awareness, WS employees who use firearms to conduct official duties are required to attend an approved firearms safety and use training program within three months of their appointment and a refresher course every two years afterwards. WS employees who carry firearms as a condition of employment are required to sign a form certifying that they meet the criteria as stated in the *Lautenberg Amendment* which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence. Similar safety measures are used by the USFWS and WDNR for personnel authorized to use firearms.

2.1.3.2 Effects on Human Health and Safety from Not Conducting CDM

The concern stated here is that the absence of adequate CDM would result in adverse effects on human health and safety, because DCCO damage would not be curtailed or reduced to the minimum levels possible and practical. In the case of DCCO hazard management at airports, the potential impacts of not conducting such work could lead to increased incidence of injuries or loss of human lives. These potential adverse effects are discussed in Section 1.5.5.

2.1.4 Effects on Aesthetic Values

Aesthetics is a philosophy dealing with the nature of beauty, or the appreciation of beauty. Therefore, aesthetics is subjective in nature and is dependent on what an observer regards as beautiful. The human attraction to animals has been well documented throughout history and started when humans began domesticating animals. The American public is no exception, and some people may consider individual wild animals and birds as "pets" or exhibit affection toward these animals, especially people who enjoy coming in contact with or viewing wildlife. Conversely, others may see the same species as a detriment to aesthetic values (e.g. droppings and damage to vegetation associated with large groups of DCCOs). Therefore, the public reaction to wildlife damage management is variable and mixed because there are numerous philosophical, aesthetic, and personal attitudes, values, and opinions about the aesthetic value of wildlife and the best ways to reduce conflicts/problems between humans and wildlife.

Wildlife populations provide a range of social and economic benefits (Decker and Goff 1987). These include direct benefits related to consumptive and non-consumptive use (e.g., wildlife-related recreation, observation, harvest, sale), indirect benefits derived from vicarious wildlife related experiences (e.g., reading, television viewing), and the personal enjoyment of knowing wildlife exists and contributes to the natural ecosystems (e.g., ecological, existence, bequest values) (Bishop 1987). Direct benefits are derived from a user's personal relationship to animals and may take the form of direct consumptive use (using the animal or intending to) or non-consumptive use (viewing the animal in nature or in a zoo, photography) (Decker and Goff 1987). Indirect benefits or indirect exercised values arise without the user being in direct contact with the animal and come from experiences such as looking at photographs and films of wildlife, reading about wildlife, or benefiting from activities or contributions of animals such as their use in research (Decker and Goff 1987). Indirect benefits come in two forms: bequest and pure existence (Decker and Goff 1987). Bequest is providing for future generations and pure existence is merely knowledge that the animals exist (Decker and Goff 1987).

There is likely to be concern that the proposed action or alternatives would result in the loss of aesthetic benefits to the public, resource owners, or neighboring residents. Potential impacts of the proposed action on aesthetic values include potential reductions in opportunities to view and enjoy DCCOs at specific sites where CDM is conducted, the potential that CDM might adversely affect co-nesting colonial waterbirds and opportunities to view and enjoy these species, the risk that if left unmanaged, expanding DCCO populations may result in the elimination of some co-nesting colonial waterbirds from certain sites and adversely affect bird viewing opportunities, adverse impacts of large numbers of nesting DCCOs on vegetation at nest sites, complaints regarding noise and odor associated with large DCCO colonies, and potential adverse impacts of CDM activities on opportunities to enjoy certain fishery resources.

2.1.5 Humaneness and Animal Welfare Concerns of Methods Used by WS

DCCO control methods, especially lethal control, may raise issues about humaneness and animal welfare. The issue of humaneness and animal welfare, as it relates to the killing or capturing of wildlife is an important but very complex concept that can be interpreted in a variety of ways. Schmidt (1989) indicated that vertebrate pest damage management for societal benefits could be compatible with animal welfare concerns, if *" . . . the reduction of pain, suffering, and unnecessary death is incorporated in the decision making process."* Suffering is described as a *" . . . highly unpleasant emotional response usually associated with pain and distress."* However, suffering *" . . . can occur without pain . . . ,"* and *". . . pain can occur without suffering . . ."* (AVMA 1987). Because suffering carries with it the implication of a time frame, a case could be made for *" . . . little or no suffering where death comes immediately . . ."* (CDFG 1991), such as shooting.

Defining pain as a component in humaneness of WS methods appears to be a greater challenge than that of suffering. Pain obviously occurs in animals. Altered physiology and behavior can be indicators of pain, and identifying the causes that elicit pain responses in humans would *" . . . probably be causes for pain in other animals . . ."* (AVMA 1987). However, pain experienced by individual animals probably ranges from little or no pain to considerable pain (CDFG 1991).

Pain and suffering, as it relates to WS damage management methods, has both a professional and lay point of arbitration. Wildlife managers and the public would be better served to recognize the complexity of defining suffering, since *" . . . neither medical nor veterinary curricula explicitly address suffering or its relief"* (CDFG 1991).

Therefore, humaneness, in part, appears to be a person's perception of harm or pain inflicted on an animal, and people may perceive the humaneness of an action differently. The challenge in coping with this issue is how to achieve the least amount of animal suffering within the constraints imposed by current technology and funding.

2.2 ISSUES CONSIDERED BUT NOT IN DETAIL WITH RATIONALE

2.2.1 Impacts on Biodiversity

The proposed program does not attempt to eradicate any native species of wildlife. The alternatives discussed in this EA include specific measures for the maintenance of a healthy viable DCCO population in Wisconsin. Any CDM actions would be conducted in accordance with international, Federal, State, and

Tribal laws, and regulations enacted to ensure species viability. Effects on target and nontarget species populations because of WS' lethal CDM activities are minor, as shown in Section 4.1.1 and 4.1.2, and therefore will not result in significant nationwide or statewide impacts on biodiversity (USDA 1997, Revised).

2.2.2 A "Threshold of Loss" Should Be Established Before Allowing Any Lethal CDM

The agencies are aware that some people feel Federal wildlife damage management should not be allowed until economic losses reach some arbitrary predetermined threshold level. Such policy, however, would be difficult or inappropriate to apply to human health and safety situations. Although some damage can be tolerated by most resource owners, resource owners and situations differ widely and a set wildlife damage threshold levels would be difficult to determine or justify. WS has the legal direction to respond to requests for assistance, and it is program policy to aid each requester to minimize losses. WS uses the Decision Model thought process discussed in Chapter 3 to determine appropriate strategies.

In a ruling for Southern Utah Wilderness Alliance, et al. vs. Hugh Thompson, Forest Supervisor for the Dixie National Forest, et al., the United States District Court of Utah denied plaintiffs' motion for preliminary injunction. In part the court found that a forest supervisor needs only show that damage from wildlife is threatened, to establish a need for wildlife damage management (Civil No. 92-C-0052A January 20, 1993). Thus, there is judicial precedence indicating that it is not necessary to establish a criterion such as percentage of loss of a particular resource to justify the need for wildlife damage management actions.

2.2.3 An ongoing monitoring program is needed to assess impacts on DCCO populations.

Impacts on DCCO populations from CDM are monitored through the bird counting and data reporting requirements of the PRDO. WS, the USFWS and WDNR have also been conducting annual surveys of DCCO colonies at sites where CDM is conducted. WS, the USFWS, and WDNR also participated in the 2005 Great Lakes DCCO survey and will participate in other regional population survey efforts.

2.2.4 Fisheries in the Great Lakes are already at risk from invasive species, nutrient loading, wetlands destruction and other threats.

This comment was made by opponents and supporters of CDM. The WDNR already focuses much of its fisheries management effort in the Great Lakes to understanding, and reducing the impacts of, invasive species. The United States and Canada conduct extensive programs to reduce sea lamprey numbers. All

states on the Great Lakes are striving to improve water quality and protect wetland habitat in and around the Great Lakes. Opponents of CDM argue that the impact DCCOs are having on the system is likely insignificant relative to the impact of introduced species, pollution, habitat alteration, etc., so we should be managing those factors instead of managing DCCOs. Advocates of CDM argue that it is beyond our current capabilities to manage many of the factors that are adversely impacting the Great Lakes but we can and should try managing DCCOs. As noted above, the impact of DCCO predation may be greater in fish populations that are already under stress because of problems with depressed recruitment or declines in the availability of forage fish. Advocates of CDM contend that if it is possible to enhance fish populations without jeopardizing DCCO populations then we should do so.

The agencies acknowledge that determining the exact nature and magnitude of the impact of DCCOs on fish populations is difficult, especially in the complex systems in the Great Lakes. The agencies agree that factors like introduced species, nutrient loading and other threats also impact fish populations. Rarely are declines in fish populations in the Great Lakes attributable to only one source; rather, problems usually result from a suite of causal factors. The agencies can only control some of these factors. The question becomes whether managing the factors which we can address will be sufficient to overcome the collective problems faced by the species we wish to protect/enhance.

Analysis in this EA and the FEIS indicate that high numbers of DCCOs have the potential to adversely impact local fisheries. The proposed programs to address concerns regarding DCCO impacts on fishery resources use an adaptive management approach to address this issue. The adaptive management approach involves reductions in DCCO numbers in local areas coupled with monitoring of DCCO and fish populations and review of the findings of ongoing research on CDM and DCCO impacts on public resources. Reductions in DCCO numbers are set and carefully monitored to ensure that the actions do not threaten the long-term sustainability of the State DCCO population. This type of approach strives to allow for management benefits while simultaneously learning from the experience to better define the full scale and scope of the problem and the extent of benefits to be expected from CDM. This approach provides for realizing management benefits, and facilitates research and evaluation without having to fully eliminate all uncertainty in all locations.

2.2.5 The EA fails to provide adequate scientific data proving need for action. Only potential impacts are used as need for action. No studies have been conducted in the Door County Area to determine what the birds eat. Need for action in these areas is based solely on speculation and correlational analysis and no hard data. More information is needed than the fact that there are a lot of DCCOs present and that they eat fish and that the WDNR is concerned before CDM should be initiated. The EA needs to prove that the fish taken are economically

important and that fish consumption is actually adversely impacting the population.

What constitutes "sufficient" evidence to justify CDM is, to a certain extent, a question of values. Among stakeholders concerned with DCCO management, there is considerable disagreement over whether or not the proposed action is justified, with some individuals arguing for more or less CDM than is proposed in the EA. In the FEIS, the USFWS stated that they "do not believe that agencies should have to wait until impacts occur and are proven with absolute certainty before they are allowed to manage DCCOs. One of the benefits of the PRDO is that agencies in areas where risks of significant DCCO impacts are greatest are given more flexibility in taking action including preventive action." (USFWS 2003).

The EA provides the data and science-based inference that were used to identify the sites where CDM may be conducted. The imminent threat of damage or loss of resources is often deemed sufficient for wildlife damage management actions to be initiated (U.S. District Court of Utah 1993). Resource management agencies, organizations, associations, groups, and individuals have requested WS to conduct CDM damage management to protect fishery resources in the sites discussed in this EA. All CDM activities would be conducted in compliance with relevant laws, regulations, policies, orders and procedures, including those set by the USFWS when it established the PRDO.

The problem with CDM for the protection of fishery resources is, and will continue to be, that the data necessary to fully explore these issues don't exist in many locations and/or will be very costly and likely take time (years) to obtain. While the agencies agree that having highly detailed information on each site prior to initiating CDM would be optimal, they also recognize that there are consequences to inaction in places where CDM is warranted including adverse impacts on fish populations, local fishing opportunities and associated industries, commercial fisheries and ecosystems. The adaptive management approach presented here allows agencies to take action to reduce adverse impacts while engaging in an ongoing process of data review and subsequent modification of management actions to ensure that the actions will not have substantial cumulative adverse impacts on DCCOs or non-target species.

We do not concur that a DCCO prey species must be proven to have significant economic value for CDM to be warranted. Neither the PRDO nor the MBTA require that economic value be a determining factor in deciding when to engage in CDM.

2.2.6 If expanded control is permitted, it will be fueled by public pressure not real scientific need.

Science is a process for testing hypotheses. It forms one of the foundations for making management decisions but is not the only factor considered. Human values are and will always be an important factor in making natural resource management decisions. This comment assumes that there is only one management conclusion that is correct or science-based. In reality, decisions about when to manage (or not to manage) are largely value-driven which means that different people can look at the same data and come to different conclusions about the management implications. Furthermore, this comment assumes that listening to the public and heeding the science are mutually exclusive when, in fact, they are not.

2.2.7 Control of a native bird to protect a non-native fish species (brown trout), even if that species provides recreational benefit to a small portion of the human population, is ethically questionable. This is especially true given that biologists across the Great Lakes are identifying non-native species as one of the greatest threats to ecosystem health and integrity.

The impacts of non-native species are not universally detrimental or undesirable. The brown trout is a highly valued non-native species in the Great Lakes. The WDNR works to establish a near shore fishery to increase the diversity of fishing opportunities in the state and to foster fishing opportunities during seasons when off-shore fishing is not accessible and for individuals who may not have the resources for off-shore fishing. Popularity with sport anglers is not the only reason WDNR stocks species like brown trout. Another reason that agencies like the WDNR had to turn to establishment of non-native species like brown trout, rainbow trout, and Chinook salmon was to adapt to the negative effects of water contamination, invasive species (forage fish like alewives) and other factors on Great Lakes fishery ecosystems, including populations of predatory fish. Introduction and management of these species is a part of what works to maintain a healthy fishery in the highly perturbed Great Lakes ecosystems. The intentional introduction of nonnative predatory fish species in the Great Lakes is often heralded as one the great natural resource management success stories of our time.

2.2.8 There is no proof that DCCO removal would protect/enhance target fish populations. Given the complexity of the factors impacting Great Lakes fish populations, how can the agencies be sure the proposed actions will alleviate conflicts?

The intent of the proposed program is not to manage fish populations, but is to manage DCCO damage to specific resources, including fisheries. We cannot be entirely sure that CDM activities will have the desired effect (although we are

confident that they will) which is why the principles of adaptive management are being used as CDM is implemented. The CDM activities proposed in this EA will be paired with monitoring of fish populations through methods such as ongoing Creel Surveys and Trawl Surveys. The cooperating agencies are also working with the USDA, APHIS, WS, National Wildlife Research Center (NWRC), to determine if fatty acid analysis can be used to identify fish species consumed by DCCOs in the Great Lakes. The method has been used successfully in earlier studies to distinguish not only between farm-raised channel catfish and game fish in the diet of cormorants but the source of the farm-raised channel catfish in the diet (Stahl et al. 2006). The process looks for distinctive fatty acids in prey species and then checks samples from DCCOs to see if the DCCOs have been consuming fish with the fatty acids in question. The level of potential increase will be dependent upon not only the reduction of DCCO predation on the resource, but also on environmental and human-induced factors that affect aquatic ecosystems and fish populations.

2.2.9 Please conduct CDM to protect fish at Lake Largo.

During the WDNR comment period on management objectives for DCCOs in Wisconsin, several individuals expressed concern regarding the impact of DCCOs on Lake Largo in Brown County. Lake Largo is a private man-made lake that is not open to public access. As such, fish in the lake are private property and not a "public resource" as defined by the PRDO. Reduction of cormorant damage to fishery resources at this site would be handled in the same manner as other DCCO damage to private property. Technical assistance with the development of a CDM strategy for the site is available from WS. Nonlethal CDM methods may be used without a permit from the USFWS. If needed, the lake owners association or other applicable authority would have to apply for and receive a migratory bird depredation permit (MBP) from the USFWS to use lethal CDM methods.

CHAPTER 3: ALTERNATIVES

Alternatives were developed for consideration using the WS Decision Model (Slate et al. 1992); Appendix J ("*Methods of Control*"), Appendix N ("*Examples of WS Decision Model*"), and Appendix P ("*Risk Assessment of Wildlife Damage Control Methods Used by USDA, Wildlife Services Program*") of the WS FEIS (USDA 1997, Revised); and Appendix 4 ("*Management Techniques*") of the USFWS DCCO FEIS (USFWS 2003).

Agency Decisions

These alternatives describe the management techniques available to WS (involvement in CDM), the USFWS Migratory Bird Office (issuing permits and oversight of the PRDO), the USFWS National Wildlife Refuges (NWRs) managed by the Horicon National Wildlife Refuge and WDNR (involvement in CDM). Although the lead and cooperating agencies have worked together to produce a joint document and intend to collaborate on CDM in Wisconsin, each of the lead agencies will be making its own decision on the alternative to be selected in accordance with the standard practices and legal requirements pertaining to each agency's decision making process.

Although the agencies make independent decisions, the decisions made by one agency can restrict the actions taken by the other agencies. For example, if the USFWS Migratory Bird Office, WS and the WDNR selected an alternative that allowed for non-lethal and lethal CDM techniques to implement the management objectives discussed in Section 1.5.7, but the NWRs choose not to allow CDM on Pilot or Spider Islands, then the minimum population that could be achieved would be the DCCO population on Pilot and Spider Islands (5,753 nests in 2007) plus 500 nests on Hat Island and 500 nests on Jack Island for a total of 6,753 nests and not the 5,000 nests proposed for the area.

Alternatively, if the USFWS Migratory Bird Office and NWRs chose an alternative that allowed for non-lethal and lethal CDM techniques, but WS selected a non-lethal only alternative, then WS could help with non-lethal CDM, but lethal CDM could only be conducted at the NWRs with the assistance of the WDNR. Selection of a non-lethal only alternative by WS would also prevent WS from conducting the consultations and completing the forms required by the USFWS before issuing a MBP. Therefore it would not be possible to obtain a MBP for CDM. Details on the relationships among agency decisions are provided in Appendix E.

For simplicity and clarity of analysis, each of the alternatives below is described and its impacts are analyzed as if the lead agencies had selected the same alternative.

3.0 ALTERNATIVES ANALYZED IN DETAIL

Each of the lead and cooperating agencies will make its own decision regarding the alternative to be selected. This chapter contains a description of each of the alternatives

and a discussion of how the selection of each alternative by one agency affects the management actions of the other agencies. Alternatives analyzed in detail are:

- Alternative 1 - Integrated CDM Program, including implementation of the PRDO (Proposed Action/No Action). This is the "No Action" alternative as defined by the Council on Environmental Quality.
- Alternative 2 – Only Non-lethal CDM by Federal Agencies.
- Alternative 3 – Only Technical Assistance with CDM from Federal Agencies.
- Alternative 4 – No Federal CDM.
- Alternative 5 – Integrated CDM Program, excluding implementation of the PRDO

3.1 DESCRIPTION OF THE ALTERNATIVES

3.1.1 Alternative 1. Integrated CDM Including Implementation of the PRDO (Proposed Action/No Action Alternative)

As defined by the CEQ, the no action alternative can be interpreted as the continuation of current CDM practices. This alternative would continue and expand current CDM activities in Wisconsin that have included working under the PRDO and MBPs. An integrated wildlife damage management (IWDM) approach would be implemented to reduce DCCO damage to and conflicts with public resources, aquaculture, property, and human health and safety. The IWDM strategy would encompass the use and recommendation of practical and effective methods of preventing or reducing damage while minimizing harmful effects of damage management measures on humans, target and non-target species, and the environment. Under this action, the lead and cooperating agencies could provide technical assistance and direct operational damage management, including non-lethal and lethal management methods by applying the WS Decision Model (Slate et al. 1992). When appropriate, physical exclusion, habitat modification, nest destruction, or harassment would be recommended and utilized to reduce damage. In other situations, birds would be removed through use of shooting, egg oiling/addling/destruction, or euthanasia following live capture. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of non-lethal and lethal methods, or there could be instances where the application of lethal methods alone would be the most appropriate strategy.

The primary strength of this alternative and the IWDM approach is that it allows for access to the full range of CDM techniques when developing site specific management plans. However, under this alternative, an agency could decide to only use a subset of the possible CDM methods for the management of DCCO damage at a specific site. For example, it would be possible to use only non-lethal techniques at specific sites. Selection of this alternative also does not obligate any agency to work to implement the WDNR management objectives at

all sites under their jurisdiction. For example, the NWRs could choose to restrict their actions under this alternative to responding to and discouraging DCCO activity at any new NWR sites in the Door County Area and not conduct CDM at Pilot or Spider Islands.

Cormorant conflict management activities would be conducted in the State, when requested and funded, on private, public or tribal property, after receiving permission from the landowner/land manager. All management activities would comply with appropriate Federal, State, and local laws. The USFWS would be responsible for ensuring compliance with the PRDO and MBPs and that the long-term sustainability of regional DCCO populations is not threatened. Selection of this alternative by any of the agencies would not restrict the management options available to the other agencies.

Implementation of the PRDO: If this alternative is selected, the agencies could work to meet the management objectives set in Section 1.5.8 under the authorities established in the PRDO. If permitted by the appropriate land management agency, the current goal of the WDNR is to primarily use egg-oiling to gradually reduce the DCCO populations in the Green Bay area over the course of several years. However, lethal methods may also be used if oiling is not sufficient to meet management objectives. An adaptive management approach would be used which would include regular monitoring of the results and impacts of CDM efforts in Wisconsin and new information from the literature. Management methods and objectives will be adjusted as needed based on available information. This process would include review of the EA to determine if the analysis adequately addresses current conditions and plans. The EA will be supplemented or replaced as needed in accordance with APHIS and USFWS NEPA implementation procedures.

It is the agencies' determination that the resource protection goals for Cat, Hat, Jack, Spider and Pilot Islands do not require an immediate reduction in DCCO numbers in order to achieve the desired results. Consequently the agencies feel they can use a slower more conservative approach to achieving population reduction goals (e.g., egg oiling) instead of using methods like shooting to achieve a more rapid reduction in DCCO numbers. This would allow the agencies to monitor the affected resources and adjust management actions gradually in response to new information. It is also hoped that using only egg-oiling will minimize the disruption to DCCOs and the likelihood that birds will move to new sites.

On other sites such as Plum, Hog, and Lone Tree Islands, in the Green Bay Area and Miller's Bay Island in Lake Winnebago, that still have established trees and shrubs, a more aggressive approach involving the full range of available CDM methods may be used. Carcasses of DCCOs killed for reduction of damage to public resources would be disposed of in landfills or used in research projects in accordance with applicable permits and State and Federal regulations.

3.1.2 Alternative 2. Only Non-lethal CDM by Federal Agencies

Under this alternative, the Federal agencies would only use, recommend and permit non-lethal techniques for CDM. WS would not assist with the site evaluations and completion of WS Form 37 required by the USFWS for a MBP. The USFWS would not issue MBPs for lethal techniques to resolve conflicts with DCCOs or research involving lethal CDM methods. The NWRs would not use or permit the use of lethal CDM on the refuges. Permits are not required from the USFWS for non-lethal CDM techniques so access to these methods would not change.

The USFWS FEIS on DCCO management permits PRDO actions that will result in the take of less than 10% of a DCCO colony (USFWS 2003). Decisions made by the USFWS in this EA cannot affect this type of CDM action on non-Federal land. The WDNR and tribes could still act as action agencies under the PRDO and could use lethal methods to take up to 10% of the birds in a colony in combination with nonlethal methods to try and meet management objectives (Section 1.5.7) on non-Federal lands. Egg oiling involves killing the developing fetus and, as such, is a lethal CDM method. As with other lethal techniques, egg oiling could be used by the state and tribes, but would not be used by the federal agencies, nor would it be used on federal lands. The WDNR could also use egg and nest destruction and lethal take of up to 10% of the local colony to discourage DCCO colonization of new sites in the Green Bay that are not federal lands and when assisting the City of Oshkosh with management of DCCO impacts on Miller's Bay Island. However, lethal methods could not be used to discourage DCCO colonization of new sites on Federal lands in the Green Bay Area because the action would require the approval of the USFWS NWRs. Overall management objectives for the CDM in Wisconsin would be as described for Alternative 1.

3.1.3 Alternative 3. Only Technical Assistance from Federal Agencies

The lead and cooperating agencies considered two ways to design this alternative. In one design, the Federal agencies would not conduct operational CDM, but all permitting including giving other agencies (WDNR) permission to work on Federal lands would be considered a form of technical assistance and would be allowed. Impacts of this alternative would have been similar to Alternative 1 and would have provided little new information. In the second design, the Federal agencies would not conduct operational CDM and would not permit any CDM on Federal lands. The agencies selected this design for the EA because it allowed consideration of the impacts of an intermediate level of CDM not analyzed in any of the other alternatives and also allowed the agencies to consider the impacts of having CDM conducted at some but not all sites that were under consideration in Alternative 1. Analysis of the second design of this alternative also gave the

agencies the opportunity to address concerns of individuals opposed to CDM on the NWRs.

Under this alternative, the Federal agencies would not be able to conduct operational CDM in Wisconsin, and would only provide technical assistance. WS would be able to assist with site evaluations and completion of WS Form 37 documents required by the USFWS for MBPs. Issuing permits is a type of technical assistance, so the USFWS would still be able to issue MBPs and grant approval for PRDO projects anticipated to take more than 10% of local DCCO population. However, operational CDM would not be conducted on Federal lands (e.g., the NWRs). Cormorant conflict management for the protection of public resources on nonfederal lands could only be conducted by WDNR or the tribes and would be the same as described for Alternative 1. WS would not be involved in operational CDM.

3.1.4 Alternative 4. No Federal CDM

Under this alternative, the Federal agencies would not participate in CDM. WS would not conduct the consultations or complete the forms required by the USFWS to issue MBPs and the USFWS would not issue MBPs. Non-lethal CDM techniques could still be used without a permit. Information on CDM methods would still be available through other sources such as USDA Agricultural Extension Service offices, USFWS, WDNR, universities, or pest control organizations.

As with Alternative 2, the USFWS would not grant approval for actions conducted under the PRDO that propose the take of more than 10% of the local DCCO population. Decisions made by the USFWS in this EA cannot affect this type of CDM action on non-Federal land. The WDNR and tribes could still act as action agencies under the PRDO and could use lethal methods to take up to 10% of local DCCO colonies in combination with nonlethal methods to try and meet management objectives (Section 1.5.7) on non-Federal lands. Selection of this alternative would not result in much change in the proposal to use egg oiling to achieve desired reductions in nesting DCCOs on Cat, Hat and Jack Islands. The WDNR could also use egg and nest destruction and lethal take of up to 10% of the local colony to discourage DCCO colonization of new sites in the Green Bay that are not federal lands and when assisting the City of Oshkosh with management of DCCO impacts on Miller's Bay Island. No CDM would be conducted at the NWRs because Federal agency (USFWS) approval would be needed for any activities at that location.

3.1.5 Alternative 5. - Integrated CDM Program, Excluding Implementation of the PRDO

The agencies are aware that there is ongoing litigation regarding the USFWS EIS on management of DCCOs (USFWS 2003).[7] This alternative evaluates the impacts of implementing an integrated CDM program in the absence of the PRDO. Agency actions under this alternative would be identical to Alternative 1, with the exception that WS, WDNR, and the Tribe(s) would not conduct CDM under the PRDO. All CDM would be conducted under MBPs. As currently implemented by the action agencies, MBPs could be requested and issued for the reduction of DCCO impacts on sensitive species or their habitats (e.g., vegetation), but, with the exception of research projects, would generally not be requested or issued for birds taking free-swimming fish from public waters. The only projects proposed under the PRDO which include protection of fishery resources are the projects proposed for the Door County Area and the Kewaunee River. WDNR management objectives in the Door County Area have also been established to prevent the establishment of new DCCO colonies at sites with vegetation used by other colonial waterbirds.

3.2 CDM STRATEGIES AND METHODOLOGIES

3.2.1 Integrated Wildlife Damage Management (IWDM)

The most effective approach to resolving wildlife damage is to integrate the use of several methods simultaneously or sequentially. The philosophy behind IWDM is to implement the best combination of effective management methods in a cost-effective[8] manner while minimizing the potentially harmful effects on DCCO populations, humans, nontarget species, and the environment. IWDM may incorporate cultural practices (e.g., fish husbandry), habitat modification (e.g., exclusion, vegetation management), animal behavior modification (e.g., scaring, roost dispersal), and removal of individual offending animals (e.g., shooting, live capture and relocation), local population reduction (e.g., shooting, nest and egg destruction), or any combination of these.

The IWDM approach proposed by the lead and cooperating agencies involves the use of four general strategies for addressing DCCO damage:

> **Technical Assistance Recommendations** "Technical assistance" as used herein is information, demonstrations, and advice on available and appropriate wildlife damage management methods. The implementation of damage management actions is the responsibility of the requester. In

[7] A court decision has been subsequently issued in favor of the USFWS (05-2603-cv). We have retained this alternative because it provides valuable information on an intermediate level of CDM between that proposed in Alternative 1 and that proposed in Alternative 4 (No Federal CDM).

[8] The cost of management may sometimes be secondary because of overriding environmental, legal, human health and safety, animal welfare, or other concerns.

some cases, WS provides supplies or materials that are of limited availability for non-WS entities to use. Technical assistance may be provided through a personal or telephone consultation, or during an on-site visit with the requester. Generally, several management strategies are described to the requester for short and long-term solutions to damage problems; these strategies are based on the level of risk, need, and the practicality of their application.

Under APHIS NEPA implementing regulations and specific guidance for the WS program, WS technical assistance is categorically excluded from the need to prepare an EA or EIS. However, it is discussed in this EA because it is an important component of the IWDM approach to resolving DCCO damage problems.

Direct Damage Management Assistance This is the implementation or supervision of CDM activities. Direct damage management assistance may be initiated when the problem cannot effectively be resolved through technical assistance alone. When conducted by WS direct damage management assistance is not conducted until *Agreements for Control* or other comparable documents are completed which detail the type of CDM assistance to be provided and the methods to be used. The initial investigation defines the nature, history, extent of the problem, species responsible for the damage, and methods that would be available to resolve the problem. Professional skills of trained damage management personnel are often required to effectively resolve problems, especially if restricted use chemicals are necessary, or if the problems are complex.

Educational Efforts Education is an important element of CDM because wildlife damage management is about finding balance and coexistence between the needs of people and needs of wildlife. This is extremely challenging as nature has no balance, but rather, is in continual flux. In addition to the routine dissemination of recommendations and information to individuals or organizations with DCCO damage, lectures, courses, and demonstrations are provided to aquaculture producers, homeowners, state and county agents, colleges and universities, and other interested groups. The lead and cooperating agencies frequently work together in education and public information efforts. Additionally, technical papers are presented at professional meetings and conferences so that wildlife professionals, and the public are updated on recent developments in damage management technology, programs, laws and regulations, and agency policies.

Research and Development The lead and cooperating agencies are all involved in research efforts relating to DCCO biology, the impact of DCCOs on fisheries, wildlife and other natural resources, and CDM techniques. The lead and cooperating agencies also cooperate and

exchange information with universities and other agencies and entities conducting DCCO research. Research findings are used to clarify the need for action, refine management objectives and improve the methods used to address DCCO damage. The Wisconsin Cormorant Coordination Group will serve a critical role in the exchange and dissemination of findings from current research and the incorporation of that research in management decisions. Decisions on future PRDO CDM projects will be made only after the working group examines the results of current DCCO research and damage management activities.

3.2.2 Decision Making

WS personnel use a thought process for evaluating and responding to damage complaints that is depicted by the WS Decision Model described by Slate et al. (1992) (Figure 3-1). The Decision Model is not a written documented process, but a mental problem-solving process similar to that used by all wildlife management professionals including those in the lead and cooperating agencies when addressing a wildlife damage problem. WS personnel assess the problem; and evaluate the appropriateness and availability (legal and administrative) of damage management strategies and methods based on biological, economic and social considerations. Following this evaluation, methods deemed to be practical for the situation are incorporated into a management strategy. After this strategy has been implemented, monitoring is conducted and evaluation continues to assess the effectiveness of the strategy. If the strategy is effective, the need for further management is ended. In terms of the WS Decision Model (Slate et al. 1992), most damage management efforts consist of continuous feedback between receiving the request and monitoring the results of the damage management strategy.

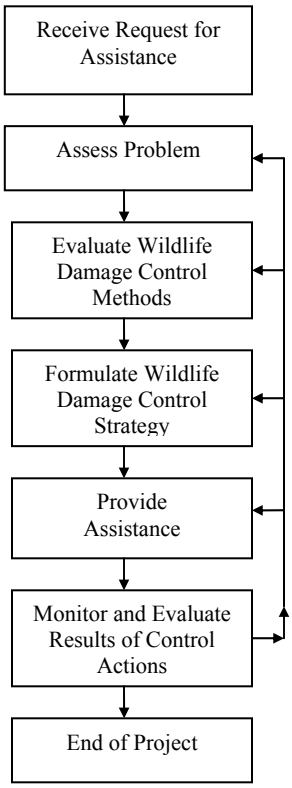

Figure 3-1. WS decision Model

3.2.3 Cormorant Damage Management Methods Available for Use (*see* Appendix 4 of USFWS FEIS (USFWS 2003) for detailed description of methods)

3.2.3.1 Non-lethal Methods

Agricultural producer and property owner practices consist primarily of non-lethal preventative methods such as **cultural methods**[9] and **habitat modification**. Examples of habitat modification include the removal of nesting trees or nesting materials.

Animal behavior modification refers to tactics that alter the behavior of birds or disperse birds to reduce damages. Some, but not all, of these tactics include the following:

- Exclusion methods such as netting and overhead wires,
- Propane exploders (to scare birds),
- Pyrotechnics (to scare birds),
- Distress calls and sound producing devices (to scare birds),
- Visual repellents and scaring tactics (to scare birds),
- Lasers (to scare birds), and
- Scarecrows.

Dispersal of DCCOs from day/night roosts or from breeding/nesting sites utilizing propane exploders, pyrotechnics, distress calls/sound producing devices, visual repellants or scarecrows may help to limit or reduce DCCO activity in the area where damage is occurring.

Lasers are a non-lethal technique recently evaluated by NWRC (Blackwell et al. 2002, Glahn et al. 2000*a*). The low-powered laser has proven to be effective in dispersing a variety of bird species in a number of different environments. The low-powered laser is most effective before dawn or after dusk when the red beam of the laser is clearly visible. Bright sunlight will "wash out" the laser light rendering it ineffective. Although researchers are not sure if birds see the same red spot as people, it is clear that certain bird species elicit an avoidance response in reaction to the laser. The birds appear to view the light as a physical object or predator coming toward them and generally fly away to escape. Research, however, has shown that the effectiveness of low-powered lasers varies depending on the bird species and the context of the application. Lasers have been used to startle DCCOs under low-light conditions (Wires et al 2001, Hatch and Weseloh 1999, and McKay et al. 1999).

Nest destruction of the target species before eggs or young are in the nest.

[9]Generally involves modifications to the management of protected resources to reduce their vulnerability to wildlife

3.2.3.2 Lethal Methods

Egg addling/destruction is the practice of destroying the embryo in the egg prior to hatching; physically breaking eggs; or directly removing eggs from a nest and destroying them.

Egg oiling is a method for suppressing reproduction of birds by spraying a small quantity of food grade vegetable/corn oil on eggs in nests.

Live traps/nets are various types of traps designed to capture birds alive. Cormorants captured in traps, nets, or by hand would be humanely euthanized.

Shooting is effective as a dispersal technique and a way to reduce bird numbers. Shooting with rifles or shotguns is sometimes used to manage DCCO damage problems when lethal methods are determined to be appropriate. At many locations, the use of a .22 caliber rifle equipped with a noise suppressor is the only practical method of removing DCCOs without spooking them or having a negative effect on other birds that are protected under Federal law. CDM programs in other parts of the U.S. and Canada have been experimenting with other types of firearms and ammunition as alternatives for minimizing impacts on nontarget species near DCCOs. As data become available, new shooting strategies will be incorporated as practical and appropriate (e.g., legal for use in Wisconsin). The birds are killed as quickly and humanely as possible. Shooting can be helpful in some situations to supplement and reinforce other dispersal techniques. It almost never results in the direct mortality of nontarget species and may be used in conjunction with the use of spotlights and decoys.

Cervical dislocation is an American Veterinary Medical Association (AVMA) approved euthanasia method (Beaver et al. 2001) which is sometimes used to euthanize birds which are captured by hand or in live traps/nets. The bird is stretched and the neck is hyper-extended and dorsally twisted to separate the first cervical vertebrae from the skull. The AVMA approves this technique as a humane method of euthanasia and states that cervical dislocation when properly executed is a humane technique for euthanasia of poultry and other small birds (Beaver et al. 2001). Cervical dislocation is a technique that may induce rapid unconsciousness, does not chemically contaminate tissue, and can be quickly accomplished (Beaver et al. 2001).

Carbon dioxide (CO_2) gas is an AVMA approved euthanasia method (Beaver et al. 2001) which is sometimes used to euthanize birds which are captured in live traps/nets or by hand. Live birds are placed in a container or chamber into which CO_2 gas is released. The birds quickly expire after inhaling the gas. CO_2 gas is a byproduct of animal respiration, is common in the atmosphere, and is required by plants for photosynthesis. It is used to carbonate beverages for human consumption and is also the gas released by dry ice. The use of CO_2 by WS for

euthanasia purposes is exceedingly minor and inconsequential to the amounts used for other purposes by society.

3.3 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL WITH RATIONALE

3.3.1 Lethal CDM Only

Agency(ies) selecting this alternative would not use non-lethal techniques for CDM. This alternative was eliminated from further analysis because some DCCO damage problems can be resolved effectively through non-lethal means and at times lethal methods may not be available for use due to safety concerns or local ordinances prohibiting the use of some lethal methods, such as the discharge of firearms.

3.3.2 Compensation for DCCO Damage Losses

The compensation alternative would require the establishment of a system to reimburse persons impacted by DCCO damage. This alternative was eliminated from further analysis because no Federal or State laws currently exist to authorize such action. Under such an alternative, WS would not provide any direct control or technical assistance. Aside from lack of legal authority, analysis of this alternative in the WS FEIS indicated that the concept has many drawbacks (USDA 1997, Revised):

- It would require larger expenditures of money and labor to investigate and validate all damage claims, and to determine and administer appropriate compensation. A compensation program would likely cost several times as much as the current program.
- Compensation would most likely be below full market value. It is difficult to make timely responses to all requests to assess and confirm damage, and certain types of damage could not be conclusively verified.
- Compensation would give little incentive to resource owners to limit damage through improved cultural, husbandry, or other practices and management strategies.
- Not all resource owners would rely completely on a compensation program and lethal control would most likely continue as permitted by Federal and State law.
- Compensation would not be practical for reducing threats to human health and safety or damage to public resources.

3.3.3 Increase DCCO Population Reduction and/or Eliminate DCCOs

As indicated in Section 1.5.1, DCCOs are a native species in Wisconsin and are an important and integral part of the Wisconsin ecosystem. Individuals

expressing a desire to eradicate or radically control DCCOs cite vegetation loss and consumption of sport or commercially valuable fish as the need for action. While the agencies agree that DCCOs can cause adverse impacts on public resources, it should also be noted that DCCOs also consume undesirable non-native fish such as round goby. In moderation, the habitat changes that occur as a consequence of the establishment of large DCCO colonies are part of a natural process which creates nesting opportunities for other bird species. While the agencies recognize that there are some individuals who's aesthetic enjoyment of a site is diminished by the loss of vegetation, and individuals who are concerned about DCCO impacts on fishing opportunities, they also recognize that there are many people who enjoy viewing large flocks of DCCOs and for whom the knowledge and sight of a healthy DCCO population in Wisconsin has aesthetic value. The importance of DCCOs to Wisconsin citizens was demonstrated when the struggling DCCO population was placed on the state list of threatened and endangered species in 1972, and public resources were committed to the recovery of the DCCO population.

It is the responsibility of the WDNR, USFWS, WS and the tribes to maintain healthy and viable native wildlife populations while also working with cooperating agencies, the landowners and resource managers to address conflicts with native wildlife species that may occasionally occur. The management objectives in Section 1.5.7 were established to obtain a balance between the desire for a healthy DCCO population and the need to manage adverse impacts of DCCOs on vegetation and co-nesting species and fishery resources.

3.3.4 Non-lethal Methods Implemented Before Lethal Methods

This alternative is similar to Alternative 1 except that WS personnel would be required to always recommend or use non-lethal methods prior to recommending or using lethal methods to reduce DCCO damage. Both technical assistance and direct damage management would be provided in the context of a modified IWDM approach. The Proposed Action recognizes non-lethal methods as an important dimension of IWDM, gives them first consideration in the formulation of each management strategy, and recommends or uses them when practical before recommending or using lethal methods. However, the important distinction between the Non-lethal Methods First Alternative and the Proposed Alternative is that the former alternative would require that all non-lethal methods be used before any lethal methods are recommended or used.

While the humaneness of the non-lethal management methods under this alternative would be comparable to the Proposed Program Alternative, the extra harassment caused by the required use of methods that may be ineffective could be considered less humane and may unduly disturb co-nesting species. As local bird populations increase, the number of areas negatively affected by birds would likely increase and greater numbers of birds would be expected to congregate at sites where non-lethal management efforts were not effective. This may

ultimately result in a greater number of birds being killed to reduce damage than if lethal management were immediately implemented at problem locations (Manuwal 1989). Once lethal measures were implemented, DCCO damage would be expected to drop relative to the reduction in localized populations of birds causing damage.

Since in many situations this alternative would result in greater numbers of DCCOs being killed to reduce damage, at a greater cost to the requester, and result in a delay of reducing damage in comparison to the Proposed Alternative, the Non-lethal Methods Implemented Before Lethal Methods Alternative is removed from further discussion in this document.

3.4 STANDARD OPERATING PROCEDURES FOR CDM IN WISCONSIN

Mitigation measures are any features of an action that serve to prevent, reduce, or compensate for effects that otherwise might result from that action. The current WS program, nationwide and in Wisconsin, uses many such mitigation measures and these are discussed in detail in Chapter 5 of the ADC FEIS (USDA 1997, Revised) and Chapter 4 of the DCCO FEIS (USFWS 2003).

3.4.1 Standard Operating Procedures - General

Some key measures pertinent to the proposed action and the other alternatives that will be incorporated into Standard Operating Procedures, depending upon the alternative selected, include:

- A Decision Model thought process like the WS Decision model (USDA 1997, Revised) will be used to identify effective wildlife damage management strategies and their effects (Section 3.2.2).
- Reasonable and prudent measures or alternatives are identified through consultation with the USFWS and are implemented to avoid effects to T&E species.
- Research is being conducted to improve CDM methods and strategies so as to increase selectivity for target species, to develop effective non-lethal control methods, and to evaluate nontarget hazards and environmental effects.
- When used in accordance with WS procedures and policies, the risk of adverse impacts on public safety and hazard to the environment from the proposed CDM methods have been determined to be low according to a formal risk assessment (USDA 1997 Revised, Appendix P). Where such activities are conducted on private lands or other lands of restricted public access, the risk of hazards to the public is even further reduced.
- Agents acting under the authority of the lead and cooperating agencies (50 CFR 21.48(c)(2)) will be informed and trained in the safe and proper use of CDM methods including applicable laws and regulations authorizing

use of these methods.

3.4.2 Additional Mitigation Specific to the Issues

The following is a summary of additional mitigation measures that are specific to the issues listed in Chapter 2 of this document.

Effects on Target Species Populations

- CDM activities are directed to resolving DCCO damage problems by taking action against individual problem birds, or local populations or groups, not by attempting to eradicate populations in the entire area or region.
- DCCO take is monitored by comparing numbers of birds killed with overall populations or trends in populations to assure the magnitude of take is maintained below the level that would threaten the long-term sustainability of regional DCCO populations (See Chapter 4).
- To avoid adverse impacts on DCCO populations, the lead and cooperating agencies will abide by the terms and conditions of the PRDO (50 CFR 21.48) and USFWS migratory bird permits issued for the management and control of DCCO damage and conflicts, including, but not limited to, reporting on an annual basis the number of nests in which eggs were oiled or destroyed and the number of DCCOs killed.
- In certain circumstances when conducting control activities in DCCO breeding colonies, WS is required to notify the USFWS prior to conducting control activities with the approximate number of DCCOs that may be killed under the proposed project (50 CFR 21.48(d)(9)). The USFWS will review this advanced notification to determine if the proposed project would threaten the long-term sustainability of regional DCCO populations.
- When shooting nesting DCCOs, WS will attempt to remove both breeding adults from a specific nest to prevent the possibility of renesting.
- If determined practical and effective, egg oiling and shooting of DCCOs will target different nests or areas of a colony to maximize effectiveness and minimize the potential of renesting.

Effects on Nontarget Species Populations Including T&E Species

- WS personnel are trained and experienced in selecting the most appropriate method for taking problem animals and excluding nontargets.
- Observations of birds in areas that are associated with DCCO concentrations are made to determine if nontarget or T&E species (Federal, Tribal, or State Listed) would be at risk from CDM activities.
- As appropriate, management actions taken in mixed-species waterbird colonies would be conducted in such a manner to avoid or minimize impacts to non-target species (i.e. visiting sites during early morning and

late afternoon hours to avoid thermal stress to eggs/nestlings, conducting actions as early as possible in the nesting season to reduce nestling abandonment, limiting the number of visits, etc.).

- Egg oiling will only be used for ground and shrub nesting DCCOs to minimize disturbances to co-nesting colonial waterbird species.
- Where appropriate, egg oiling activities will take place during night hours to minimize potential impacts to co-nesting colonial waterbird species. Night egg oiling will not be used in areas with Common Terns because terns will not return to their nest until morning if disturbed during the night. Also, WS will not conduct such activities during night hours if it is determined unsafe to do so.
- When possible, when shooting DCCOs from blinds set up in breeding colonies, moving to and from the blinds and blind preparation will be conducted during periods of darkness to minimize impacts to co-nesting colonial waterbird species. However, WS will not conduct such activities during night hours if species sensitive to night disturbance (Common Terns) are present or it is determined unsafe to do so.
- When shooting DCCOs in breeding colonies, WS will utilize the smallest caliber firearm that is effective and will utilize noise-suppressed firearms (silencers) as deemed appropriate to minimize repeated disturbances to co-nesting colonial waterbird species.
- The removal of DCCO carcasses will be completed at such intervals and times of day that will cause the least amount of disturbances to co-nesting colonial waterbird species.
- WS has consulted with the USFWS regarding potential effects of control methods on T&E species, and abides by reasonable and prudent alternatives and/or reasonable and prudent measures established as a result of that consultation (see Section 4.1.2).
- WS will abide by the conservation measures specified in the USFWS FEIS (USFWS 2003) and at 50 CFR 21.48(d)(8) to avoid adverse effects on listed species.
- Prior to any control action, WS will consult with the WDNR to ensure that no actions taken under this plan will adversely affect state-listed threatened and endangered species.
- Non-toxic shot will be used when using shotguns to harass or kill DCCOs.
- As applicable, WS will review the USFWS Final Report (Wires and Cuthbert 2001) – "Prioritization of waterbird colony sites for conservation in the U.S. Great Lakes region" prior to conducting control activities at DCCO breeding colonies. If WS conducts control activities at any of the sites identified in this report as "priority sites for waterbird conservation" (i.e., Cat, Hat, and Jack Islands), WS will consult with the USFWS at that time for advice on how to proceed with management actions.
- To avoid adverse impacts on nontarget species, WS will abide by the terms and conditions of the PRDO (50 CFR 21.48) and USFWS migratory bird permits issued to WS for the management and control of DCCO damage and conflicts.

- As specified in the PRDO (50 CFR 21.48(d)(10), on an annual basis, WS is required to provide the USFWS with a statement of efforts being made to minimize incidental take of nontarget species and also to report the number and species of migratory bird involved in such take, if any. The USFWS will review this information to ensure control activities taken under the PRDO will not adversely impact nontarget migratory bird species.
- In certain circumstances when conducting control activities in DCCO breeding colonies, WS is required to notify the USFWS prior to conducting control activities which species of other (non-target) bird species are present (50 CFR 21.48(d)(9)). The USFWS will review this advanced notification to determine if the proposed project may threaten the long-term sustainability of nontarget migratory bird species.
- Before going into a new site to conduct work to prevent colonization by nesting DCCOs, the agencies will consult with the USFWS and WDNR regarding the occurrence of state and federally-listed plant species. When possible, areas supporting these species will be avoided. Agency staff will be trained in the identification of these species and will be made aware of the occurrence of these species at the site in order to avoid negative impacts.

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

4.0 INTRODUCTION

Chapter 4 provides information needed for making informed decisions when selecting among the alternatives for meeting the purpose and need of the proposed action. This chapter analyzes the environmental consequences of each alternative in relation to the issues identified for detailed analysis in Chapter 2. Each alternative is analyzed in comparison with the no action alternative (Alternative 1) to determine if the real or potential effects would be greater, lesser, or the same. Although each agency has the authority to make its own decision regarding the alternative to be selected, impacts are analyzed for each alternative as if all of the lead and cooperating agencies had selected the same alternative. This allows for analysis of the full range of potential impacts from the proposed alternatives while maintaining clarity and avoiding undue repetition. Impacts of the lead and cooperating agencies selecting differing alternatives will be intermediate to those presented in this chapter.

The following resource values within the State are not expected to be significantly impacted by any of the alternatives analyzed: soils, geology, minerals, flood plains, wetlands, visual resources, air quality, prime and unique farmlands, timber, and range. These resources will not be analyzed further.

Cumulative Effects: Cumulative effects are discussed in relationship to each of the alternatives analyzed, with emphasis on potential cumulative effects from methods employed, and including summary analyses of potential cumulative impacts to target and nontarget species, including T&E species.

Irreversible and Irretrievable Commitments of Resources: Other than minor uses of fuels for motor vehicles and other materials, there are no irreversible or irretrievable commitments of resources.

Effects on sites or resources protected under the National Historic Preservation Act: The actions of the lead and cooperating agencies are not undertakings that could adversely affect historic resources (See Section 1.7.2). The lighthouse at Pilot Island is on the federal state and federal register of Historic Places. The lighthouse was built in 1958 to mark the Port des Morts Passage. Fog signal buildings were built in 1862 and 1880. Only the lighthouse and one of the fog signal buildings remain. The lighthouse was automated in 1962 and is still functioning. Advocates for the lighthouse have expressed concern regarding the amount of fecal matter and the loss of woody vegetation on the island associated with the high number of nesting DCCOs (3,621 pairs in 2007).

4.1 ENVIRONMENTAL CONSEQUENCES FOR ISSUES ANALYZED IN DETAIL

4.1.1 Effects on DCCO Populations

The analysis for magnitude of impact generally follows the process described in Chapter 4 of USDA (1997, Revised). Magnitude is described in USDA (1997, Revised) as *". . . a measure of the number of animals killed in relation to their abundance."* Magnitude may be determined either quantitatively or qualitatively. Quantitative determinations are based on population estimates, allowable harvest levels, and actual harvest data. Qualitative determinations are based on population trends and harvest data when available. Standard Operating Procedures to avoid adverse impacts on DCCO populations are described in Chapter 3.

Alternative 1 – Integrated CDM Program, Including Implementation of the PRDO (Proposed Action/No Action Alternative)

DCCOs range throughout North America, from the Atlantic coast to the Pacific coast (USFWS 2003). By 1997, the DCCO population had expanded to an estimated 372,000 nesting pairs; with the U.S. population (breeding and non-breeding birds) conservatively estimated to be greater than 1 million birds (Tyson et al. 1999). In the EIS on DCCO management, the USFWS estimated the current continental population at approximately 2 million birds (USFWS 2003). Tyson et al. (1999) found that the DCCO population increased approximately 2.6% annually during the early 1990s. The greatest increase was in the Interior region with a 22% annual increase in the number of DCCOs in Ontario and the U.S. States bordering the Great Lakes (Tyson et al. 1999). The Wisconsin population of DCCOs is primarily composed of birds from the Interior population (USFWS 2003, Tyson et al. 1999). The number of breeding pairs of DCCOs in the Atlantic and Interior population in 1997 was estimated at over 85,510 and 256,212 nesting pairs, respectively (Tyson et al. 1999). From 1990 to 1997, the annual growth rate in the Interior population was estimated at 6% with the most dramatic increases occurring on Ontario, Michigan, and Wisconsin waters (Tyson et al. 1999, USFWS 2003).

A number of DCCO population surveys have been conducted in the Great Lakes in recent years. The Great Lakes Decadal Colonial Waterbird Survey conducted in 1997 indicated there were an estimated 88,902 nesting DCCO pairs in the Great Lakes. By 2000, this number had increased to approximately 115,000 pairs and in 2005 there were an estimated 118,860 nesting DCCO pairs in the Great Lakes (Wires et al. 2001; Weseloh et al. 2006; Weseloh 2008, unpub. data). Data from the 2007 Great Lakes Decadal Colonial Waterbird Survey indicate that the number of nesting DCCOs in the Great Lakes had decreased slightly to 115,026 nesting pairs. However, this decrease was not observed for DCCOs nesting at sites in Lake Michigan. The number of DCCO nesting pairs at sites in Lake

Michigan was 28,158 pairs in 1997, 34,673 pairs in 2005, and 38,446 pairs in 2007. It should be noted that the Great Lakes Colonial Waterbird survey only counts birds on the Great Lakes and within 1 km of the shoreline, and the survey does not include birds at inland colonies such as those at Lake Winnebago or other inland Wisconsin sites.

Seamans et al. (2008) used bird band recovery models to estimate temporal trends in hatch year (HY), second year (SY) and after second year (ASY) survival of Double-crested Cormorants banded in the Great Lakes from 1979-2006. This time period included the period of rapid DCCO population increase in the Great Lakes, the USFWS issuance of the 1998 Aquaculture Depredation Order and the 2003 PRDO and changes in the Aquaculture Depredation Order. Survival in hatch-year birds decreased throughout the study period and was negatively correlated with abundance estimates for DCCOs in the Great Lakes area. This decline may have been related to density-dependent factors. However, there was also evidence that the depredation orders were contributing to the decreasing survival in hatch-year birds. There was no clear evidence of impact of the depredation orders on second-year or after-second-year DCCOs even though lethal removal of DCCOs in the Great Lakes increased more than 6-fold after the implementation of the depredation order. After-hatch-year survival did decrease from 2004-2006 but was still within the range of previous years. Additional time may be required before the models detect any changes in mortality rates resulting from the 2003 depredation orders. This may be especially true given that it wasn't until the 2007 Great Lakes Colonial Waterbird Survey, after the completion of Seamans et al.'s (2008) study, that the first reduction (3.2%) in the Great Lakes area DCCO population was recorded since the initiation of their study (Weseloh et al., 2008 unpub. data).

Most DCCOs are found in Wisconsin during the spring, summer and fall months when the breeding and migrating populations are present (Wires et al. 2001, USFWS 2003). In 1997, the number of breeding DCCOs in Wisconsin was estimated at 10,546 pairs (Matteson et al. 1999). In 2005, 14,462 nesting pairs distributed among 16 colonies were counted in a complete survey of the DCCO population in Wisconsin (Fig. 1-1). This population estimate does not include sub-adults and nonbreeding birds. Estimates of 0.6 to 4.0 subadult DCCOs per breeding pair have been used for several populations (Tyson et al. 1999). Therefore, the resident DCCO population in Wisconsin can conservatively be estimated at more than 37,600 birds. During migration, there are additional DCCOs moving through the State. In addition to state-wide DCCO surveys and Great Lakes Colonial Waterbird Surveys, additional information is available on the number of nesting DCCOs in the Green Bay Area (Fig. 1-3). In 2007 there were a total of 14,970 pairs nesting on Cat, Hat, Jack, Pilot and Spider Islands.

Estimated DCCO Take – Scientific Collecting Permits

During 2004-2007, 436, 547, 457, and 3 DCCOs respectively were taken by WS under scientific collecting permits primarily for the study of the

impacts of the Cat Island DCCO colony on yellow perch (Meadows 2007). The remainder were taken to determine the cause of illness and death of DCCOs. Because of differences in prey availability, diet studies for opportunistic foragers like DCCOs can rarely be extrapolated to other sites. Although WS, the WDNR and the NWRC are investigating alternative means of evaluating diet studies in DCCOs (e.g., fatty acid analysis), future diet studies may require lethal DCCO take similar to the study on the Cat Island DCCO colony. Take for DCCO research is not anticipated to occur every year, nor is it anticipated to exceed 600 DCCOs per year in the years when it does occur. DCCOs taken for CDM will be used whenever possible to reduce the need for additional mortality under scientific collecting permits (Table 4-1).

Estimated DCCO Take – Damage to Property, Heath and Safety Risks

To date, MBPs for CDM in Wisconsin have primarily involved the reduction of damage to fish at private and public (state, Federal) aquaculture facilities. In the last two years there have been increasing inquiries regarding the use of lethal take to reinforce harassment to address DCCO damage to vegetation on private property. Wisconsin is unique in that several of the sites where DCCOs have been or are starting to nest are on private property. Damage management actions conducted at these sites would only be classified as the protection of public resources if a state or Federal wildlife management agency has identified the species on the site as being a public resource needing special protection, or if the management of DCCOs on private property is warranted for the protection of public resources in another location (e.g., fishery resources). All other instances of DCCO damage to private property would be addressed under MBPs.

Total annual take of DCCOs under MBPs for the period of 2004-2007 has ranged from, 18 to 38 birds per year. Based on current inquiries regarding cormorant damage management, the lead and cooperating agencies anticipate increases in requests for MBPs to address DCCO damage to fish stocks in private lakes and DCCO damage to vegetation on private property. Total annual take under MBPs is not anticipated to exceed 1,000 birds per year.

Estimated DCCO Take – Management of Damage to Public Resources (PRDO)

As currently proposed in Section 1.5.7, the management objectives for the protection of public resources in Wisconsin for 2008 emphasize under this alternative egg oiling with relatively limited use of lethal removal. As noted in Section 1.5.7, this represents current management needs.

However, the presence and size of DCCO colonies in Wisconsin can and has changed over time.

Future actions to reduce DCCO damage to public resources may be conducted at sites instead of or addition to those listed in Section 1.5.7. In addition to new sites, lethal removal of adults could conceivably be used in the Lower Green Bay and Door County Areas if egg oiling proves inadequate to achieve management objectives. As noted in Section 1.5.6, action agencies will consult with the Wisconsin DCCO Coordination Group prior to initiating new CDM projects under the PRDO, and will comply with USFWS notification and review requirements for implementation of the PRDO. This EA anticipates potential expansion in CDM activities and the use of lethal methods by analyzing the impacts of estimated future CDM activities. Additionally, each year WS will review impacts of CDM activities in context of the impacts anticipated and analyzed in this EA to determine if CDM actions and impacts in Wisconsin remain within the parameters analyzed in the EA.

The majority of change in lethal take of DCCOs under the PRDO would likely occur if lethal methods are added to the techniques used to achieve management objectives in the Lower Green Bay and Door County Areas. In 2007, the DCCO breeding population in the Lower Green Bay and Door County Areas was 14,970 pairs, or 8,970 pairs (17,940 birds) over the management objective of 6,000 pairs. It would be unacceptable to the lead and cooperating agencies to attempt to use lethal methods to remove this number of individuals in order to meet management objectives at all locations within the Green Bay Area. If it is determined that lethal removal of DCCOs is warranted at these sites it would be implemented using an adaptive management approach which would initially only involve removal of a fraction of the population in excess of the management objectives. For purpose of this alternative and analysis, the maximum number of birds that could be taken per year under this alternative has been set at approximately 1/4 the current number of DCCOs in excess of management objectives for the Lower Green Bay and Door County Areas or approximately 4,000 DCCOs. Based on current requests for CDM at inland sites in Wisconsin and anticipated requests for future assistance, take for the protection of public resources at inland sites in Wisconsin is not anticipated to exceed 1,000 birds per year for a total maximum annual state-wide DCCO take under the PRDO of 5,000 birds (Table 4-1).

Table 4-1. Number of DCCOs that could be lethally removed under each Alternative

Authorization for Take	Alternative #1	Alternative #2	Alternative #3	Alternative #4	Alternative #5
PRDO	5,000	2,400	4,600	2,400	
MBPs					
Scientific collecting permits	600		600		600
Depredation Permits	1,000		500		1,000
Depredation permits for protection of Public Resources					4,500
TOTAL	**6,600**	**2,400**	**5,700**	**2,400**	**6,100**

Nationwide, the FEIS predicted that the implementation of the Aquaculture Depredation Order (AQDO, 50 CFR 21.47), PRDO, and issuance of migratory bird permits would affect approximately 8% of the continental DCCO population on an annual basis (USFWS 2003). Assuming an equitable distribution of take among the 24 states in which the PRDO applies, this is an average of about 6,650 birds per State. This would be about 18% of the estimated 2005 summer Wisconsin DCCO population of 37,600 birds and a smaller but unknown percentage of all DCCOs (residents and migrants) occurring in the State. The FEIS concluded that the proposed level of take would be sustainable at the state, regional and national level (USFWS 2003).

This alternative does propose the extensive use of egg oiling to achieve desired reductions in the number of nesting DCCOs at Cat Island and the Door County Area. From 2006-2007 egg oiling was used to help stabilize the number of nesting DCCOs at Cat, Hat and Jack Islands. These efforts were intended to slow increases in the number of nesting DCCOs at these sites and not necessarily reduce local DCCO numbers. More extensive use of egg oiling may be made at these sites to achieve proposed reductions in the number of nesting DCCOs. The EIS stated that since DCCOs are relatively long-lived birds, egg oiling would have to be conducted repeatedly over a period of years before any impact on adult populations would be evident. The EIS also determined that without extensive regional coordination of efforts the overall impact of egg oiling on the continental and regional DCCO populations would likely be minimal. On a local level, oiling a high proportion of nests in a colony can reduce the number of DCCOs in a colony over time (USDA 2003, Stromberg et al. 2008). Collectively, if management objectives are achieved for the Lower Green Bay and Door County Areas, the individual CDM egg oiling projects may result in a reduction in the state DCCO population. WS, the USFWS and the WDNR will monitor the cumulative impacts of CDM on DCCO populations in the state.

Using the estimated take numbers from above (Table 4-1), in Wisconsin, cumulative annual take of DCCOs by all sources available under Alternative 1 would not exceed 6,600 birds or approximately 18% of the 2005 summer population of 37,600 birds (Table 4-1). This is similar to the 6,640 birds per state analyzed in the FEIS on cormorant management (USFWS 2003). Actions proposed for the Lower Green Bay and Door County Areas are anticipated to reduce but not eliminate the local breeding DCCO populations in these areas. If local management objectives are met for the Lower Green Bay and Door County Areas, there would still be a total of 6,000 breeding pairs in just this region of the state. This is twice the number of pairs that was established as the recovery level for removing DCCOs from the state list of threatened and endangered species. In addition to this overall management objective, minimum population thresholds of 500 breeding pairs have been established for any of the existing Door Colony colonies where CDM is conducted to ensure that efforts to reduce the Door County Area population to 5,000 pairs do not result in the eradication of DCCOs from any of these islands. Given that the number of nesting DCCO pairs in the Lower Green Bay/Door County Area was able to increase from 6,000 nesting pairs in the early 1990s, to 14,970 pairs in 2007 (Fig. 1-3), reducing the number of DCCOs in the Lower Green Bay/Door County Area is not anticipated to jeopardize the long-term sustainability of the Wisconsin DCCO population.

DCCOs are protected by the USFWS under the MBTA. Therefore, nationwide, DCCOs are taken in accordance with applicable Federal laws and regulations authorizing take of migratory birds and their eggs or young, including the AQDO (not applicable in Wisconsin), PRDO, and the USFWS permitting processes. The USFWS, as the agency with migratory bird management responsibility, will impose restrictions on DCCO management at the State, Regional, National, and International levels as needed to assure cumulative take does not adversely affect the long-term sustainability of populations. WS, WDNR, and the Tribes will report and coordinate their CDM activities and the USFWS will ensure that cumulative take does not exceed that which can be sustained by the population.

Based upon the above information, the lead and cooperating agencies have determined that the impacts to the Wisconsin DCCO population from this alternative will not jeopardize the long-term sustainability of DCCO populations at a local, state, regional, or national level.

Alternative 2 – Only Non-lethal CDM by Federal Agencies

Under this alternative, the Federal agencies would not kill any DCCOs or destroy eggs because no lethal methods would be used. As discussed in Section 3.1, WS would not complete the WS Form 37 consultations needed before USFWS could

issue depredation permits, and the USFWS would not issue MBPs. Local governments, landowners and their designated agents (e.g., private damage management businesses) could only use non-lethal CDM techniques. All population objectives and minimum population thresholds described for Alternative 1 would still be used. However it may not be possible to achieve management objectives in the Door County Area because CDM would not be conducted on Pilot or Spider Islands.

Under the PRDO the WDNR and tribes have the authority to take up to 10% of local breeding populations of DCCOs per year, with the consent of the land owner/ manager, in order to protect public resources (USFWS 2003). The WDNR has indicated that it would use this authority on non-Federal lands. The USFWS would not permit lethal CDM techniques on the NWRs but non-lethal methods could be used to try and meet management objectives defined in Section 1.5.6.3. To estimate maximum lethal take that might occur in current and future years, we assumed that the maximum annual WDNR take would be 10% of the local breeding DCCO population at all current sites proposed for CDM including Cat, Hat, Jack, Little Strawberry (to prevent colonization), and Miller's Bay Islands or approximately 2,100 birds. An additional 300 birds might be taken for projects like the one proposed for the Kewaunee River which uses lethal to reinforce nonlethal harassment at sites other than nesting colonies and to prevent colonization of new sites for a total of 2,400 DCCOs. This represents maximum annual take under a worst-case scenario. As noted for Alternative 1 and elsewhere in the EA, the WDNR currently intends to use egg oiling and not the lethal removal of adults to achieve management goals for the large established colonies in the Green Bay Area. Lethal would only be used at these sites if egg-oiling proves inadequate to achieve management objectives. An annual take of 2,400 DCCOs would be approximately 6.4% of the conservatively estimated 2005 summer DCCO population and is a far lower level of take than would occur under Alternative 1. For reasons noted for Alternatives 1, the lead and cooperating agencies conclude that this alternative would not jeopardize the long-term sustainability of DCCO populations at the state, regional, or national level.

Alternative 3 – Only Technical Assistance from Federal Agencies

Under this alternative, WS would have no impact on DCCO populations in the State because WS would not conduct any operational CDM activities and would be limited to providing advice on CDM. WS would still be able to complete the WS Form 37 consultations needed before USFWS could issue depredation permits. Issuing permits is a kind of technical assistance, so the USFWS could still issue MBPs for research, damage to private property and risks to human health and safety. However operational damage management (exclusive of work conducted under the PRDO) would have to be conducted by the permittee or their designated agent, WDNR, local government, or private wildlife damage management companies because the Federal agencies would be prohibited from providing operational assistance with CDM.

The USFWS could also grant approval for PRDO projects that propose to take more than 10% of the local breeding DCCO population on non-Federal lands. Cormorant conflict management would not occur on the NWRs. All population objectives and minimum population thresholds described for Alternative 1 would still be used. However it may not be possible to achieve management objectives in the Door County Area because CDM would not be conducted on Pilot or Spider Islands. The WDNR has indicated that it will conduct the same level of CDM on non-Federal lands under this alternative as would occur under Alternative 1.

In the analysis of impacts on the DCCO population in Alternative 1, it was predicted that up to 25% of the number of breeding DCCOs in excess of management objectives might be killed per year. Selection of this alternative and the lack of CDM on Federal lands would not impact Cat Island. Twenty-five percent of the 2007 nesting population in excess of the 1,000 pair management objective would be a maximum annual take at Cat Island of approximately 720 DCCOs. Under this Alternative, no CDM could be conducted on Federal lands (e.g., Spider, Pilot and Lone Tree Islands). Given the current number of breeding DCCOs at Spider and Pilot Islands 5,753 pairs) and the minimum population threshold set for Hat and Jack Islands (500 pairs per island), the state would be unable to achieve the management objective of 5,000 pairs. The closest it could come would be to reduce the number of DCCOs at Hat and Jack Islands to 500 pairs for a total of 6,753 pairs in the Door County Area. In 2007, there were a total of 6,753 DCCO pairs at Hat and Jack Islands, 5,783 pairs (11,566 birds) in excess of 1,000 pairs total for the two Islands. Using the estimate of lethal take of 25% of the number of DCCOs in excess of the management objective from Alternative 1 yields maximum annual take of approximately 2,900 DCCOs. Adding the estimated maximum take of 1,000 DCCOs per year for inland sites (see Alternative 1) yields a maximum annual lethal DCCO take under this alternative of approximately 4,600 DCCOs.

This level of take is less than that proposed under Alternatives 1 and 5 but greater than that for Alternatives 2 and 4. For reasons noted for Alternatives 1, the lead and cooperating agencies conclude that this alternative would not jeopardize the long-term sustainability of DCCO populations at the state, regional, or national level.

Alternative 4 - No Federal CDM

Under this alternative, the Federal agencies would have no impact on DCCO populations in the state. As discussed in Section 3.1, WS would not complete the WS Form 37s consultations needed before USFWS could issue depredation permits, and the USFWS would not issue MBPs. No CDM would be conducted at the NWRs. However, similar to Alternative 2, under the PRDO the state does have the authority to take up to 10% of local breeding population of DCCOs on

non-Federal lands, with the consent of the land owner/manager, in order to protect public resources (USFWS 2003). Maximum annual take of DCCOs under the PRDO would be the same as for Alternative 2, 2,400 DCCOs, and would not jeopardize the long-term sustainability of DCCO populations at the state, regional, or national level.

Alternative 5 - Integrated CDM Program, Excluding Implementation of the PRDO

Take of DCCOs for management of damage at aquaculture facilities, damage to private property, and risks to human health and safety and DCCO take for research projects would be similar to that described for Alternative 1. Some CDM activities to protect public resources could be conducted under MBPs. Depredation permits can be issued for the protection of sensitive plants and animals (e.g., co-nesting colonial waterbirds). Permits would probably not be issued for the protection of free-swimming fish populations, but permits could be issued for CDM at the specific sites where hatchery fish are being released (USFWS 2003). Most cormorant management objectives proposed in Section 1.5.7 were established for the protection of vegetation and wildlife. The program objectives for the Door County Area have been proposed for the protection of fishery resources and vegetation and co-nesting birds. However, local population reduction proposed for this site is not likely to change if the project was conducted solely for the protection of co-nesting birds and their habitat, because it was based in part, on the time when complaints regarding DCCO impacts on vegetation and co-nesting species were relatively low, so there was no call to reduce DCCO colonization of new sites in Wisconsin.

Based on the limited amount of CDM conducted exclusively for the protection of free-swimming fish populations, take for the protection of public resources is not expected to be much lower for this alternative than for Alternative 1. At most, maximum annual take is only anticipated to drop by approximately 500 birds to 6,100 DCCOs per year. Based on analysis for Alternative 1, this level of take is not anticipated to jeopardize the long-term sustainability of DCCO populations at the state, regional, or national level.

4.1.2 Effects on Other Fish and Wildlife Species, Including Threatened and Endangered Species

Alternative 1 - Integrated CDM Program, Including Implementation of the PRDO (Proposed Action/ No Action Alternative)

Adverse Impacts on Non-target Species (Not Threatened or Endangered Species). Direct impacts on non-target species occur when program personnel inadvertently kill, injure, or harass animals that are not target species, including eggs or young of nesting adults that are disturbed by CDM activities. It is extremely unlikely that a non-target species would be shot. No non-target birds or mammals have

been killed by WS during CDM operations in Wisconsin (MIS 2005 database). Non-target species caught in live-traps and nets would be released. While every precaution is taken to safeguard against taking non-target birds, at times changes in local flight patterns and other unanticipated events can result in the incidental take of unintended individuals. These occurrences are rare and should not affect the overall populations of any species under the proposed program. Mitigation measures to reduce potential impacts to non-target species, especially nesting birds, are listed in Chapter 3.

The most likely negative effect on non-target species from CDM activities in Wisconsin is disturbance of co-nesting colonial waterbirds. If adults are startled from the nest for too long or at the wrong time of day, there is potential for increased mortality rates for eggs and chicks. However, in most instances, migratory birds and other affected non-target wildlife may temporarily leave the immediate vicinity of scaring, but usually return after conclusion of the action. Moore et al. (2005) evaluated the impact of DCCO removal on co-nesting Great Blue Herons and Great Egrets on Lake Ontario. For both species, there was no impact on the proportion of time spent in nest attendance between control and treatment sites for the interval prior to DCCO removal, the intervals between DCCO removal efforts and the period after DCCO removal was completed. Nest attendance declined for both species during the DCCO removal periods (35±20 min). Herons disturbed during the DCCO removal returned to the nest in 11 - 14 min (longest unattended=50±30 min) and all egrets returned to nests before the cormorant removal had ended (longest unattended=6±4 min). There was no difference in the nest success of herons or egrets between treated and untreated sites. These findings are similar to those of CDM monitoring conducted on West Sister Island, Green Island, and Turning Point Island in Ohio in 2006 and 2007.

On both West Sister and Green Island, observers recorded the response of other colonial waders to the presence and actions of management personnel. During DCCO management activities, 59 -60% of observed waders remained on their nests. Of the waders that did flush from the nest 80% did so when the teams were $\leq$ 30 meters from the nest. Over 65% of the waders returned when the teams were $\leq$ 20 meters from the nest. Time away from the nest was 10 ± 1.5 minutes in 2006 and 7.4 $\pm$ 0.7 minutes in 2007 (Ohio Division of Wildlife, unpublished data). At West Sister Island, Great Blue Heron and Great Egret population estimates increased by 37 and 29%, respectively from 2005 (prior to CDM) to 2006 (1st year of CDM). On Green Island, Great Blue Heron population estimates decreased by 32%, but since the nest surveys were conducted 2 weeks later than the previous year, nests may have been missed due to increased foliage density and lowered visibility (Dave Sherman, ODW, personal communication). Annual West Sister Island nesting survey results from 2007 showed that Great Blue Heron, Great Egret, and DCCO nest numbers decreased approximately 25% from 2007 while Black-crowned Night-Heron nests decreased 4%. Site observations indicate that a severe thunderstorm with high winds was mainly responsible for the 2007 decreases in the Great Blue Herons, egrets, and possibly DCCOs. The

Black-crowned Night-Heron nests were not as severely affected likely because they nest later in the year and had greater opportunity for renesting. Despite the decreases, the number of Great Egret and Great Blue Heron nests counted in 2007 was within 10% of the mean nest estimates for the previous 5 years. Great Egret nests remained stable at Turning Point Island. Black-crowned Night-Heron nest numbers at Turning Point Island increased by 50% in 2006 and decreased by 40% in 2007, perhaps demonstrating the variability of Night-Heron nest numbers at that location. Great Blue Heron numbers at Green Island decreased 30% in 2006, but the 2007 survey showed a 50% increase for this species on Green Island.

At colonies which support a high number of co-nesting gulls, predation by gulls has become an increasing concern for CDM projects. Human activities including research, population surveys and CDM actions which result in adult birds leaving their nests create opportunities for gulls to prey on eggs and chicks of other gulls and co-nesting species. Efforts to reduce gull predation include working at the colonies at night to reduce likelihood that adults will move off nests, minimizing the number of site visits, conducting CDM later in the season when gulls have eggs and chicks and are less likely to leave their own young in order to prey on other nests, and maintaining a sufficient distance from non-target birds to prevent or reduce incidence of adults flushing from nests. While this type of disturbance does result in the loss of eggs and chicks, many of the species including gulls and DCCOs may renest and can successfully fledge young (LLBO 2007).

One strategy which may be used to remove DCCOs while minimizing impacts on co-nesting waterbirds is to shoot DCCOs from boats or other nearby off-colony locations within the major approach and departure paths for birds using the colony. This method has also been used to reduce the number of birds foraging in areas where local colonies may not be accessed for CDM. However, if the USFWS does not permit DCCO removal or egg oiling on Spider or Pilot islands, this method will not be used to remove birds near these islands unless approved by the USFWS.

Movement of DCCOs from treatment sites to untreated locations or new locations where they may also cause problems has been raised as a potential adverse impact of CDM programs. A CDM program involving egg oiling that was conducted at Young Island in Lake Champlain, appeared to result in an increase in the number of DCCOs at a nearby untreated colony (Four Brothers Colony). There also appeared to be an increase in DCCO attempts to colonize new sites. Duerr et al. (2007) evaluated factors impacting DCCO emigration rates at these sites. DCCO emigration from the treated island was greatest in the year when gulls preyed on eggs that were left unprotected by adults during egg oiling, and was lowest and relatively minimal during the year when eggs were oiled at night to prevent problems with gull predation. The authors hypothesized that difference may have been attributable to the scale of the impact of the different types of disturbance and the way DCCOs obtain information on future nesting sites. Gull predation had a colony wide effect on treated and untreated sites because adults were

flushed from the nests in both locations as part of the study protocol. Predation problems may indicate that the DCCOs had selected a poor quality colony and that the appropriate response would be to leave the colony. Egg oiling with low gull predation had a more localized impact. DCCOs may use information from nearby untreated locations to indicate that they had selected a poor site within the colony or made a poor selection of a mate. Neither perception would be anticipated to be as likely to result in emigration from the island as colony-wide predation problems. Based on the study findings, the authors concluded that an egg-oiling program which managed gull predation and left at least a portion of the birds to successfully nest (as a cue to DCCOs that the site could be successful) would likely still be an effective means of reducing local DCCO problems with minimal impacts on nearby colonies and uncolonized sites from DCCO emigration. Additional research is still needed to further test this hypothesis and to determine the proportion of nests that must be left in order to minimize issues with DCCO relocation to new sites.

While the study by Duerr et al. (2007) provides valuable information on factors influencing DCCO emigration rates, care must be taken when applying this information to the Lower Green Bay and Door County Areas. Even if no management is conducted at existing colonies, bird banding data indicate that at least some movement of DCCOs among colonies is likely. Based on the findings of Duerr et al. (2007), it seems likely that any activity which increases problems with gull predation on eggs and chicks including bird research and monitoring activities may influence the tendency for DCCOs to emigrate from a site. Observations by Stromberg et al. (2008 unpub. report) at Spider Island in 2003 indicate that an intensive research program at the site that was conducted early in the year may have had this impact. Even prior to the initiation of CDM efforts, research and bird population monitoring has been conducted at Pilot, Spider and Cat Islands, so the environmental status quo for these sites in the absence of CDM includes a certain level of disturbance and opportunity for increased gull predation. Timing of the CDM or other activity, the size of the gull colony and associated risk of predation, and the opportunity for renesting are also likely to be important factors in determining DCCO emigration rates. Therefore, the extent to which CDM efforts would contribute to existing disturbance and DCCO emigration rates is likely variable. Risks of emigration and colonization of new sites may be reduced if efforts are made to minimize impacts of gull predation and to time CDM efforts so that they coincide with research and monitoring projects.

Despite the variables that influence the likelihood that CDM will result in increased DCCO movement to new locations, the issue should be considered. As noted above, if no CDM is conducted, DCCO movement to new locations in response to resource limitations at existing sites seems likely where, if left unmanaged, they may pose new risks to vegetation and co-nesting species. Adverse impacts on vegetation and nontarget species at existing colony sites is likely to continue or increase as will any adverse impacts on fishery resources.

If management is only conducted at some sites, (i.e.,, no management is conducted at the NWR's Spider and Pilot Islands as per the reasons provided in Section 1.5.7.3) then, as discussed above, management may result in movement of birds from treated to untreated sites. Decreases in DCCO numbers at treated sites are likely to reduce any adverse impacts on remaining vegetation and co-nesting species, but may not be sufficient to address any adverse impacts on fishery resources. Any increases in DCCO numbers at untreated sites may aggravate any existing negative impacts on vegetation and co-nesting species at those locations (e.g. remaining vegetation and Black-crowned Night-Herons at Pilot Island). DCCO numbers at untreated sites may be high enough to prohibit managers from achieving management objectives for the protection of fishery resources. DCCOs from treated sites and DCCOs responding to resource limitations at untreated sites may attempt to colonize new locations where, if left unmanaged, they could pose new risks to vegetation and co-nesting species.

If CDM is conducted at all of the existing colonies in the Lower Green Bay and Door County Areas, then movement among treatment colonies may occur but is unlikely to result in increases in DCCO numbers at any treatment site. Adverse impacts on remaining vegetation and co-nesting species from DCCOs at treatment sites will be minimized and managers will have the greatest likelihood of reducing any adverse impacts on fishery resources that may be linked to the number of foraging DCCOs in the area. DCCOs from treated sites are likely to attempt to colonize new locations where they may pose new risks to vegetation and co-nesting species.

Successful, professional CDM programs require a continual evaluation of impacts on nontarget species and modification to meet the specific needs and concerns for each site. For example, conducting CDM activities at night is one means of reducing difficulties with gull predation, but this method cannot be used at sites with nesting Common Terns because the terns will leave their nests and may not return for hours, which increases the risks to tern eggs and chicks (USDA 2005). In 2006, CDM efforts at Cat Island raised concerns regarding the potential impact of CDM on American White Pelicans. In response, WS increased the perimeter around the pelicans where egg-oiling is not conducted and has worked to minimize the number of site visits needed to achieve project objectives. The lead and cooperating agencies work together and with agencies conducting CDM in other states to exchange information on the impacts of and ways of minimizing impacts on nontarget species from CDM.

Given the data available, the SOPs established for the protection of non-target species, and the fact that the agencies will continue to evaluate impacts on non-target species and adjust management techniques accordingly, the use of frightening devices proposed in this alternative will have a low magnitude of impact on non-target species.

Beneficial Impacts on Non-target Species (Not Threatened or Endangered Species). The PRDO was established to allow for CDM activities specifically designed to benefit nontarget species including co-nesting birds (including the Black-crowned Night-Heron, which is a species of special concern in USFWS Region 3), vegetation and fisheries. CDM programs can benefit wildlife species that are adversely impacted by DCCO predation, competition with DCCOs for habitat, and/or the impact of large DCCO colonies on vegetation. Experience by the lead and cooperating agencies indicates that an integrated CDM program as would be permitted under this alternative would have the greatest potential to successfully reduce adverse DCCO impacts on other plant, wildlife and fish species.

Threatened and Endangered Species Impacts. Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential risks and the establishment of special restrictions or mitigation measures to minimize or negate any risks. Standard Operating Procedures to avoid adverse T&E effects are described in Chapter 3.

Federally-listed Species. A summary of Federally-listed T&E species in Wisconsin is provided in Appendix B. The USFWS completed an Intra-Service Section 7 Biological Evaluation on the management of DCCOs in the U.S. for the FEIS (USFWS 2003). The only species in the national consultation that could potentially be impacted by CDM actions in Wisconsin is the Piping Plover (USFWS 2003). Bald eagles were also addressed in the FEIS, but have subsequently been removed from the Federal list of threatened and endangered species and are currently protected under the Bald and Golden Eagle Protection Act and the MBTA.

There are some plant and animals species in Wisconsin which were not addressed in the EIS that may be found in some areas where the agencies are working to prevent establishement of new DCCO colonies including Dune thistle and dwarf lake iris. An additional Section 7 consultation was completed specific to CDM actions in Wisconsin. All recommendations from the Wisconsin Section 7 consultation will be incorporated into the CDM activities conducted by the agencies. The following is a list of conservation measures to reduce risks of adverse impacts on federally-listed species applicable to CDM in Wisconsin:

(i) All personnel conducting CDM will be trained in the identification of Piping Plovers and will check treatment areas prior to and during treatment for the presence of Piping Plovers.

(ii) Discharge/use of firearms to kill or harass DCCOs or use of other harassment methods are allowed if the control activities will occur more than 1,000 feet from active Piping Plover nests or colonies and migrating plovers.

(ii) Other control activities such as egg oiling, cervical dislocation, CO_2 asphyxiation, egg destruction, or nest destruction are allowed if these activities occur more than 500 feet from active Piping Plover nests or colonies and migrating plovers.

(iii) To ensure adequate protection of Piping Plovers, any agency or its agents who plan to implement control activities that may affect areas designated as Piping Plover critical habitat in the Great Lakes Region are to make contact with the appropriate Regional Migratory Bird Permit Office prior to implementing control activities.

(iv) Before going into a new site to conduct work to prevent colonization by nesting DCCOs, the agencies will consult with the USFWS regarding the occurrence of dwarf lake iris and dune thistle at the site. When possible, areas supporting these species will be avoided. Agency staff will be trained in the identification of these species and will be made aware of the occurrence of these species at the site in order to avoid accidental damage by trampling.

The lead and cooperating agencies will abide by the final conservation measures in the Section 7 consultation for Wisconsin to avoid risks to federally-listed species. As documented in Section 1.5.4, colonization by DCCOs can result in substantial shifts in the vegetative community. Efforts to prevent DCCO colonization of sites where federally-listed plant and invertebrate species occur may have beneficial impacts on these species. Given these protective measures, the lead and cooperating agencies have determined that the preferred alternative may affect but will not adversely affect any Federally-listed T&E species or critical habitat in Wisconsin.

State-listed Species. The State list of endangered and threatened species is provided in Appendix C. The lead and cooperating agencies have determined that CDM has the potential to affect the Great Egret, Piping Plover, Trumpeter Swan, Snowy Egret, Yellow-crowned Night-Heron, Common Tern, Forster's Tern, Caspian Tern and Osprey. Trampling associated with CDM activities intended to prevent DCCO colonization of new sites could also impact dune goldenrod, elk sedge, dwarf lake iris, small-flower grass-of-parnassus, dune thistle, thickspike, western fescue and sticky false asphodel. Prior to any control action, the lead and cooperating agencies will consult with the WDNR to ensure that no actions taken under this plan will adversely affect Wisconsin's state-listed threatened and endangered species. All recommendations from the WDNR for the protection of state-listed species will be incorporated in the program activities. When possible, areas supporting these species will be avoided. Agency staff will be trained in the identification of State-listed

plant species and will be made aware of the occurrence of these species at the site in order to avoid accidental damage by trampling. Actions to minimize risks to State-listed are described above for species that are also federally-listed and in the section on SOPs in Chapter 3.

CDM actions intended to protect vegetation are likely to have a beneficial impact on State-listed plants and may also benefit State-listed bird species by virtue of protecting their habitat. The lead and cooperating agencies conclude that with the mitigation measures described here and in Chapter 3, this alternative will not adversely impact State-listed species.

Alternative 2 – Only Non-lethal CDM by Federal Agencies

The Federal agencies would be restricted to the use of non-lethal techniques. Consequently, there would be no risks from Federal use of lethal CDM techniques. The USFWS would also not issue MBPs for DCCO management. However, under the PRDO the state and tribes have the authority to take up to 10% of local breeding population of DCCOs, with the consent of the land owner/manager, in order to protect public resources (USFWS 2003). The WDNR has indicated that it would use this authority on non-Federal lands. The USFWS would not permit lethal CDM techniques on the NWRs.

The primary risk to non-target species from the use of non-lethal techniques is the risk of disturbing co-nesting species during harassment, nest destruction and other non-lethal CDM activities as described for Alternative 1. Given the data available, the SOPs established for the protection of non-target species, and the fact that the agencies will continue to evaluate impacts on non-target species and adjust management techniques accordingly, the use of frightening devices proposed in this alternative will have a low magnitude of impact on non-target species.

Without even the minor use of lethal techniques to reduce habituation to nonlethal CDM methods (DCCOs getting used to and not responding to frightening devices), this alternative will likely require more hours of non-lethal CDM than Alternatives 1 and 5 in order to achieve similar management objectives for some projects, therefore the risk of disturbing co-nesting species will be greater for this alternative than for Alternatives 1 and 5. Given the tendency of DCCOs to habituate to frightening devices, it may not be possible to achieve the same level of CDM as with Alternatives 1 and 5. Success in protecting public resources may be more likely on non-Federal lands where the WDNR and tribes would have limited access to lethal CDM techniques. However, it is likely to take longer for the WDNR and tribes to achieve management objectives than under Alternatives 1 and 5.

The lead and cooperating agencies will continue to utilize SOPs for CDM activities as discussed in Chapter 3 and for Alternative 1 in order to reduce

potential impacts on listed (Federal and State) and non-listed species. Therefore, risks associated with use of lethal CDM alternatives under this alternative would be similar to Alternative 1, but overall impact would be lower than Alternative 1 because less lethal CDM would be conducted.

Beneficial Impacts on Non-target Species Including Threatened and Endangered Species. This alternative would only allow Federal agencies to use non-lethal techniques to protect public resources. The WDNR and tribes would have limited access to lethal methods for implementation of the PRDO on non-Federal lands. Management objectives would remain the same for this alternative as for Alternatives 1 and 5. However, as discussed above, the lead and cooperating agencies are concerned that they may not be able to achieve CDM objectives under the restrictions of this alternative. For example, use of lethal methods such as egg destruction to prevent the colonization of new sites on NWRs would not be available under this alternative. Lack of access to this method, which when combined with nest destruction has already proven effective in deterring DCCO colonization of Hog Island, may be a serious impediment to efforts to protect vegetation and colonial nesting species at the NWRs.

Alternative 3 – Only Technical Assistance from Federal Agencies

Adverse Impacts on Non-target Species Including Threatened and Endangered Species from CDM. Under this alternative, the lead and cooperating agencies would not conduct operational CDM. WS would still be able to complete the WS Form 37 consultations needed before USFWS could issue MBPs. The USFWS would also have the ability to approve CDM projects that propose to take more than 10% of the local breeding DCCO population. Therefore, it would still be possible for WDNR to conduct CDM under the PRDO, but it would not receive any operational assistance from the USFWS or WS. Additionally, CDM would not be conducted at the NWRs. The tools that could be used for CDM would not differ from Alternatives 1 and 5. However, because the PRDO will not be implemented on Federal lands, the amount of CDM that could be conducted would be lower than for Alternative 1. Therefore, this alternative is likely to have a lower level of risk to non-target species than the already low level discussed for Alternative 1.

Beneficial Impacts on Non-target Species Including Threatened and Endangered Species. Projects to protect wildlife and plants on non-Federal lands would likely be identical to Alternatives 1 and 5. However, CDM efforts at these sites may be complicated by the lack of CDM at the NWRs. The NWRs may serve as a refuge for DCCOs harassed from the other sites. Although, as discussed for Alternative 1, the extent to which DCCOs move in response to CDM efforts like egg oiling depends on a number of factors, especially, the risk of gull predation at treatment sites. Cormorants at the NWRs may also serve as a source population for colonization or recolonization of the non-Federal sites.

As noted for Alternative 1, if management is conducted at non-Federal sites but not at the NWRS, it may aggravate any existing problems or lead to new problems at the NWRs which the agency would be unable to address. Additionally, DCCO numbers at untreated sites may be high enough to prohibit managers from achieving management objectives for the protection of fishery resources. Overall beneficial impacts on non-target species would likely be lower than for Alternatives 1 and 5.

Alternative 4 - No Federal CDM

Adverse Impacts on Non-target Species Including Threatened and Endangered Species from CDM. Under this alternative, the Federal agencies would not participate in CDM. The USFWS would not issue MBPs and would not grant approval for PRDO projects proposing to take more than 10% of a local DCCO population. The USFWS would not permit CDM on the NWRs. As with Alternatives 2 and 3, under the PRDO the state and tribes do have the authority to take up to 10% of a local breeding population of DCCOs, with the consent of the land owner/manager, in order to protect public resources (USFWS 2003). The WDNR has indicated that it would use this authority on non-Federal lands. The state, local governments, landowners and their designated agents (e.g., private damage management businesses) could use non-lethal CDM techniques on non-Federal lands. The amount of CDM that could be conducted would be much lower than for Alternative 1. Unlike Alternative 2, non-lethal CDM would not be conducted on Federal lands (e.g., at NWRs). Therefore, this alternative is likely to have a reduced level of risk to non-target species than the low level discussed for Alternative 1.

Beneficial Impacts on Non-target Species Including Threatened and Endangered Species. Management objectives for activities to protect wildlife and vegetation on non-Federal lands would be the same as all the other alternatives. The ability to achieve the management objectives will be limited by the restrictions on the number of DCCOs that can be taken using lethal methods, lack of assistance from WS, and further complicated by the lack of CDM on the NWRs (as with Alternative 3). Also like Alternative 3, CDM activities on non-Federal lands and the lack of CDM on the NWRs is likely to exacerbate adverse impacts of DCCOs on vegetation and other species of wildlife using the refuges. Overall benefits to non-target species are lowest for this alternative.

Alternative 5 - Integrated CDM Program, Excluding Implementation of the PRDO

Adverse Impacts on Non-target Species Including Threatened and Endangered Species. Impacts would be slightly less than Alternative 1. Under Alternative 5, it would be possible to obtain MBPs for all actions proposed for the protection of co-nesting birds and sensitive plant communities. Permits would probably not be issued for the protection of free-swimming fish populations, but permits could be

issued for CDM at the specific sites where hatchery fish are being released (USFWS 2003). Consequently, slightly less CDM may be conducted under this alternative than Alternative 1. The program objectives for the Door County Area have been proposed for the protection of fishery resources and vegetation and co-nesting birds. However, local population reduction proposed for this site is not likely to change if the project was conducted solely for the protection of co-nesting birds and their habitat because it was based on the time when fisheries data indicate a decline in brown trout recovery rates *and* also represents a time when complaints regarding DCCO impacts on vegetation and co-nesting species were relatively low so there was no call to reduce DCCO colonization of new sites in Wisconsin. Consequently, the WDNR has determined that management objectives for this area are unlikely to change substantially even if the project were limited to the protection of co-nesting birds and their habitat.

Beneficial Impacts on Non-target Species Including Threatened and Endangered Species. Under this alternative the USFWS could still issue MBPs for the protection of co-nesting species and their habitats, and sensitive plant communities. Benefits to public resources as defined by the PRDO, except fishery resource, would be as described for Alternative 1. However, the USFWS does not generally issue MBPs for the protection of fishery resources. Therefore the only potential benefits to free-swimming fish populations would be incidental to actions conducted for the protection of other public resources such as co-nesting birds. Unlike Alternative 1, if at a future time, data become available indicating that a new management objective would be beneficial for the protection of public fishery resources, that type of work could not be conducted under this alternative. Consequently, this alternative will have lower beneficial impacts on nontarget species than Alternative 1.

4.1.3 Effects on Human Health and Safety

4.1.3.1 Effects on Human Health and Safety from CDM Methods

Alternative 1 - Integrated CDM Program, Including Implementation of the PRDO (Proposed Action/ No Action Alternative)

CDM methods that might raise safety concerns include shooting with firearms and harassment with pyrotechnics. Firearms and pyrotechnics would only be used by lead and cooperating agency personnel and their designated agents who are trained and experienced in the safe and legal use of firearms. WS personnel regularly receive refresher safety training to keep them aware of safety concerns and the other agencies have similar training requirements. There have been no accidents involving the use of firearms or pyrotechnics in which a member of the public was harmed by the lead or cooperating agencies. A formal risk assessment of WS' operational management methods found that when used in accordance with applicable laws, and WS regulations, policies and directives, risks to human safety were low (USDA 1997, Revised, Appendix P). Therefore, no adverse

effects on human safety from use of these methods are expected. Agents acting under the authority of the lead and cooperating agencies will be informed and trained in the safe and proper use of CDM methods including the use of firearms.

Alternative 2 – Only Non-lethal CDM by Federal Agencies

Under this alternative, the CDM method that might raise safety concerns is harassment with pyrotechnics. Risks associated with these methods are identical to those for Alternative 1. However, there will likely be greater use of harassment techniques than for Alternative 1. However, given the training and experience of lead and cooperating agency personnel conducting CDM, risks to human health and safety are still anticipated to be very low.

Alternative 3 – Only Technical Assistance from Federal Agencies

Under this alternative, the lead and cooperating agencies would not engage in direct operational use of any CDM methods. Risks to human safety from the use of firearms and pyrotechnics would hypothetically be lower than the no action alternative, but not much because the current program has an excellent safety record in which no accidents involving the use of these devices have occurred that have resulted in a member of the public being harmed.

Local governments, landowners and their designated agents (e.g., private damage management businesses) could still use pyrotechnics or firearms in CDM programs and this activity would likely occur to a greater extent in the absence of assistance from the lead and cooperating agencies. Hazards to humans and property could be greater under this alternative if personnel conducting CDM activities have less training and experience than personnel with the lead and cooperating agencies. However, the lead and cooperating agencies would be able to provide advice and information on the safe and proper use of these methods so risks should be less than Alternative 4. Overall risks to human health and safety are still likely to be low, but might be higher than with Alternative 1.

Alternative 4 - No Federal CDM

Under Alternative 4, the lead and cooperating agencies would not be involved in CDM activities in Wisconsin so there would be no risks from their use of firearms or pyrotechnics. Local governments, landowners and their designated agents (e.g., private damage management businesses) could still use pyrotechnics or firearms in CDM programs and this activity would likely occur to a greater extent in the absence of assistance from the lead and cooperating agencies. Hazards to humans and property could be greater under this alternative if personnel conducting CDM activities have

less training and experience than personnel with the lead and cooperating agencies. The lead and cooperating agencies would not be able to provide advice and information on the safe and proper use of these methods so risks may be greater than Alternative 1. Overall risks to human health and safety are still likely to be low, but may be higher than with Alternative 5.

Alternative 5 - Integrated CDM Program, Excluding Implementation of the PRDO

The CDM methods to be used are identical to Alternative 1, but there would be slightly less CDM under this Alternative than under Alternative 1. This is not anticipated to result in a substantial change in the extremely low risk to human health and safety anticipated for Alternative 1.

4.1.3.2 Effects on Human Health and Safety from Not Conducting CDM

Alternative 1 - Integrated CDM Program, Including Implementation of the PRDO (Proposed Action/ No Action Alternative)

People are concerned with potential injury, and loss of human life resulting from DCCO strikes with aircraft (Sections 1.5.5). An Integrated CDM strategy combining lethal and non-lethal methods has the greatest potential of successfully reducing risks to aviation and human safety. In some situations the implementation of non-lethal controls such as harassment could actually increase the risk of human safety problems at other sites by causing the birds to move to sites not previously affected. In such cases, lethal removal of the birds may actually be the best alternative from the standpoint of overall human safety concerns. If the lead and cooperating agencies are providing direct operational assistance in relocating DCCOs, coordination with local authorities will be conducted to assure they do not reestablish in other undesirable locations.

Alternative 2 – Only Non-lethal CDM by Federal Agencies

Under this alternative, the lead and cooperating agencies would be restricted to implementing and recommending only non-lethal CDM methods. As discussed in Chapter 3, the USFWS would not be able to issue MBPs for the use of lethal techniques to address risks to human safety from DCCOs. This alternative is unlikely to be as effective in reducing DCCO risks to human safety because there are some situations at airports where non-lethal techniques may not provide a sufficiently rapid or controlled response from the target bird(s) or where non-lethal techniques are not effective because the target animal has habituated to the frightening stimulus. Overall risks to human safety would be slightly greater under this alternative than Alternative 1.

Alternative 3 – Only Technical Assistance from Federal Agencies

Under this alternative, the lead and cooperating agencies would be restricted to providing technical assistance on CDM methods. WS would be able to assist with the certification of aquaculture facilities and the consultations and WS Form 37 required for the USFWS to issue MBPs. Potential impacts would be variable. The nature of risk to aircraft and human safety from DCCO strike is such that actions will be taken to address DCCO risks to aircraft with or without assistance from WS. Efficacy of non-WS efforts to address risks to aircraft will depend on the training and experience of the individual conducting the CDM effort. This potential risk would be less likely under this alternative than Alternative 4 when people requesting assistance receive and accept technical assistance recommendations.

In some situations the implementation of non-lethal controls such as harassment could actually increase the risk of problems at other sites by causing the birds to move to other sites not previously affected. This potential risk would be less likely under this alternative than Alternative 4 when people requesting assistance receive and accept technical assistance recommendations. Overall risks to human safety could be greater than for Alternatives 1 and 5.

Alternative 4 - No Federal CDM

Under this alternative, the lead and cooperating agencies would not participate in CDM. As discussed in Chapter 3, the USFWS would not be able to issue MBPs for the use of lethal techniques to address risks to human safety from DCCOs. CDM by entities other than the lead and cooperating agencies would be limited to non-lethal techniques. Resource owners and managers would be responsible for developing and implementing their own CDM program. Efforts by these individuals to reduce or prevent conflicts could result in less experienced persons implementing control methods, therefore leading to a greater potential to not reduce DCCO hazards, than under the proposed action. As discussed for Alternative 2, there may be some situations where non-lethal techniques are not adequate to reduce the safety risk. In other situations the implementation of non-lethal controls such as harassment could actually increase the risk of problems at other sites by causing the birds to move to sites not previously affected. Under this alternative, problems could increase if affected individuals were unable to find and implement effective means of controlling DCCOs that cause damage. Overall risks to human safety would be greatest under this alternative.

Alternative 5 - Integrated CDM Program, Excluding Implementation of the PRDO

Activities conducted to reduce risks of DCCO strikes to aircraft will not differ between this Alternative and Alternative 1. Impacts on human safety would not differ between the two alternatives.

4.1.4 Effects on Aesthetic Values

Alternative 1 - Integrated CDM Program, Including Implementation of the PRDO (Proposed Action/ No Action Alternative)

Some people who routinely view individual birds or flocks of DCCOs would likely be disturbed by removal of such birds. Some individuals are morally or philosophically opposed to the killing of any birds and may feel that distress at the knowledge that lethal CDM methods can be or have been used will compromise their enjoyment of a site. The lead and cooperating agencies are aware of such concerns and take this into consideration when planning CDM activities. Preference is given to nonlethal methods where practical and effective. For example, the initial proposals for Cat, Hat, Jack, Spider and Pilot islands involve using egg oiling to achieve the desired reductions in the number of breeding DCCOs. Lethal removal of adults is unlikely to be used unless management objectives cannot be achieved through exclusive use of egg oiling or other nonlethal techniques.

Lethal control actions would generally be restricted to local sites and are not intended to reduce state or regional DCCO populations. CDM measures proposed for Cat, Hat, Jack, Pilot and Spider Islands have minimum population thresholds of 500 nesting pairs per island for Hat, Jack, Pilot and Spider Islands and 1,000 pairs at Cat Island to ensure that these sites retain viable DCCO colonies. These numbers do not include young of the year, or non-reproductive birds so the total number of birds at the sites will be higher than indicated by the number of nests. The opportunity to view large DCCO colonies would still be available. In most cases at other sites, CDM activities will reduce but not eliminate local DCCO populations. Lethal removal of DCCOs from airports should not affect the public's enjoyment of the aesthetics of the environment since airport properties are closed to public access.

In some instances, large roosting or nesting populations of DCCOs can destroy habitat and displace other nesting birds, reducing the aesthetic value for some people. This alternative would reduce negative impacts caused by DCCOs on wildlife species and their habitats including Black-crowned Night-Herons and other colonial waterbirds co-nesting with DCCOs at the sites proposed for CDM. The enjoyment of recreational fishing, and, for some, the opportunity to consume the fish captured, are positive aesthetic values for some people. This alternative

would provide the best opportunity to reduce negative impacts caused by DCCOs to fish and wildlife species and their habitats.

Alternative 2 – Only Non-lethal CDM by Federal Agencies

Under this alternative the Federal agencies would only use and authorize non-lethal CDM techniques. The only lethal CDM that could be conducted under this alternative would be by the state and tribes under the PRDO and would only involve take of up to 10% of the local breeding population. People who oppose lethal control of wildlife by government but are tolerant of government involvement in non-lethal wildlife damage management would favor this alternative. Persons who have developed affectionate bonds with individual wild birds would be less affected by the death of individual birds under this alternative than under Alternatives 1 and 5 because fewer birds would be taken. However, these individuals may still oppose dispersal of certain birds. The ability of individuals to enjoy viewing DCCOs would not differ from Alternative 1 in that the objectives for the reduction in the number of birds nesting at sites would be the same. However, the fate of some of the birds would be different since there would be much less use of lethal CDM techniques.

This alternative would allow the lead and cooperating agencies to conduct work under the PRDO. This alternative would reduce the negative aesthetic impacts of DCCOs on birds, vegetation and fisheries resources if non-lethal methods were effective in reducing such damage to acceptable levels. However, as stated in Section 4.1.2, non-lethal methods are not always effective and, so this alternative is not anticipated to be as effective in reducing negative impacts of DCCOs on non-target species as Alternative 1. However, Alternative 2 maybe more effective in protecting public resources than Alternative 5 because this alternative would still allow for action under the PRDO and therefore could be used to protect public fishery resources.

Alternative 3 – Only Technical Assistance from Federal Agencies

Under this alternative, the Federal agencies would be restricted to providing technical assistance on CDM methods. WS would be able to assist with WS form 37s required for the USFWS to issue MBPs. People opposed to direct operational assistance with CDM by the government might prefer this alternative to Alternative 5 especially because no CDM would be conducted on Federal lands. However, the WDNR and tribes would still be able to conduct CDM under the PRDO including the use of lethal CDM techniques on non-Federal lands. Persons concerned about the welfare of individual birds and opposed to the use of lethal control would likely be opposed to this alternative because lethal control could be conducted by the WDNR and other non-Federal entities.

Under this alternative, the lack of Federal operational assistance in reducing negative DCCO impacts on vegetation, birds and fish could result in an increase in adverse affects on aesthetic values depending on the staff experience and resources available to the non-Federal entities. There would be no CDM conducted on the NWRs so any adverse impacts on aesthetic values associated with birds using the NWRs would not be addressed. Conversely, individuals opposed to the use of lethal CDM especially on NWRs may prefer this alternative more than Alternatives 1 and 5 but less than Alternatives 2 and 4. Beneficial impacts of this alternative on the opportunity to enjoy vegetation, co-nesting birds, and fishery resources on non-Federal sites would be similar to Alternatives 1 and 5.

Alternative 4 - No Federal CDM

Under this alternative, the Federal agencies would not conduct or permit any CDM in Wisconsin. No CDM would be conducted on Federal lands. People opposed to government involvement in CDM and the use of CDM on the NWRs would favor this alternative. People concerned about the welfare of individual birds or the use of lethal CDM would prefer this alternative over Alternatives 1 and 5 because the lethal removal of DCCOs would be lower. However, lethal take under the PRDO could still be implemented by the WDNR and tribes, so long as lethal take does not exceed 10% of the local breeding DCCO population. Non-Federal entities could still use non-lethal techniques and some individuals might oppose dispersal of certain birds.

Under this alternative, the lack of Federal operational assistance in reducing negative DCCO impacts on vegetation, birds, fish and property could result in an increase in adverse affects on aesthetic values. The PRDO would only be implemented by WDNR and tribes, and their actions would be limited to take of up to 10% of the local DCCO population on non-Federal lands. There would be no CDM conducted on the NWRs so any adverse impacts on aesthetic values associated with birds using the NWRs would not be addressed. Beneficial impacts of this alternative on the opportunity to enjoy vegetation, birds, or fisheries resources that are negatively affected will be much lower than Alternative 1.

Alternative 5 - Integrated CDM Program, Excluding Implementation of the PRDO

Individuals opposed to the use of lethal CDM techniques would be as opposed to this alternative as they are to Alternative 1 because the number of DCCOs that could be removed is only likely to be slightly lower than for Alternative 1. However, as with Alternative 1, this alternative will not jeopardize the DCCO population and DCCO viewing opportunities will still be available. In most cases, CDM activities will reduce but not eliminate local DCCO populations and minimum population thresholds have been established for Cat, Hat, Jack,

Pilot and Spider Islands to ensure that these sites retain healthy, viable DCCO populations. If proposed management objectives were met for the lower Green Bay and Door County Areas, there would still be 6,000 breeding pairs of DCCOs plus associated juveniles and non-reproductive individuals for people to view and enjoy.

Positive impacts on the opportunity to enjoy vegetation, and co-nesting species of birds that can be negatively impacted by high numbers of DCCOs would be similar to Alternative 1. The enjoyment of recreational fishing, and, for some, the opportunity to consume the fish captured, are positive aesthetic values for some people. The USFWS generally does not issue MBPs for the protection of free-swimming fish although exceptions can be made for sites where hatchery fish are released. Any adverse impacts of DCCOs on free swimming fish would continue to adversely impact the aesthetic enjoyment of those who value fishery resources.

4.1.5 Humaneness and Animal Welfare Concerns of the Methods Used

Alternative 1 - Integrated CDM Program, Including Implementation of the PRDO (Proposed Action/ No Action Alternative)

Under this alternative, lethal methods viewed by some persons as inhumane would be used in CDM. Shooting, when performed by experienced professionals, usually results in a quick death for target birds. Occasionally, however, some birds are initially wounded and must be shot a second time or must be caught by hand and then dispatched or euthanized. Some persons would view shooting as inhumane. Some people may also be opposed to killing embryos via egg oiling, egg addling, or egg destruction as inhumane but this technique is generally viewed as preferable to killing juvenile (hatched) or adult birds.

Occasionally, DCCOs captured alive would be euthanized. The most common method of euthanasia would be by decapitation, cervical dislocation or CO_2 gas. These methods are described and approved by AVMA as acceptable euthanasia methods (Beaver et al. 2001).

WS has improved the selectivity and humaneness of management techniques through research and development. Research is continuing to bring new findings and products into practical use. Until new findings and products are found practical, a certain amount of animal suffering could occur when some CDM methods are used in situations where non-lethal damage management methods are not practical or effective.

Personnel with the lead and cooperating agencies are trained, experienced and professional in their use of management methods so that they are as humane as possible under the constraints of current technology, workforce and funding. Mitigation measures/SOPs used to maximize humaneness are listed in Chapter 3.

Alternative 2 – Only Non-lethal CDM by Federal Agencies

Under this alternative, lethal methods viewed as inhumane by some persons would not be used or permitted by the Federal agencies. WS would not conduct the site evaluations and complete the WS form 37s necessary for USFWS issuance of MBPs. However, the WDNR and tribes would be able to use lethal methods under the PRDO so long as lethal take did not exceed 10% of the local breeding colony. No lethal CDM could be conducted on Federal land. In general, individuals who consider the use of lethal CDM methods inhumane would find this alternative preferable to Alternative 1.

Alternative 3 – Only Technical Assistance from Federal Agencies

Under this alternative, the Federal agencies would not use lethal CDM techniques. However, permitting is a form of technical assistance, and the USFWS could still approve PRDO projects that propose the take of >10% of the local breeding DCCO colony and issue MBPs for the lethal take of DCCOs for CDM. WS would still be able to conduct the site evaluation and complete the WS form 37s necessary for USFWS issuance of MBPs. However, no CDM would be conducted on Federal land. Use of lethal CDM methods would be lower than for Alternatives 1 and 5 but higher than Alternatives 2 and 4. Individuals who believe lethal CDM techniques are inhumane would probably still consider this alternative more humane than Alternative 1.

Alternative 4 - No Federal CDM

Under this alternative the Federal agencies would not be involved in CDM. WS would not conduct the site evaluations and complete the WS form 37s necessary for USFWS issuance of MBPs. The USFWS would not issue MBPs or approve projects that propose the take of more than 10% of the local breeding DCCO population. No CDM would be conducted at the NWRs. Similar to Alternative 2, the WDNR and tribes would be able to use nonlethal and lethal methods under the PRDO so long as lethal take does not exceed 10% of the local breeding DCCO colony. Individuals who believe lethal CDM techniques are inhumane are likely to perceive this method as similar to Alternative 2 and more humane than Alternative 1.

Alternative 5 - Integrated CDM Program, Excluding Implementation of the PRDO

Impacts would be similar to Alternative 1. This alternative differs from Alternative 1 only in that lethal techniques will be used slightly less than in Alternative 1 (Section 4.1.1) because they would not be used for the protection of fishery resources. However, differences in lethal take are likely to be minor, and individual responses to this alternative are likely to be similar to Alternative 1.

4.2 CUMULATIVE IMPACTS

Cumulative impacts, as defined by CEQ (40 CFR 1508.7), are impacts to the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts may result from individually minor, but collectively significant, actions taking place over time.

Under the alternatives presented, the lead and cooperating agencies would address damage associated with DCCOs in a number of situations throughout the State. The lead and cooperating agencies would coordinate their efforts and information on the impacts of their activities and the activities of other entities reporting to the USFWS to monitor the cumulative impacts of their actions. The potential cumulative impacts analyzed below could occur either as a result of the lead and cooperating agency CDM program activities over time, or as a result of the aggregate effects of those activities combined with the activities of other agencies and individuals.

Cumulative Impacts on Wildlife Populations

As analyzed in Sections 4.1.1 and 4.1.2, CDM methods used or recommended by the lead and cooperating agencies together with impacts by other entities, will likely have no cumulative adverse effects on DCCO and non-target wildlife populations although, depending on the alternative selected, intentional or unintentional (indirect) mortality of some individuals is possible. The intent and expected result of this program is to prevent the adverse impacts of high DCCO numbers on co-nesting colonial waterbirds and their habitat, fishery resources, property and aircraft safety. Take of DCCOs by all sources is anticipated to have no affect on the long-term sustainability of DCCO populations in Wisconsin, the region, and the U.S. Population trend data and information provided in the USFWS FEIS (USFWS 2003) and this EA indicate that DCCO populations have increased for Wisconsin, the region and the U.S. over the past 20 years. When control actions are implemented by the lead and cooperating agencies the potential lethal take of non-target wildlife species is expected to be minimal to non-existent. The potential for beneficial impacts on vegetation, sensitive wildlife populations and populations of fee-swimming fish is greatest for Alternative 1 and then decreasingly less under Alternative 5, 2, 3, and 4.

Cumulative Impact Potential from CDM Methods

CDM methods used or recommended by the lead and cooperating agencies may include exclusion through use of various barriers, habitat modification of structures or vegetation, live trapping and euthanasia of birds, harassment of birds or bird flocks, nest and egg destruction, and shooting. Shotguns would only use shot that does not contain lead to

prevent adverse impacts associated with lead in the environment. No cumulative adverse environmental effects are anticipated from implementation of these CDM methods.

4.3 SUMMARY

Under the Proposed Action, the lethal removal of DCCOs by the lead and cooperating agencies would not have an adverse impact on the long-term sustainability of DCCO populations in Wisconsin, the Region or the United States, but some local reductions would occur. Given the SOPs for the protection of nontarget species in Chapter 3 and the lead and cooperating agencies' commitment to adhere to all USFWS and WDNR recommendations and requirements for the protection of State and Federally-listed threatened and endangered species, the Proposed Action will not adversely impact nontarget species populations. No risk to public safety is expected when the lead and cooperating agencies conduct or recommend CDM because trained and experienced wildlife biologists/specialists would be conducting the work and providing guidance (technical assistance) to others conducting CDM. Potential risks to public safety are slightly higher from persons who reject assistance and recommendations in Alternatives 1, 2, 3 and 5 and conduct their own CDM activities, and when no assistance is provided in Alternative 4. However, overall risks to public safety from the actions of entities other than the lead and cooperating agencies are anticipated to be very low.

Although some persons will likely be opposed to the lead and cooperating agencies conducting CDM activities on public and private lands within the state of Wisconsin, the analysis in this EA indicates that an Integrated CDM program will not result in cumulative adverse impacts on the quality of the human environment. Table 4-3 summarizes the expected impact of each of the alternatives on each of the issues.

Table 4-3. Summary of impacts of each of the alternatives on each of the issues related to CDM in Ohio.

Issues	*Alternative 1* ***Integrated CDM Program Including PRDO (Proposed Action/No Action)***	*Alternative 2* ***Only Non-lethal CDM by Federal Agencies***	*Alternative 3* ***Only Technical Assistance from Federal Agencies.***	*Alternative 4* ***No CDM by Federal Agencies***	*Alternative 5* ***Integrated CDM, Excluding PRDO***
Effects on DCCO Populations	Low effect - reductions in local DCCO numbers; would not significantly affect long-term sustainability of state, regional, national, and continental populations.	Limited effect by Federal agencies. Nonlethal CDM on Federal lands. WDNR and tribal removal of DCCOs for the protection of public resources would be lower than Alts. 1, 3 and 5. No other lethal CDM would be permitted.	No effect by Federal agencies. No CDM on Federal Lands. Number of DCCOs removed by WDNR and tribes on non-Federal sites and DCCOs removed under MBPs and research permits would be slightly lower than Alts. 1 and 5, but higher than 2 and 4.	No effect by Federal agencies. No CDM on Federal Lands. WDNR and tribal removal of DCCOs for the protection of public resources would be lower than Alts 1, 3 and 5 and equal to Alt. 2. No other lethal CDM would be permitted.	Low effect - reductions in local DCCO numbers; would not significantly affect long-term sustainability of state, regional, national, and continental populations. Slightly lower impact that Alt. 1 because no or very limited CDM for protection of free-swimming fish.

Issues	*Alternative 1* ***Integrated CDM Program Including PRDO (Proposed Action/No Action)***	*Alternative 2* ***Only Non-lethal CDM by Federal Agencies***	*Alternative 3* ***Only Technical Assistance from Federal Agencies.***	*Alternative 4* ***No CDM by Federal Agencies***	*Alternative 5* ***Integrated CDM, Excluding PRDO***
Effects on Other Wildlife Species, Including T&E Species	Low adverse effect - methods used by lead and cooperating agencies would be highly selective with very little risk to non-target species. Specific measures to minimize impacts to T&E species. Maximum benefits to species adversely impacted by DCCOs.	Low adverse effect - methods used by lead and cooperating agencies, would be highly selective with very little risk to non-target species. Specific measures to minimize impacts to T&E species. Benefits to species adversely impacted by DCCOs dependent upon efficacy of exclusive use of non-lethal methods on Federal lands and reduced use of lethal techniques at non-Federal sites.	No effects by Federal agencies. Low adverse effect by WDNR and tribes - methods used would be highly selective with very little risk to non-target species. Specific measures to minimize impacts to T&E species. Benefits to species adversely impacted by DCCOs on non-Federal lands similar to Alts 1 and 5. No benefit to species impacted by DCCOs on Federal land. Problems on Federal land may be worse if DCCOs move to Federal lands with no CDM.	No effect by Federal agencies. Low adverse effect by WDNR and tribes - methods used would be highly selective with very little risk to non-target species. Specific measures to minimize impacts to T&E species. Benefits to species adversely impacted by DCCOs dependent upon efficacy of non-lethal techniques and reduced use of lethal techniques at non-Federal sites. No benefit to species adversely impacted by DCCOs on Federal land. Problems on Federal land may be worse if DCCOs move to Federal lands with no CDM.	Low adverse effect - methods used by lead and cooperating agencies would be highly selective with very little risk to non-target species. Specific measures to minimize impacts to T&E species. Maximum benefits to species (birds, plants) adversely impacted by DCCOs. Only limited benefits to free-swimming fish populations.

Issues	*Alternative 1* ***Integrated CDM Program Including PRDO (Proposed Action/No Action)***	*Alternative 2* ***Only Non-lethal CDM by Federal Agencies***	*Alternative 3* ***Only Technical Assistance from Federal Agencies.***	*Alternative 4* ***No CDM by Federal Agencies***	*Alternative 5* ***Integrated CDM, Excluding PRDO***
Effects on Human Health and Safety	Negligible risk from methods used by lead and cooperating agencies. Good probability of reducing hazards associated with DCCOs.	Negligible risk from methods used by lead and cooperating agencies. Risk from WDNR and tribal use of lethal techniques less than low levels anticipated for Alts. 1 and 5. Less likely to reduce hazards associated with DCCOs than Alternatives 1, 3, and 5.	No risk from actions of Federal agencies. No CDM on Federal land. Risks from WDNR and tribal CDM actions on non-Federal lands identical to Alts. 1 and 5. Risks from actions of other entities under MBPs low but variable depending upon experience. Risks reduced by use of technical assistance. Good probability of reducing hazards associated with DCCOs.	No risk from actions of Federal agencies. No CDM on Federal land. Risk from WDNR and tribal use of lethal techniques less than low levels anticipated for Alts. 1 and 5. Less likely to reduce hazards associated with DCCOs than Alternatives 1, 3, and 5.	Negligible risk from methods used by lead and cooperating agencies. Good probability of reducing hazards associated with DCCOs.

Issues	*Alternative 1* ***Integrated CDM Program Including PRDO (Proposed Action/No Action)***	*Alternative 2* ***Only Non-lethal CDM by Federal Agencies***	*Alternative 3* ***Only Technical Assistance from Federal Agencies.***	*Alternative 4* ***No CDM by Federal Agencies***	*Alternative 5* ***Integrated CDM, Excluding PRDO***
Aesthetic Impacts	Low to moderate effect at local levels; Some local populations may be reduced. DCCO viewing opportunities would still be available Best potential for localized benefits to those who enjoy public resources and private property that may be adversely impacted by DCCOs.	Low to moderate effect. Impact will depend on success of efforts to resolve DCCO problems with non-lethal techniques and success of limited WDNR and tribal use of lethal CDM methods to protect public resources on non-Federal lands Localized benefits to those who enjoy public resources and private property that may be adversely impacted by DCCOs variable depending on efficacy of non-lethal techniques and WDNR and tribal programs.	No effect by Federal agencies. No CDM on Federal land. Impact of non-Federal entities would be similar to Alts 1 and 5 on non-Federal lands. Benefits to those who enjoy public resources and private property adversely impacted by DCCOs on non-Federal lands similar to Alts. 1 and 5. No benefits to those who enjoy public resources adversely impacted by DCCOs on Federal land.	No effect by Federal agencies. No CDM on Federal land. Impact of non-Federal entities will depend on success of efforts to relocate problem DCCOs with non-lethal techniques and success of limited WDNR and tribal use of lethal CDM methods to protect public resources on non-Federal lands. Localized benefits to those who enjoy public resources and private property that may be adversely impacted by DCCOs on non Federal lands variable depending on efficacy of WDNR efforts. No benefits to those who enjoy public resources adversely impacted by DCCOs on Federal land.	Low to moderate effect at local levels; Some local populations may be reduced. DCCO viewing opportunities would still be available Best potential for localized benefits to those who enjoy species that may be adversely impacted by DCCOs. Only limited benefits to public fishery resources.

Issues	*Alternative 1* ***Integrated CDM Program Including PRDO (Proposed Action/No Action)***	*Alternative 2* ***Only Non-lethal CDM by Federal Agencies***	*Alternative 3* ***Only Technical Assistance from Federal Agencies.***	*Alternative 4* ***No CDM by Federal Agencies***	*Alternative 5* ***Integrated CDM, Excluding PRDO***
Humaneness and Animal Welfare Concerns of Methods Used	Low to moderate effect - methods viewed as inhumane (lethal CDM methods) by some people would be used by lead and cooperating agencies. Highest lethal take of all Alternatives.	Lower effect than Alt. 1 because only non-lethal methods would be used by entities other than WDNR and Tribes. Use of lethal methods by WDNR and tribes greatly reduced.	No effect by Federal agencies. No CDM on Federal land. Lethal available to non-Federal entities but fewer DCCOs would be taken than under Alts. 1 and 5 because no lethal on Federal land.	No effect by Federal agencies. No CDM on Federal land. No use of lethal by any entity other than WDNR and tribes. Use of lethal methods by WDNR and tribes greatly reduced.	Low to moderate effect - methods viewed by some people as inhumane (lethal CDM methods) would be used by lead and cooperating agencies. Slightly less lethal CDM because only very limited CDM for protection of free-swimming fish populations.

CHAPTER 5: LIST OF PREPARERS AND PERSONS CONSULTED

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Robert R. Nack, Wildlife Biologist	USDA, APHIS, WS[10]
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[10] Worked for USDA, APHIS, WS for a portion of the period when this EA was prepared. Currently employed by the WDNR.

CHAPTER 6: RESPONSES TO COMMENTS

This Chapter contains issues raised by the public during the comment period for this EA and the agencies' response to each of the issues. The agencies received 258 comment letters regarding the EA, 128 of which were copies of one of 3 form letters. Comments from the public are numbered and are written in bold text. The agencies' response follows each comment and is written in standard text.

The EA (Section 2.1.4) notes that the public reaction to wildlife damage management is variable and mixed because there are numerous philosophical, aesthetic, and personal attitudes and opinions about the aesthetic and utilitarian values of wildlife, and the best ways to reduce conflicts/problems between humans and wildlife. The diversity of opinions regarding wildlife and wildlife management was reflected in letters advocating for and against CDM and the proposed CDM program. Comments ranged from expressions of pleasure at the increase in DCCO numbers and the opinion that the increase was a sign of the improving health of the Great Lakes ecosystem to expressions of dismay at another adverse impact on the native ecosystem by a species perceived to be present in artificially high numbers because of the abundance of non-native fish for forage. Despite the diversity of values and opinions, the common theme in all the letters was the authors' passionate concern for the well-being and future of the state's natural resources, a concern shared by the lead and cooperating agencies.

1. Cormorants are a non-native invasive species. Why is this species federally protected? What good is a DCCO?

Double-crested Cormorants are native to North America and are listed as a protected species under the MBTA. The cormorant taxonomic family (*Phalacrocoracidae*) and 31 other families of birds were added to the List of Migratory Birds (birds protected under the MBTA) in 1972 as a result of an amendment to the 1936 "Convention between the United States of America and the United Mexican States for the Protection of Migratory Birds and Game Mammals" (23 U.S.T. 260, T.I.A.S. 7302). As noted in the EA (Section 1.5.1), and FEIS (USFWS 2003), DCCO populations declined sharply in the U.S. between 1940s and 1970s across the species' range, and, in Wisconsin, DCCOs were state-listed as an endangered or threatened species from 1972 – 1986. Given the relatively rapid recovery of the species, it is not surprising that their resurgence in recent years has been perceived by some individuals as an introduction of a new species.

DCCOs, as a predatory species, are an integral part of a diverse and healthy native ecosystem (USFWS 2003). However, protection under the MBTA does not preclude management of damage problems caused by DCCOs. The USFWS established the PRDO and issues MBPs to help resolve damage by DCCOs. The purpose of the EA was to determine if and how the agencies would use the PRDO and MBPs to address DCCO damage in Wisconsin.

2. EA fails to note positive impacts of DCCOs on other species.

The loss of trees and shrubs that can result from use by high densities of DCCOs may have negative impacts on tree-nesting species but does create opportunities for species which nest in open areas. The EA notes in Section 1.5.4 that some colonial waterbirds such as pelicans, Common Terns, and potentially Caspian Terns prefer sparsely vegetated substrates. However, DCCO impacts on these species are not always beneficial. At Leech Lake in Minnesota, high numbers of nesting DCCOs caused shifts in use of nesting area by gulls, which in turn moved into nesting areas used by Common Terns to the detriment of the terns despite nonlethal efforts to exclude the gulls from the tern nest sites (e.g., overhead wires and nest and egg destruction; USDA 2005). Koonz (2007) noted that in long-term established colonies, incidence of birds destroying eggs of birds disturbed during visits by researchers appeared to be lower in colonies where DCCO and pelican nests separated tern and gull nests. However, the statement was an informal observation and no formal studies have documented this impact. In the Great Lakes region nest predation by gulls has been observed in colonies where CDM is conducted and CDM programs have been modified to minimize egg destruction by gulls (USDA 2005, 2006*a*).

Koonz (2007) describes DCCOs as primary food finders, noting that species such as gulls, terns and pelicans have learned to follow foraging groups of DCCOs and take advantage of food (i.e., fish schools) brought to the surface in response to diving DCCOs. Some commenters who fish in the Door County and Green Bay area also reported seeing this behavior, expressing concern that DCCOs may have impacts on fish populations in excess of the food needed to support DCCOs. Inadequate data exist on the extent or frequency of this type of behavior, to quantify its impacts on co-feeding bird or fish populations. However, it should be noted that under the preferred alternative at least 5,000 pairs of nesting DCCOs plus juveniles and non-breeding birds and migrants would still be present in the Door County area. Consequently, opportunities for gulls, terns and pelicans to forage with DCCOs would not be eliminated

3. Commenter is concerned that DCCOs will spread to new sites and have adverse impacts on vegetation and tree and shrub-nesting species at the new locations. Some commenters expressed specific concerns about Plum and Hog Islands in Green Bay NWR

The agencies share this concern and while there may be some inland areas where DCCO colonies may become established or re-establish without causing substantive problems, one of the general management objectives of the proposed action is to prevent establishment of new DCCO colonies in the Green Bay/Door County Area at sites with tree and shrub-nesting colonial waterbirds, or sensitive vegetation[11] and bird species such

[11] Protection of vegetation under the PRDO would be warranted if: the damage is deemed significant by the agency responsible for management of the vegetation; the vegetation comprises a unique or ecologically special vegetative community type (e.g., Carolinian forest); the vegetation provides important habitat for wildlife species of concern; the vegetation is important in preventing island erosion; and/or the vegetation includes Federal- or State-listed threatened or endangered plants.

as state or federally-listed threatened and endangered species and USFWS Birds of Conservation Concern (Section 1.5.8.1, USFWS 2008).

4. DCCO numbers are at the highest levels in recorded history. There is no mention from early French explorers of large numbers of DCCOs.

There are several historical reports from the 1800s of DCCOs nesting, sometimes in high numbers, at inland lakes in Minnesota, Missouri, Ohio, Ontario, Manitoba and Saskatchewan (Mortensen and Ringle 2007, Wires and Cuthbert 2006). However, less information is available on nesting DCCOs in the Great Lakes (Wires and Cuthbert 2006). The first formal report of DCCOs nesting on the Great Lakes comes from an anecdotal report of nesting in 1913. However, anecdotal and circumstantial evidence would appear to indicate DCCOs were probably nesting on the Great Lakes in the 1800s. The EA provides a review of available information regarding current DCCO densities in Wisconsin. In general, most biologists agree that recent numbers of DCCOs nesting on the Great Lakes have been the highest in recorded history, although a 2007 survey indicated that the total number of nesting DCCOs in the Great Lakes may have declined slightly from 2005 numbers (C. Weseloh and F. Cuthbert, unubl. data, Weseloh et al. 2006, Wires and Cuthbert 2006).

5. Plan needs to consider re-establishing vegetation on affected islands. Adverse impacts from DCCOs on plants and other birds will take years to reverse and/or will be irreversible if not managed.

As noted in EA Section 1.5.8.2, the agencies do not plan to work to reestablish vegetation on Hat, Jack, Spider, Pilot or Cat Islands. As noted in Issue 1 above, sparsely vegetated nesting sites are preferred by some bird species and have their place in native ecosystems. Pelicans nest on Cat and Hat Islands and gulls nest on all 5 Islands. The agencies recognize that the pattern of bird colonization and vegetation alteration is a natural process, but, the agencies are also aware of the importance of trees and shrubs to some species of colonial waterbirds and the need to protect rare and/or sensitive plants and vegetative communities. The decision to not attempt to re-vegetate Cat, Hat, Jack, Spider, and Pilot islands, and the decision to act to prevent the establishment of new DCCO breeding colonies at forested sites in the Green Bay area were made to balance the needs of the various plant and bird species living in the area within the constraints of available time and resources. Even if the agencies were to decide to reestablish trees and shrubs on the islands, the number of other birds, especially gulls, on some islands would make re-vegetating the sites problematical unless action was taken to reduce nesting by gulls and DCCOs. For example, in 2007, Hat and Jack Islands supported colonies of approximately 1,500-1,800 breeding pairs of Herring Gulls and on Spider Island there were over 2,400 nesting pairs of Herring Gulls (EA Appendix F). Given that DCCOs are attracted to trees and shrubs for nesting (Hebert et al. 2005) when the option is available, protecting the vegetation while still retaining DCCO colonies on the islands, as is described for the preferred alternative could be very difficult and labor intensive. However, as noted for Responses 6 and 15 below, there is some natural vegetation regeneration at Spider Island. Monitoring of conditions at that location will provide

useful information on the reestablishment of trees and shrubs at sites with large DCCO colonies. It should be noted that although the agencies have decided to not reestablish trees and shrubs on the islands, their decision does not preclude the owners of private islands from undertaking efforts to establish new vegetation.

6. There is no other life on Pilot Island except DCCOs. The environment on Spider, Pilot, Cat, Hat and Jack Islands is too fragile to support DCCOs and any other living thing.

This statement is inaccurate. Appendix F of the EA provides information on other bird species co-nesting on the islands with DCCOs. Interestingly, USFWS personnel and volunteers working on Spider Island indicate that there is a resurgence of willow, aspen and dogwood at the site in spite of the fact that Spider Island has one of the oldest DCCO colonies in the Green Bay/Door County area (S. O'dell, USFWS Horicon NWR, pers. comm., K. Stromborg, pers. comm.). See also Response 5 above.

7. Concerned about potential DCCO impacts to private property including vegetation.

In general, under the chosen alternative, DCCO damage to private property could be addressed though the use of nonlethal methods which do not need a permit and, if needed, by requesting a MBP from the USFWS. Wildlife Services could provide technical assistance (advice) on CDM and, at the request of and with funding from the landowner, could also provide operational assistance with damage management. If DCCO activity on private property adversely impacts public resources as defined under the PRDO (e.g., fish populations, nesting habitat of bird species of concern), the WDNR may choose to work with the landowner to address the damage problem within context of the PRDO as has been the case with Hat and Jack Islands in Green Bay, and Miller's Bay Island and Long Tail Island in Lake Winnebago.

8. The financial possibilities of DCCO observation are not mentioned anywhere in EA. The spectacle of thousands of DCCOs accompanied by hundreds of pelicans and innumerable gulls is one that could be used to generate tourism revenue. Agencies should make some attempt to estimate other ecosystem values.

Although NEPA regulations do not require a formal monetized cost-benefit analysis (CFR 1502.23), the EA does provide available information on economic impacts of non-consumptive wildlife activities in Wisconsin (EA Section 1.5.4). In public comments, the aesthetic and non-consumptive use value of large colonies of DCCOs and co-nesting species varied considerably. Some individuals perceived the large groups of DCCOs as "menacing" or complained about the noise, odor and vegetation loss resulting from large colonial waterbird colonies. Other expressed their excitement and pleasure at knowing that native wildlife populations were healthy enough that they could be observed in such abundance. The EA Section 1.5.4 notes that non-consumptive uses of wildlife such as bird-watching contribute significantly to the state economy, but more site-specific information is not available. The USFWS has chosen to not allow DCCO colony

reduction efforts on Pilot or Spider Islands, and CDM efforts at the remaining islands would leave a minimum of 500 breeding pairs (1,000 birds) per Island on Hat and Jack Islands and 1,000 pairs on Cat Island. These birds together with their young-of-the-year, non-breeding birds and co-nesting species would still be available for birders who enjoy watching large colonies of DCCOs and co-nesting species. Consequently, there would still be opportunities to develop economic endeavors based on watching large colonies of DCCOs (this would have to be done at a distance to avoid disturbance to the birds).

9. EA uses impacts on vegetation and other birds as justification for reducing DCCO numbers in Lower Green Bay but provides no proof that DCCOs are having an adverse impact.

Section 1.5.4.1 shows the pattern of vegetation loss at Cat Island that was concurrent with increases in DCCO nesting at the Island. We realize that the presence of high numbers of other species such as gulls may have contributed to the loss of vegetation on Cat Island, but we think that loss of trees (especially the cottonwoods that were preferentially used by DCCOs during the initial years of their presence at the island) was likely linked to DCCO activity. Section 1.5.8.2 describes the WDNR' objectives for Lower Green Bay as follows, "The proposed goal for Lower Green Bay is to reduce the breeding population and associated demands on food resources and/or nest space to *minimize incentives for DCCO expansion* from 2.5 acre Cat Island onto Lone Tree Island and other forested habitat in Lower Green Bay. No new DCCO colonies are desired in this area. This management objective was established by the WDNR after consultation with agency and other biologists. It would allow for a viable DCCO population[12], should reduce DCCO demands on food resources and nesting space and should leave ample nesting space for other colonial waterbirds such as American White Pelicans.

10. The USFWS is preventing the state from doing something to manage DCCOs. Why does it take political pressure to force a response to a real scientific need? What is USFWS waiting for?

Each agency retains its own authority to make management decisions about DCCOs. The USFWS has authority for the management of migratory birds through the MBTA and oversees implementation of the PRDO. The USFWS is also charged with the management of the National Wildlife Refuges in Green Bay. The agencies agree that it is not unreasonable or contradictory for the threshold of action for a National Wildlife Refuge to differ from that of the WDNR, WS, or private property owners.

The fundamental mission of the National Wildlife Refuge System is wildlife conservation. Green Bay and Gravel Island National Wildlife Refuges were established specifically in 1912 and 1913 (Executive Orders 1487, 1678) "as a preserve and breeding ground for native birds." Plum and Pilot Island were transferred to the USFWS in 2007 to protect native and migratory bird habitat and endangered species habitat.

[12] The number of breeding pairs nesting at Cat Island increased from 1,063 pairs in 1989 to 2,129 pairs in 1997 (Fig. 1-3).

The WDNR has a broader directive to maintain a balance between the needs of fish and wildlife, recreational interests, commercial harvest, and environmental preservation. For example, the Wisconsin Department of Natural Resources Lake Michigan Integrated Fisheries Management Plan (WDNR 2004) identified 4 goals for managing the fishery in Lake Michigan: 1) a diverse, balanced and healthy ecosystem, 2) a diverse multi-species sport fishery, 3) a sustainable commercial fishery, and 4) science-based management of Great Lakes Fisheries. WDNR DCCO management objectives for the Door County area were established to reduce DCCO foraging pressure on near-shore fisheries, specifically brown and rainbow trout. Managing for near-shore stocks of brown and rainbow trout is not within the legal authority of the USFWS and, thus, is not part of the Green Bay and Gravel Island National Wildlife Refuges' management objectives.

Consistent with the refuges' purposes to protect native migratory bird habitat and provide a preserve for breeding birds, refuge staff feel it is important to have some sites in the Green Bay area where CDM is not conducted. As units of the National Wildlife Refuge System, activities conducted on Green Bay and Gravel Island National Wildlife Refuges must meet sound science principles and effectively achieve management objectives.

Available data do not provide sufficient evidence that cormorants are the primary factor causing declines in the brown trout population in the Door County area to warrant action which would conflict with the Refuge's role "as a preserve and breeding ground for native birds" or the value of Spider and Pilot Islands as research sites where no CDM is conducted. Of particular concern to the Refuge is the lack of a dietary analysis to document what cormorants are eating in the Door County area and a quantitative assessment of the relative impacts of DCCOs (vs. other mortality factors) on the fish. In addition, as noted in the EA, it is the USFWS' desire to protect Spider Island from any form of disturbance which would jeopardize the long-term DCCO population study. The study results provide valuable information on DCCO population dynamics and may serve as a baseline to determine the impacts of CDM programs on DCCO breeding populations in the Great Lakes. The Service will continue working with the Wisconsin DCCO Coordination Group and consider future access for cormorant control if research reveals that cormorants are a primary factor in reducing fish populations in the Door County area. The agencies are aware of the public interest in the issue of CDM on refuge lands for the protection of fishery resources, and will supplement the EA, including providing opportunity for public involvement, if the NWRs reconsider the decision to not conduct CDM on refuge lands for the protection of fish populations.

Although the Refuges have determined that action to reduce DCCO numbers at Spider and Pilot Islands is not warranted at this time, the Refuge recognizes the need to protect sensitive plants and plant communities and to provide habitat for tree and shrub-nesting waterbirds (EA Section 1.5.8). Like the WDNR, the USFWS does not want new DCCO colonies at forested sites with tree and shrub-nesting colonial waterbirds and plans to use an integrated approach to prevent the establishment of new DCCO colonies in these areas. Two Islands, Plum Island and Hog Island in the Green Bay NWR, are of particular concern. The USFWS has already conducted activities to prevent the establishment of a DCCO breeding colony on Hog Island.

11. Is USFWS going to pay the state to help manage cormorants? Who's going to pay to reverse damage by DCCOs?

The USFWS is an oversight agency and is responsible for ensuring compliance with the MBTA and the PRDO regulations so that the long-term sustainability of regional DCCO populations is not threatened by CDM activities. The PRDO does not provide funding for the action agencies' CDM activities. When DCCO management is conducted on refuge lands (e.g., Hog Island), it is done by the USFWS acting as an agent of the WDNR. However, the work is paid for by the USFWS.

12. Commenter understands need for research. However, if new information indicates that reduction of DCCO numbers on Spider and Pilot Island is needed to protect nearby islands (Hog, Plum) or to protect fishery resources will the Refuge change its management plans for Spider and Pilot Islands?

Like the WDNR, the USFWS does not want new DCCO colonies established at forested sites with colonies of other tree and shrub-nesting colonial waterbirds and plans to use an integrated approach to prevent this (See Response 10 above and EA Sec. 1.5.8.3). The agencies propose to use an adaptive management approach in which management actions are monitored and adjusted in response to new data as they become available. If new information becomes available indicating that population reduction at Spider and Pilot Island would aid in protecting other Refuge islands, the USFWS and cooperating agencies could conduct CDM on Spider an Pilot Islands provided that the impacts do not exceed parameters analyzed in the EA.

13. Perhaps a controlled burn is needed to rid Pilot Island of the huge mess [dead and dying vegetation] and allow people to begin work on lighthouse. Work to repair/protect lighthouse and associated structures on Pilot Island is being impaired because access to the island is denied in order to protect DCCOs. We must act quickly to save anything on historic Pilot Island.

The USFWS recognizes the many ecological benefits of fire in restoring, maintaining, and enhancing refuge lands. Due to high moisture, isolation, and relatively small size, fire was not likely a major player in the natural disturbance regime of refuge islands. Using prescribed fire as a management tool is not consistent with current management objectives. Several species of migratory birds co-nest with cormorants at Pilot Island, including Great Blue Herons, Black-crowned Night-herons, and Herring Gulls. A prescribed burn has the potential to destroy the nests of co-nesting species and cause abandonment of co-nesting species. The refuge islands provide important stopover migration habitat for raptors and passerines. These islands are critical resting and feeding areas for exhausted birds during migration. The few remaining standing snags provide roosting habitat for a variety of migratory birds. In addition, destroying DCCO nests and removing nesting material by use of prescribed fire has potential to cause DCCO to abandon refuge islands and seek out other nearby vegetated islands (Plum and Hog). DCCOs show high fidelity to a colony site and often reuse same nests and nesting material (Hatch and Weseloh 1999).

The fundamental mission of the National Wildlife Refuge System is wildlife conservation. However, the USFWS also recognizes the importance of historical and cultural preservation. Accordingly, the USFWS formed a Friends Partnership Agreement with the Friends of Plum and Pilot Island (non-profit 501 (c)(3)) in 2008. The USFWS supports the variety of activities the Friends will undertake to stabilize and maintain the historic buildings and structures on Plum and Pilot Islands, while supporting the Service's mission and Green Bay National Wildlife Refuge. Stabilization work on the historic structures on Plum and Pilot Island is already under way. A professional engineering and architectural firm recently completed a stabilization plan for all buildings. Urgent repairs were made to the roof on the Pilot Island Lighthouse and to the Plum Island Life Saving Station and materials have been purchased to aid in stabilizing the buildings.

14. USFWS wants to continue research. Research can't be cheap. How much research is needed? Just look at two islands? The money would be better spent cleaning up and re-vegetating the islands.

The USFWS study is not investigating DCCO impacts to vegetation as the commenter implies. Gravel Island NWR (Spider Island) has been the site of a DCCO banding and observation study. Data from the banding study provides valuable information on DCCO movements, mortality rates and other facets of DCCO population dynamics (Seamans et al. 2008, Stromberg et al. 2008). The study began in 1988 and is still in progress. Because DCCOs can be long-lived, and the number of band re-sightings and recoveries is relatively small, a long-term study is needed. The objectives of this study are to 1) determine age of first nesting, 2) determine age specific survival rates and causes of mortality, 3) determine frequency of breeding by individuals and, 4) gain a better understanding of site fidelity and inter-colony movements. In 2008, the USFWS expanded the demographic study to include Green Bay NWR (Pilot Island) to investigate the issue of inter-colony movements. Addressing this issue will contribute valuable information with which to make informed management decisions in the future. The study results will provide data on DCCO population dynamics and may serve as a baseline to determine the impacts of CDM programs on DCCO breeding populations in the Great Lakes. The USFWS is committed to using scientific information to fulfill our mission and establish credibility with the public and conservation community.

The current vegetation on Spider and Pilot Islands does not comprise a unique or ecologically special vegetative community nor does it provide habitat for any state and federal species of concern. Disturbance caused by humans and the effects of colonial nesting birds will have lasting impacts to native vegetation. Vegetation that would return in the absence of colonial nesting birds will not be identical to historic vegetation. Furthermore, the vegetation will not comprise a unique or ecologically special vegetative community nor will the vegetation provide habitat for wildlife species of concern, or contribute to preventing island erosion. The NWR also recognizes destruction of woody vegetation on islands provides benefits to other colonial nesting bird species. American White Pelicans, Caspian Terns, and Common Terns, require bare or sparsely vegetated islands for nesting. These species are listed as state species of concern and state

endangered in Wisconsin. Therefore, controlling cormorants on Spider and Pilot Islands on the basis of vegetation impacts is not justified. See also Responses 2 and 5 above.

Refuge staff will continue DCCO control efforts on Hog Island. The USFWS recognizes the need to protect sensitive plants and plant communities and to provide habitat for tree and shrub nesting waterbirds. This island often supports breeding colonies of Great Blue Herons, Black-crowned Night-herons, Herring Gulls, and Red-breasted Mergansers. The vegetation of this island is relatively healthy and a DCCO colony would cause substantial damage.

15. Spider Island had trees and no smell prior to expansion of the DCCO colony. Commenters have watched Spider Island change to pile of white rocks taken over by DCCOs.

Spider Island is part of Gravel Island National Wildlife Refuges and was established specifically in 1913 (from Executive Orders of W.H .Taft) "as a preserve and breeding ground for native birds." Because of the island's importance as nesting grounds, it received wilderness designation in 1970. The island is part of the nationwide system of wilderness areas and is protected under wilderness rules and regulations.

Vegetation loss on Spider Island cannot be attributed solely to DCCOs. Spider Island historically has been used by other colonial nesting species including Great Blue Herons, Black-crowned Night-herons, and Herring Gulls. Colonial nesting species often cause changes in vegetation composition at nesting sites. The DCCO population on Spider Island was the epicenter of the recovery of the state population in the 1980s and 1990s. The Spider Island colony continued to grow until 2005 but has since leveled off. Islands are very dynamic systems, changing shape and species compositions rapidly. Woody vegetation, 10-12 ft high of pioneering tree species (*Populus sp., Salix sp.*) is being naturally re-established at Spider Island without DCCO control. See also Responses 5 and 6 above.

16. Pilot Island used to be a cool place to visit because of the lighthouse and the opportunity to see shipwrecks. People don't get this experience anymore because they see the DCCOs and associated mess and leave. Pilot Island could have more tourism if they'd get rid of the DCCOs, clean up the dead trees and rebuild the lighthouse.

The USFWS recognizes the importance of historical and cultural preservation, and respects the aesthetic values people have regarding the island and the lighthouse. The National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997 and the Fish and Wildlife Service Policy (603 FW2) require development of compatibility determinations for all refuge uses. Any public use has to be compatible with the establishing purpose of the refuge. The USFWS will consider public uses for Green Bay NWR during the Comprehensive Conservation Planning Process. However, the Service does not

anticipate any unrestricted public access will be allowed on Pilot Island due to its small size, the limited and treacherous access, and the need to ensure protection of breeding and migratory birds.

17. Cormorants are destroying the Pilot Island lighthouse.

Double-crested cormorants have likely contributed to the loss of vegetation at Pilot Island. However, the DCCOs are not nesting or roosting on the lighthouse so fecal material is not having a significant impact on the structure.

18. Refuge lands, by policy, are unmanaged and their waterbird colonies are protected from human disturbance.

This statement is not accurate. Management activities are conducted on USFWS Refuge lands to the extent that they are needed to achieve the purpose of the refuge, and can range from little to no direct manipulation of natural resources to more intensive management such as the use of water management devices in marshes and controlled burns in prairie areas. At Ottawa NWR Complex in Ohio, DCCO removals have been conducted annually at West Sister Island NWR since 2006 to maintain a balance between DCCOs and the needs of other colonial waterbirds that use the site (USDA 2006*a*). Like Gravel Island and Green Bay Islands NWRs, West Sister Island is also designated as a Wilderness Area. While it has been the general practice to minimize management of DCCOs on Spider and Pilot Islands, action has been taken to prevent DCCO colonization of Hog Island including nest and egg destruction.

19. USDA Wildlife Services should support the refuge and clearly communicate this support to the public and legislature.

WS only conducts CDM at sites with the consent of the land owner/land management agency and, consequently, respects the decision of the USFWS to not conduct CDM at Spider and Pilot Islands at this time. Furthermore, the EA at Section 4.1.2 notes that if the USFWS does not permit DCCO removal or egg oiling on Spider or Pilot islands, WS and the WDNR will support the Refuge's bird banding project by not conducting CDM activities near the islands unless approved by the USFWS.

20. Cormorants on Pilot Island need to be made uncomfortable, so policy of keeping people off Island may be wrong. Strictly controlled tours would prevent people from "disturbing" birds but might make DCCOs uncomfortable enough that they'd leave.

Please see Response 16 relative to public access to Pilot Island. The relatively small size of the islands and the interspersion of other non-target colonial waterbirds with DCCOs would make it extremely difficult to set up a visitation schedule that would be intrusive enough to get the DCCOs to leave without also having adverse impacts on the other birds that that also use the site. Disturbance of nesting DCCOs could also result in the death of

DCCO eggs or chicks which would be contrary to the USFWS management and research goals for Pilot Island.

21. DCCOs are damaging sport and commercial fish populations. If something isn't done about DCCO foraging, sport fish populations (e.g., perch, walleye) will be wiped out. The DCCOs are preventing full recovery of the yellow perch population

The EA provides available information on the impacts of DCCOs on fish in Wisconsin, including yellow perch, in Section 1.5.3. Models using data from a DCCO food habits study conducted in lower Green Bay indicated that although high DCCO concentrations may have reduced the magnitude of the population increase that could result from a strong perch year class, there was no reason to believe that DCCOs were causing a decline in the perch population. The opportunistic foraging pattern of DCCOs makes it improbable that they will completely eliminate any naturally reproducing fish population. DCCOs are opportunistic foragers, and generally take species in proportion to their availability (Section 1.5.2.1). Consequently, when the abundance of a species declines, it makes up a decreasing proportion of the DCCO diet and other fish species make up a larger portion of the diet.

Cormorant impacts on fish populations vary depending on the species and location of the fish. Walleye catch from the Wisconsin waters of southern Green Bay has been generally increasing since 2002 (WDNR 2008). The walleye population in this area appears to be healthy and mortality is not excessive for any size class (WDNR 2008). In 2006, the WDNR was able to increase the number of yellow perch that can be taken by licensed sport fishermen in Green Bay. In 2006 and 2007, the WDNR also increased the yellow perch quota for commercial fishermen in Green Bay (WDNR 2008). Green Bay Yellow perch harvest in 2007 was down from 2006 but was still higher than had been observed from 1997-2005. However, data from recent years indicate that there is less recruitment into the yearling and older classes than would be expected given the improved perch reproduction (WDNR 2007a, 2008, See also Response 29. Information on mpacts of DCCOs on stocked brown trout is discussed in Section 1.5.3.2 and Responses 24, 34-36.

22. Introduction of zebra mussels has resulted in clearer water and made it easier for DCCOs to forage on whitefish spawning and feeding in shallow water. Now fishermen are not finding whitefish in these areas. There was a reduction in food for whitefish but the majority of the problem is DCCOs. The North Moonlight Bay area is the largest spawning ground for whitefish on the Great Lakes and DCCO control should be a priority in this area. Impacts of this change include reduced growth rates in whitefish and the more aggressive whitefish are now in deeper water disrupting the already stressed chub population by forcing them off their preferred spring and summer habitat.

While it is a fact that the water clarity has increased during the same time period that DCCO numbers have increased, it is the professional judgment of the WDNR Fisheries Biologists that lake whitefish and chub populations are largely unaffected by DCCO. Chubs typically inhabit water in excess of 300 feet and are unlikely to be directly

impacted by DCCO. Historically, lake whitefish have seasonally inhabited water depths within reach of DCCO. However, lake whitefish across the Great Lakes Basin have made significant population level adjustments probably in response to food availability. Since the increase in water clarity and concurrent collapse of diporeia, a major diet item for whitefish, whitefish are typically inhabiting deeper water in the 100-200 feet range.

Lake Michigan is experiencing biomass declines of many fish (but not lake whitefish) and invertebrate species, and is thought to be from oligotrophication from quagga and zebra mussels that is affecting the lower food web. Primary production is being shunted to the benthos and trapped there in the form of these mussels that few fish can consume. This is preventing energy from moving up to secondary production where is can be used by forage fish. Hence there are less forage fish to support predators. This is has been occurring in Lake Huron,(which is now more like Lake Superior), and has reduced fish biomass greatly there. It is possible that the lake, with so many mussels, cannot support the level of fish production it once did.

23. Individuals engaged in commercial fishing are reporting increased numbers of fish with scars and injuries from DCCOs. DCCOs also dive into pond and trap nets and kill and injure fish.

Lake whitefish caught in pound nets, which are open to the surface, are frequently "slashed" by DCCO. However, Craven and Lev (1987) also reported that the majority of loss of lake whitefish to DCCO was through the killing of fish in what is otherwise a live-capture device. Pound nets are intended to keep fish enclosed within the trap space, not to catch and restrain the fish in the mesh of the net. Since fish can swim freely in the pound net and are not supposed to be killed by the gear, the WDNR has a 5-day lifting requirement on this type of commercial gear. When DCCOs chase fish in pound nets they can become lodged in the mesh of the net and die. Because pound nets are not checked daily, the fish that are killed in the nets are often not suitable for sale by the time the gear is checked. Craven and Lev (1987) tested 9 devices for deterring DCCO perching on pound net posts and activity near pound nets. In general, DCCO adjusted to all devices within approximately 4 weeks. Problems with DCCO depredation are a major reason that the commercial industry has gotten away from using pound nets and is now using more trap nets which are not open to the surface for harvesting lake whitefish. Trap net use has also increased as the lake whitefish have moved deeper as pound nets are only fished in waters less than ~80 feet and most of the whitefish harvest is now from deeper waters where trap nets are still effective.

24. There is no science to prove DCCOs are responsible for the brown trout problems. The idea of picking out a single factor without considering alternative hypothesis is indefensible. Use of post hoc covariance analysis to examine the time course of harvest in two geographic areas of Wisconsin is statistically wrong. Data are correlational and do not demonstrate cause and effect and should not be used.

The analysis was conducted as a simple exploratory statistic to determine if there was a difference in the harvest rates over time between the two areas. As such it is an

appropriate use of the test. The EA section 1.5.3.2 states quite clearly that the information is correlational and is not evidence of a cause and effect relationship implicating DCCOs. However, information of this nature can be used as a starting point for discussion and additional investigation. Additional discussion of factors which may also have adverse impacts on brown trout harvest rates is provided in Response 35. See also EA Section 2.2.5.

25. Washington Island economy depends on healthy fish stocks for sport and commercial fishermen. Fishing economy brings several million dollars a year to state economy. We need to protect livelihoods of men and women who work in the sport or commercial fishing industries.

The economic importance of sport fishing activities to the Wisconsin economy is addressed in Section 1.5.3.2. In 2007, Wisconsin had 68 individuals licensed as commercial fishers on Lake Michigan (including Green Bay). All 68 were small businesses, or conduct fishing operations with other licensees as part of a small business – often a family business where commercial fishing licenses are held by 2 or more family members (WDNR 2007*b*). The WDNR recognizes the importance of fishing to the recreation and economy of the region and has established maintenance of a stable commercial fishery as a management priority in the Lake Michigan Fishery Management Plan (WDNR 2004). Concerns regarding the commercial and sport fishery are among the reasons the WDNR proposed CDM in the Door County area (Section 1.5.3.2).

26. Commenter is worried about DCCO impacts on fishery and natural resources in inland lakes.

The EA, Section 1.5.8.1, states that the agencies will manage colonization or increase of inland sites on a case-by-case basis. Historically, several inland sites supported DCCO colonies that were higher than current levels without reports of adverse impacts of DCCOs. CDM activities and ongoing DCCO population expansion may result in movement of some DCCOs to existing, historic or new inland sites. It seems likely that opportunities exist for the establishment or increase of inland colonies which would allow for increased opportunities to view and enjoy DCCOs without necessarily having the adverse impacts that are currently being addressed at large colonies in the Lower Green Bay/Door County Area. However, as noted for Lake Winnebago, some management of inland colonies may also be needed.

27. Could it be that we are responsible for current DCCO numbers through fish stocking and introduced species? Agencies should consider discontinuing all stocking of fish and support of aquaculture and let the DCCOs regulate their own numbers.

Factors believed to contribute to the increase in the Interior DCCO population include the protection of DCCOs under the Migratory Bird Treaty Act, reduction of the level of compounds such as DDT in the environment which were adversely impacting reproduction, and substantial increases in forage fish species in the Great Lakes during

the late 1950s through the 1980s (USFWS 2003). Expansion of the aquaculture industry in the south provided additional food for over-wintering DCCOs. Consequently, adults may have reached breeding grounds in better condition which may also have contributed to increased productivity (USFWS 2003). The states are not stocking fish into the Great Lakes in sufficient quantity for the stocked fish to comprise a significant portion of DCCO diets, and many of the fish stocked are species which are open water pelagic predators and would only be available to DCCOs for a brief period of time immediately after stocking. Discontinuing WI fish stocking programs is unlikely to have a substantive impact on the DCCO population. The existence and support of southern aquaculture is outside the scope of the EA. However, it should be noted that ongoing depredation management programs in the southern states are limiting the availability of farmed fish to foraging DCCOs.

28. Commenter understands that predator fish have been introduced to Lake Michigan to control bait fish, but doesn't think this is working.

Predatory fish species such as salmon were introduced to the Great Lakes in response to declines in native predator fish populations and a surge in forage fish populations, especially invasive species such as alewife (WDNR 2004). In 1967, over 85% of the fish biomass in the Lake Michigan was comprised of alewife and over the next two years windrows of dead alewives washed up on Lake Michigan beaches. These were symptoms of an ecological system out of balance. Fish managers attempted to control the exotic alewives by stocking pelagic predators, which were also exotic to Lake Michigan. The introduction of pelagic predators to control alewife numbers was very successful (P. Peeters, WDNR, pers. comm.). State agencies are currently managing stocking rates, including decreasing stocking of some species to keep population of predator species in balance with available forage (WDNR 2004, 2007*a*, 2008).

29. There have been 5 or 6 years of above-average perch reproduction but fish haven't made it to adult status.

Yellow perch reproduction in Green Bay for 2002-2007 has been better than most years during 1992-2001 except 1998 when there was a strong year class (Fig. 6-1, WDNR 2008). During the 1990s, the Green Bay yellow perch population was depressed as a result of low reproductive success as measured by young of year numbers in late summer survey gear. More recently, young of year yellow perch numbers in the late summer surveys have been considerably higher. Reproduction was extremely high in 2003. However, yearling and older fish, especially from the 2003-2006 year classes, are not being detected in the WDNR surveys at rates that would be expected given improved reproduction in the population (Fig. 6-2). Fish aren't making it to a harvestable size even though there now appears to be adequate reproduction. This trend is typical of what might be expected if there is high mortality in young fish, usually from predation. The increase in mortality includes fish that are smaller than would generally be taken for human use, so over-harvest by the sport or commercial fishery is not a likely cause of the observed trend. DCCOs do readily forage on yearling and older fish as do other predators such as walleye (Meadows 2007, Fielder 2008). Density-dependent declines in

survival related to competition for food and space can also cause this type of pattern. However, Green Bay has previously been able to support much larger perch populations. Even with declines in forage related to the introduced mussels, WDNR biologists believe it is unlikely that demands on resources are high enough that density dependent mortality is a major factor for the perch population. It seems likely that predation by DCCOs and/or other predators is responsible for the decline in recruitment of perch to older age classes.

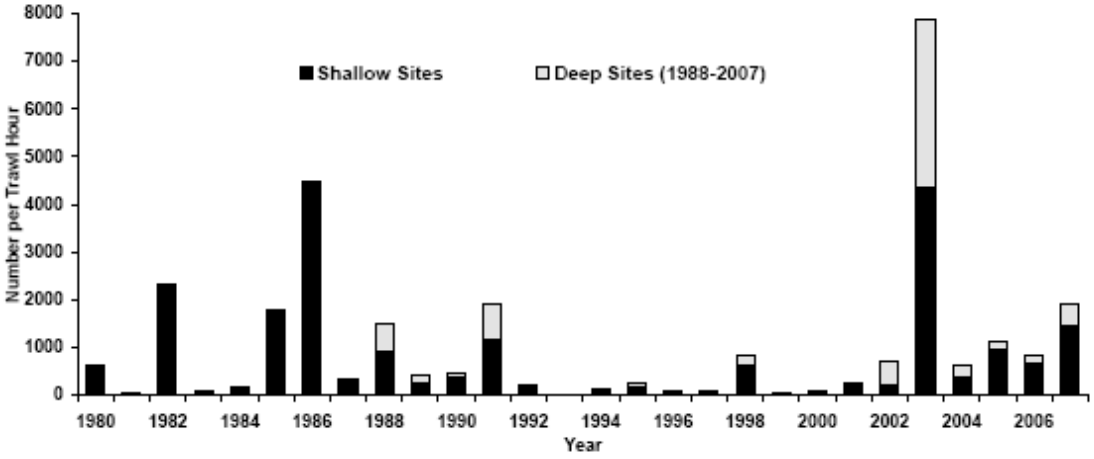

Figure 6-1. Relative abundance, weighted area average, of young of the year yellow perch collected during late summer index trawling surveys in Green Bay from 1980-2007 (WDNR 2008).

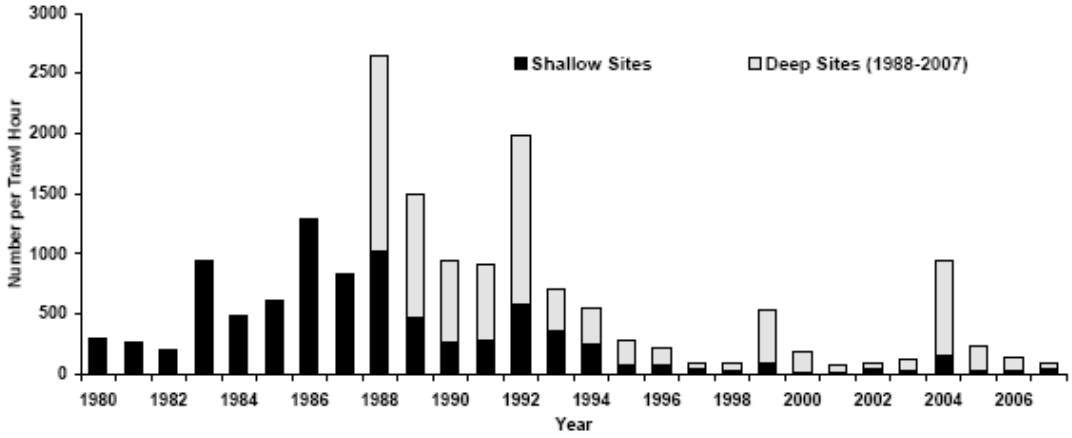

Figure 6-2. Relative abundance (weighted area average) of yearling and older yellow perch collected during late summer index trawling surveys in Green Bay from 1980-2007 (WDNR 2008).

30. Stocking efforts of WDNR and professional fishermen are being wasted because of DCCOs. Fishermen do not want to pay to raise DCCOs.

Presence of DCCOs is not resulting in unilateral failure of WDNR stocking efforts. To the extent practicable, the WDNR continues to employ nonlethal methods to reduce predation on newly stocked fish including adjusting the timing and location of releases to minimize exposure to DCCO predation (Section 1.5.3.2). Thanks, in part, to stocking efforts, Wisconsin has a world class off-shore trout and salmon fishery. In 2007, an estimated 645,000 trout and salmon were harvested from the Wisconsin waters of Lake Michigan including record harvest of Chinook salmon and above-average harvest of coho salmon (WDNR 2008). The Great Lakes spotted musky reintroduction is supporting an increasingly popular sport fishery and years of lake trout reintroduction have resulted in a large population of adult lake trout in the mid-lake reef complex. Although data indicate problems with brown trout management in some portions of the state, brown trout fishing has been excellent in the southern part of the state including a popular winter fishery in Milwaukee.

31. Commenter saw large numbers of DCCOs and pelicans on Mississippi River near Lynxville in mid-September. Did these birds move inland from Green Bay? Are they having an adverse impact on the local fish population?

Given the timing of the observation, the majority of the birds were likely migrants and not bird breeding in the area. To date, there is no data indicating adverse impacts of DCCOs on the fishery.

32. Commenters are concerned about DCCO 'feeding frenzies" in areas where fish are stocked. Birds are coming up with game fish not young alewife.

Recently stocked fish are particularly vulnerable to bird predation because they are unfamiliar with the environment into which they were stocked and require some time to become acclimated. Research has documented that cormorants can adversely impact congregations of recently stocked salmonids (Modde et al. 1996, Ross and Johnston 1999). The WDNR has adjusted management practices to minimize the risk of DCCO predation on newly stocked fish including stocking fish before DCCOs return in spring (including stocking fish under the ice), holding fall stocking until DCCOs have migrated south, and, in some situations, changing stocking locations. However, tight budgets, transport costs, and the need to move fish out of the hatchery are making it increasingly difficult to implement these practices. Harassment and harassment reinforced with lethal removal of a limited number of birds have been used in other parts of the country to address problems with bird predation on newly stocked fish.

33. Is it better to let DCCOs get millions of perch and people not get any? Why do DCCOs get to eat as many perch as they want but people are limited to 10 per day? If there is no impact from DCCOs taking a huge amount of fish, why are we limiting sport and commercial harvest? If it's worth trying anything, (specifically limiting

commercial and recreational harvest of perch) why aren't we limiting DCCO take too?

The issue of resource allocation is at the core of most management situations where humans and wildlife use the same resources. As noted in Response 21 above, people are getting yellow perch. Commercial and sport harvest limits in Green Bay have increased in recent years. Perch limit is 15/day in Green Bay and 5/day in Lake Michigan.

The DNR agrees that a fully integrated approach is needed to aid recovery of state fish populations and has proposed CDM as part of a larger effort to help increase fish populations which also includes limits on sport and commercial harvest. Additionally, fish removal by DCCOs may not have the same level of impact on the perch population as fish removal by humans. DCCOs take smaller fish than are taken by people, although DCCOs are capable of taking larger fish too (Meadows 2007). Each year, a certain portion of the perch population dies of various causes including natural mortality. The probability that a younger fish will survive to reproductive age is lower than for older fish. Consequently there is a higher probability that death of a younger fish to DCCO predation will occur in lieu of (is compensatory to) other forms of mortality is higher than for older fish taken by sport and commercial fishing. Protection of older fish as happens through limits on human harvest reduces impacts on spawning stocks and allows adult fish to spawn multiple years in their lifetime (WDNR 2008).

34. EA fails to acknowledge Brown trout declines throughout the Great Lakes including areas without DCCOs. Brown trout decline has occurred throughout Lake Michigan even in areas without DCCO predation pressure. Why are we proposing to kill a native species to protect a non-native fish that is performing poorly even in areas without DCCOs? Why is the WDNR stocking fish species that are not adapted to the suite of natural predators?

In Section 1.5.3.2, the EA acknowledges that brown trout harvest has declined some even in areas that are not in proximity to large DCCO colonies but notes that the decline is greater for areas that are closer to the DCCO colonies. The WDNR Lake Michigan Fisheries Management Plan (WDNR 2004) was developed with pubic input and external agency review. Enhancement of diverse fishing opportunities, including near-shore fishing opportunities is established as a management objective in the plan. Establishment and monitoring of brown and rainbow trout are discussed in the WDNR plan as a means of achieving this objective. Although certain strains of brown trout have not been successful in some areas of Lake Michigan and Huron (Wills 2005, Johnson and Rakoczy 2004), the WDNR has been successful with brown trout in Green Bay and the Door County area until the early 1990s. More recently, brown trout management has remained quite successful in the southern parts of Wisconsin's jurisdiction on Lake Michigan (WDNR 2008) and believes that brown trout harvest rates in areas without DCCO colonies are strong enough to warrant ongoing management effort (P. Peeters, WDNR, pers. comm.).

35. EA needs to thoroughly examine alternative explanations for decline in brown trout. Other factors which have been proposed/ considered include inferior genetics of hatchery fish, lack of smelt for forage/lack of forage fish, impact of other exotic species, habitat conditions, and successful recovery of the walleye population in Green Bay.

Low brown trout harvest rates have been observed for the Green Bay and Lake Michigan sides of the Door County Peninsula. While it is true that predation of walleye on recently stocked brown trout could help explain some of the reduced brown trout harvests in the Bay of Green Bay, walleye predation is not a factor in Lake Michigan on the East side of the Door Peninsula as walleye are seldom found in Lake Michigan proper. Although other states have expressed concerns with various genetic strains that they have been using for Great Lakes stocking, there is no difference in the stocks of brown trout used by WDNR that would explain the different trends in harvest rates between areas with and without large DCCO colonies in Wisconsin's Lake Michigan jurisdiction. The decline in forage fish is lake-wide and also would not explain the observed difference in brown trout harvest in areas with and without large DCCO colonies. Similarly, there are no currently known patterns in presence of exotic species or habitat conditions that would explain the observed pattern in brown trout harvest rates.

36. EA clearly points out lack of objective, scientific data to support action. The proposed decimation of a native bird species seems particularly egregious when not based on objective fact. Without documentation and credible data supporting the choice adopted for population goals, any management decision is arbitrary and capricious.

The agencies do not agree. The proposed action is not arbitrary or capricious. The agencies have considered every aspect of the problem that we thought, in our professional opinion, was important including the issue of other predatory fish impacts on perch populations raised by the commenter. The decision is not unlawful. "So long as an agency considers all relevant evidence, a factual finding is not arbitrary and capricious simply because conflicting evidence exists." (p35, Judge Castel's decision on Fund et al. v. Norton et al., March 2005). See EA Section 2.2.5. The analysis in Chapter 4 indicates that the proposed action will not jeopardize or result in the decimation of the state, regional or national DCCO population. The EA provides the data and science-based inference that were used to identify the sites where CDM may be conducted (Sections 1.5.3 and 1.5.8 and responses to comments). The emphasis on egg oiling to achieve population reduction at the Door County and Green Bay Islands is far less aggressive than the shooting programs employed by other Great Lakes states. The agencies believe that the more gradual DCCO population reductions that will result from egg oiling are appropriate given the nature of the problem and limitations of the existing information.

The problem with CDM for the protection of fishery resources is, and will continue to be, that the data necessary to fully explore these issues do not exist in many locations and/or will be very costly and likely take time (years) to obtain. In the FEIS, the USFWS stated that they "do not believe that agencies should have to wait until impacts occur and are

proven with absolute certainty before they are allowed to manage DCCOs. While the agencies agree that having highly detailed information on each site prior to initiating CDM would be optimal, they also recognize that there are consequences to inaction in places where CDM is warranted including adverse impacts on fish populations, local fishing opportunities and associated industries, commercial fisheries and ecosystems. The adaptive management approach presented here allows agencies to take action to reduce adverse impacts while engaging in an ongoing process of data review and subsequent modification of management actions to ensure that the actions will not have substantial cumulative adverse impacts on DCCOs or non-target species.

37. The number of nesting DCCOs has remained relatively constant while perch population has rebounded. Walleye and bass fisheries have exploded and total biomass as counted by the trawls has increased. Surely this indicates there has been little or no adverse impact of DCCOs on total fisheries.

Impact of DCCOs on fish varies depending upon the species of fish. For example, walleye grow out of the size range generally preferred by DCCOs within a few years whereas yellow perch are within the size range commonly consumed by DCCOs for a much larger portion of their lives. Impacts on a healthy, relatively abundant and naturally reproducing bass population won't be the same as impacts on a much more limited population of stocked trout. The increase in the yellow perch population is largely linked to the increase in reproduction starting with the 2003 year class. Fish from this year class comprised 42 and 39% of the open water sport harvest in 2006 and 2007, respectively (WDNR 2008). Fish from the 2003 year class also comprised 82% of fish harvested under the ice in 2007. Although reproduction rates in Green Bay have been good from 2003-2007, there has not been a commensurate increase of yearling and older yellow perch. If poor recruitment of perch into older age classes continues to occur there may be a resurgence of problems with the availability of yellow perch for sport harvest. See also Response 29.

38. Studies indicate that fish in large schools such as gizzard shad are not taken in a truly random fashion. Rather, members of schools carrying heaviest pollution load whose immune systems are compromised and are unable to synchronize their movements with those of the school are disproportionately taken by DCCOs. Viral Hemororragic Septicemia (VHS) has a neurological affect on fish. VHS is killed by temperatures in the gut of birds so it could be argued that DCCOs are a frontline defense against VHS.

It is true that fish which are sick or otherwise incapacitated are more vulnerable to predation. However, given the range of fish species vulnerable to this disease, and given that the fish shed the disease for some time prior to showing symptoms of the disease; it is highly unlikely that DCCO would have a substantive positive impact on the spread of VHS.

39. Fish species heavily represented in DCCO diets were introduced species, so DCCOs are helping to restore balance. By controlling DCCOs, you are protecting introduced species.

DCCOs are opportunistic foragers and take forage fish in proportion to their occurrence in the population. A high proportion of non-native fish in DCCO diets is indicative of a high proportion of non-native fish in the fish community. Reduction in local DCCO populations will result in reduction in feeding pressure on the fish community as a whole including desired and undesirable species. Just as DCCO foraging is unlikely to eliminate sport and commercial fish populations (Response 21); it is also unlikely to result in the elimination of invasive species.

40. Round gobies are especially vulnerable to DCCO predation because they are a territorial nest/egg predator. Territorial gobies are more vulnerable than non-territorial semi-pelagic species that may be more likely to flee site of attack. DCCOs may be providing a valuable service by removing invasive species.

There are no data to support the hypothesis presented above. Population data for Round Gobies also provides no evidence of a suppression of goby numbers by DCCOs. The U.S. Geological Survey report on prey fish populations in Lake Michigan for 2008 indicates that Round Goby population has increased exponentially from 2003 when they were first detected in the survey (Bunnell et al. 2008). In 2008, round gobies made up 18% of the total prey fish biomass in the survey and were captured at all survey transects and all depths sampled. WDNR forage trawling data appear to indicate a similar trend in Green Bay (WDNR 2008).

41. Now that resource has rebounded, citizens refuse to share the bounty with native species that have not been proven to cause lasting harm. Please don't reject the turnaround of the Bay by focusing on one small element.

We do not concur with this determination. Agency efforts to balance the demands of people and wildlife on the natural resources in the state do not constitute a rejection of improvements in some facets of the ecology of Green Bay. The proposed action is intended to maintain a viable DCCO population in the state while still allowing for commercial, recreational and aesthetic use and enjoyment of the state's natural resources. The proposed actions are not intended to eliminate DCCOs and DCCO foraging on fish, so it is also not accurate to depict the proposed action as a refusal to share fishery resources with wildlife. See also Response 1.

42. Real need for action is perceptions and attitudes of fish harvesters and not a documented case of damage to the fishery. Decision is solely motivated by a perceived problem based on attitudes of fish harvesters and a DNR dependent on fish harvesters for revenue. EA needs to clearly state that the objective of the proposed action is to manage conflict, not manage damage.

The conflict between human and wildlife uses of resources is at the heart of many wildlife damage situations. As stated in other responses to comments in this chapter, agencies do not agree that there is no information indicating that DCCOs may be having an adverse impact on fishery resources in some areas. What constitutes "sufficient" evidence to justify CDM is, to a certain extent, a question of values. Among stakeholders concerned with DCCO management, there is considerable disagreement over whether or not the proposed action is justified, with some individuals arguing for more or less CDM than is proposed in the EA. We also do not concur that protection of fishery resources is the sole need for action. As noted in Section 1.5.8, reasons for conducting CDM actions in Green Bay also include concerns about DCCO impacts on habitat and co-nesting species. The EA also provides examples of other types of damage caused by DCCOs which could be addressed by the agencies including damage to property and DCCO predation at aquaculture facilities.

43. The EA does not address the fact the decade long yellow perch reproductive failure was not an avian predation problem. Overharvesting, especially in winters 1989 and 1990, led to overly-high pressure on gravid female perch which contributed to the population problem. EA should acknowledge that the standard of harvest set during years of record perch abundance is a misleading target for normal conditions and cannot be consistently produced by any fisheries management program.

Section 1.5.3.1 clearly states that poor reproduction during the period of 1980 – 2002 was a major factor contributing to the decline in the perch population. However as noted in Response 29, there is current data indicating that although reproduction and the abundance of the adult stock in recent years has improved, biologists are not seeing expected increases in survival of perch to older age classes.

The WDNR is also aware that under current conditions unlimited perch harvest cannot be sustained by the population. Consequently, the state has established commercial and sport harvest limits as part of an integrated approach for the protection and enhancement of yellow perch populations. The program includes monitoring of the populations and regulatory mechanisms for adjusting harvest in response to changes in the perch population (WDNR 2004, 2008).

44. Brown trout and rainbow trout are managed in Lake Michigan as feral species under conditions analogous to livestock grazing on the open ranges of the 19th century.

We do not agree. Brown and rainbow trout are not private property stocked for the benefit of a limited number of private property owners, and there is no evidence that these species have been stocked at a rate detrimental to the Lake Michigan and Green Bay ecosystems. The WDNR is working to establish stocks of these fish to enhance public near-shore fishing opportunities. The stocking brown and rainbow trout to enhance near shore fisheries is specified in the Wisconsin Lake Michigan management plan which was developed with public review and input (WDNR 2004).

45. Argument that DCCOs may be preying on brown trout but that it would be undetectable by food habits study is flimsy to the point of being insulting.

The EA states that, given the relatively limited number of brown trout stocked by the WDNR in the Northern Door County area, even a very low rate of individual DCCO predation on brown tout could have an adverse impact on the population if the DCCO population is high. For example, using the DCCO population information in Section 1.5.2 and 1.5.3.2, there were approximately 28,000 breeding and nonbreeding DCCOs in the Door County area during the summer. If each of these birds consumed only 9 brown trout during the approximately 6 months they are present in the Door County area, it would account for approximately half of the roughly 500,000 brown trout stocked in the area by the WDNR. This estimate does not include any brown trout that may be taken by migrating birds, nor does it include an estimate of trout that may be taken to feed young of the year. A foraging rate of 9 brown trout in 6 months would only be a very small portion of the DCCO diet in a food habits study, but it would comprise a substantial portion of the fish stocked.

46. It is unacceptable to control a well adapted native species (DCCOs) to support a poorly adapted non-native species (brown trout). Spending money on this species is a waste when considered in context of broader ecosystem dynamics. Setting bird population numbers or management goals based on fishery goals is contrary to sound bird management and ecological principles.

The appropriateness of managing DCCOs for the protection of brown and rainbow trout is a value judgment that will vary depending on the values and perspectives of the individuals involved. The determination to spend money stocking brown and rainbow trout to enhance near shore fisheries is specified in the Wisconsin Lake Michigan management plan which was developed with public and outside agency review and input (WDNR 2004). Many of the predatory fish populations in Lake Michigan are non-native species that were introduced to control over-abundant alewives whose populations exploded after the native lake trout was eliminate from Lake Michigan by overfishing and sea lamprey predation (Section 2.2.7). Managing predator species for the protection of prey species is not a new concept in the field of wildlife management. Local DCCO management programs for the enhancement of fish populations are in place in Michigan and Minnesota (USDA 2005, 2006*b*)

47. Adaptive management requires collection of data of high enough quality to inform decisions. These data do not currently exist and funding limits mean they may never be collected. At a minimum there should be a plan for data acquisition that would inform future management decision.

We agree that one of the primary challenges to CDM for the protection of fishery resources is that the data necessary to fully explore these issues don't exist in many locations and/or will be very costly and likely take time (years) to obtain. While the agencies agree that having highly detailed information on each site prior to initiating

CDM would be optimal, they also recognize that there are consequences to inaction in places where CDM is warranted including adverse impacts on fish populations, local fishing opportunities and associated industries, commercial fisheries and ecosystems. The WDNR will continue to gather the fisheries data presented in the EA which have prompted agency concerns regarding impacts on fishery resources. The WDNR also initiated a trawl survey in Green Bay in 2003 to monitor forage fish populations this survey is just starting to provide information on forage fish population trends in Green Bay and may provide information relevant to CDM in the future. The agencies will continue to monitor DCCO populations and will coordinate information on regional and national DCCO population impacts. Additionally, as noted in Section 1.5.9, the agencies are working with the NWRC on alternative methods for detecting the presence of stocked fish in DCCO diets.

48. If DCCO impacts are not important enough to warrant WDNR redirection of management dollars reinforces the idea that there really isn't a significant management problem.

The availability of funding for a project, especially in tight economic times, is not an indicator of whether or not there is an issue that needs to be addressed. For example, available resources, including funding, are one of the reasons why some species which the USFWS has determined are warranted for listing under the ESA are precluded from listing at this time. It is also inaccurate to say that the WDNR has not reallocated resources for CDM since most CDM actions for the protection of public resources currently conducted in the state are paid for by the WDNR which has not received additional funding to conduct these actions.

49. EA wrongly assumes all fish are equal in terms of caloric density and that DCCO energy needs are the same everywhere.

We agree that fish species vary in their caloric density, and that the ideal situation would be to predict DCCO impacts using a more detailed model. However, sufficient data are not available to conduct this type of analysis for DCCOs in the Door County area. Data from the DCCO food habits study conducted at Cat Island (Meadows 2007) may provide a better estimate of DCCO diets and food consumption in the Door County area than the figures from the literature because the Green Bay data are more likely to represent conditions and fish available to DCCOs in the Green Bay/Door County area. Plugging this information in to the equations provided in Section 1.5.3.2 yields the following conservative estimate of fish consumption by DCCOs in the Door County area. Average estimates of fish consumption from Meadows (2007) for chick rearing and chick independence periods were substituted for values for nestling and fledglings below.

Breeding adults

12,536 breeding pairs in the Door County Area in 2007 x 2 adults/pair x 0.7 lb fish/day x 182 days = **3,194,173 lbs**.

Non-breeding adults

12,536 breeding pairs in the Door County Area in 2007 x 0.6 (non-breeder/breeding pair ratio) x 0.7 lb fish/day x 182 days = **958,252 lbs**.

Nestlings

12,536 breeding pairs in the Door County Area in 2007 x 2 nestlings/nest (Meadows 2007) x 0.2 (Meadows 2007) x 56 days = **308,887 lbs**.

Fledglings

12,536 breeding pairs in the Door County Area in 2007 x 2 nestlings/nest x 0.5 lb fish/day x 49 days = **614,264 lbs**.

Total fish consumption in Door County Area = 5,075,576 lbs.

As with the initial calculations used in the EA, without food habits data for the Door County area, the exact impact of this level of fish removal is unclear. However, at current levels of DCCO foraging, fishery biologists with the WDNR are concerned about potential impacts of DCCO foraging on overall biomass production and the health of the fishery ecosystem. Although this estimate is less than the average annual commercial harvest of forage fish of 11.1 million pounds that prompted the WDNR to close the commercial alewife fishery, impacts of DCCO foraging are concentrated in a much smaller area than the commercial fishing harvest. Impacts of DCCO foraging may have a much greater impact on the local fishery around the colonies than the commercial harvest even though the DCCOs take less fish.

50. Why haven't the bass suffered like the trout?

Bass have a much larger naturally-reproducing population. As such, the bass population is better able to withstand DCCO foraging pressure. Additionally, the brown trout go through a brief period of disorientation after stocking that makes them more vulnerable to DCCO predation, than the bass.

51. EA correctly notes that without data on the total fish biomass available in the Green Bay/Door county area, putting the estimated total fish consumption of the DCCO population in context is virtually impossible. No attempt is made to project what that 20 million pounds of fish would mean in terms of the real objective - producing more exotic Pacific Salmon in the sport harvest.

The EA clearly states the limitations of the available data. As noted in Response 28, predatory fish species such as salmon were introduced to the Great Lakes in response to

declines in native predator fish populations and a surge in forage fish populations, especially invasive species such as alewife (WDNR 2004). The species were also selected and are currently managed to provide fishing opportunities (WDNR 2004). Fish population monitoring, and data on the number, size, and condition of predatory fish harvested are used to monitor the predator-prey relationships in the lake (WDNR 2008). Predatory fish stocking and harvest levels are adjusted as needed in order to maintain a balance between predator and forage fish populations (WDNR 2004). In 1991, prior to much of the expansion of the DCCO population in Green Bay/Door County area, the WDNR ended the commercial harvest of alewives which was averaging about 11.1 million pounds /year (1987-1991) because of concerns regarding the availability of forage fish for salmon. It is not surprising or inconsistent that the WDNR is concerned about the foraging demands of a predatory bird population that have subsequently come to approach that of the cancelled commercial harvest.

52. The complex interrelationships among the multitude of fish stocks virtually ensures that any compensatory mechanisms exist to buffer whatever effects avian predators might have. EA contains no evaluation of potential compensatory mechanisms but instead builds a one-sided argument in favor of CDM.

There are not always intrinsic compensatory mechanisms to buffer effects of an ecological perturbation and this is notably true of the Great Lakes ecosystem. One case in point would be the invasion of sea lamprey and how they lead to the extirpation of the native lake trout population in Lake Michigan. While the Lake Michigan ecosystem is complex and resilient, it is vulnerable to dramatic ecological shifts. It is the responsibility of resource management agencies to mitigate these perturbations within the purview of their statutory authority

53. Statement that "the use of nonnative species in the Great Lakes is often heralded as on the great natural resource management success stories of our time." is misleading because while some of the non-native species may provide some usefulness to humans, many invasive species are having an adverse impact.

We do not agree. In context, the statement refers to the introduction of predatory fish species that was initiated in response to declines in native predatory fish species and to the explosion of non-native alewives that were dying and rotting on the beaches each year.(Response 28). See also Section 2.2.4. However, for added clarity, the statement has been adjusted to read, “the intentional introduction of nonnative predatory fish species in the Great Lakes is often heralded as one the great natural resource management success stories of our time.”

54. EA says "health of fishery ecosystem" is objective of program (Page 22). Most definitions of healthy ecosystems include viable predator-prey relationships as an indicator of ecosystem health. EA is actually directed not at ecosystem health but one service - fish harvest not healthy ecosystem relationships.

The fish community in Lake Michigan is a highly perturbed (e.g., contaminants, introduced species) and intensively managed system (WDNR 2004, 2008). As noted in Response 28, predatory fish species such as salmon were introduced to the Great Lakes in part because declines in native predator fish populations and a surge in forage fish populations (e.g., alewife) had led to unbalanced predator/prey relationships in the lake (WDNR 2004). The surge in non-native forage fish species in the Great Lakes during the late 1950s through the 1980s and the increase in the southern aquaculture industry are among the factors that have lead to record high populations of nesting DCCOs (USFWS 2003). The WDNR is seeking to include management of DCCO foraging as another component of the overall Lake Michigan fishery management effort which includes managing for healthy predatory prey relationships and fishing opportunities for people (WDNR 2004).

55. The loss of vegetation on islands with DCCOs may be replaced by resurgent vegetation on Strawberry, Little Sister and other nearby islands that are enlarged because of the decline in lake level. If these new areas are used by colonial birds then there will be enough space for all birds to survive and thrive.

While low lake levels have resulted in increases in the size of some Green Bay islands, several factors limit the utility of these sites for tree-nesting bird species. The WDNR is concerned about the reliability of these areas as a habitat source. Just as years of low rainfall led to the creation of the islands, years of high rainfall could just as readily eliminate the newly created habitat. It will also take years for the tree and shrub vegetation preferred by some species to become well established at these locations. The statement also assumes that the DCCOs would not move to the newly created habitat and have adverse impacts in the new locations. CDM is already being conducted on Little Strawberry to protect vegetation at that site, and the reductions in colony size proposed in the EA are intended, in part to reduce resource demands at these locations and associated incentives for DCCOs to move to new locations.

56. If nothing is done about DCCOs then they may cause other birds and vegetation to become extinct.

In general, DCCOs only use a potion of the habitat occupied by sensitive bird and plant populations, so it is usually unlikely that DCCO activity would result in the extinction of any fish or plant species. However, increasing populations of DCCOs could result in sufficient local habitat changes that plants and birds may be extirpated from a particular site. If the site is critical to the species in question, loss of the habitat could have adverse impacts on a larger (e.g., statewide) scale. Risks are greater for plant communities than bird communities, because birds can move to new locations. In Wisconsin, WDNR biologists are worried about the increasing number of DCCOs on Miller's Bay Island (aka. Monkey Island) in Lake Winnebago because the island, combined with others within the Lake Winnebago basin, supports the largest Great Egret nesting colony within the state, excluding the Mississippi River populations (Tim Lizotte, Summner Matteson, WDNR, and Tom Ziebell pers. comm.). Similarly, the USFWS is concerned about

DCCO impacts to sensitive plant species on Hog Island including two state-listed species (Western fescue and elk sedge).

57. For 2006, USGS reported that for Great Lakes Fisheries, approximately 75% of the forage biomass is deepwater species that are normally not available for DCCOs. So DCCOs can only affect 25% of the forage fish biomass available to the exotic predatory fish species.

This is not an appropriate interpretation of the available data. The survey cited by the commenter is conducted to provide an estimate of forage fish biomass for all of Lake Michigan. This survey does not address the issue of forage fish biomass available in Green Bay. In contrast, WDNR' concerns relate to the impact of DCCOs on forage fish biomass in the area around the colonies where foraging by nesting DCCOs is greatest.

58. Concerned that potential adverse impacts on co-nesting nontarget species from CDM are understated. Despite careful efforts, it is impossible to enter a waterbird colony and leave no impact. Oiling on Cat is having a negative impact on co-nesting species on the island. Since oiling has started, fewer nontarget birds are using the site and the birds that remain are experiencing reduced reproduction. The ground nesting Great Egrets have deserted the site and moved to the north end of Lone Tree Island. The colony of White Pelicans is also shifting to Lone Tree and to Willow Island to the North. Productivity of pelicans, has dropped since oiling started from 1-1.5 young per nest attempt to a low of 0.25 per nest attempt in 2008. Productivity of pelicans on Lone Tree where there is no oiling has remained around 1 young per nest attempt. Pelican Eggs weren't oiled but oiling occurs during a critical sensitive period for the pelicans - hatching until a week-10 days from hatching while the chicks are still small enough to be vulnerable to gull predation.

Egg oiling on Cat Island is conducted with a WDNR wildlife biologist to help with counting DCCO eggs and nests and identification of non-DCCO nests. WS has never oiled an egret nest on Cat Island, but may have marked the nest with spray paint. The markings are used to keep track of which DCCO nests have been treated and may also be used to help WS keep track of which untreated nests have been counted. In 2008, WS did start to oil what may have been a black-crowned night heron nest, but only one egg was partially oiled and the oil was removed immediately. The nest was probably marked with spray paint, indicating oiling took place, when it actually did not.

It is the belief of WS biologists that the ground-nesting egrets have left Cat Island for preferred shrub habitat on Lone Tree Island. The egret colony on Lone Tree has increased since WS started conducting CDM at the site.

WS does not disagree that any visit to the colony results in at least some disturbance to nesting birds. However, the situation at Cat and Lone Tree Islands is far more complex than indicated in the comments. There are several other sources of disturbance that occur on Cat Island with equal or greater potential to disturb nesting pelicans. At this time, there is insufficient information to attribute differences in pelican nesting success to any

one factor. Each year, multiple visits are made for research and monitoring of pelican nests and young, and pelicans on Cat Island are banded. These visits require the observer to come closer to the pelican nests than the crews conducting CDM. Banding birds requires handling individuals and may be highly disruptive to nesting birds. In contrast, WS deliberately does not oil the DCCO nests closest to the pelicans in order to minimize disturbance of the pelicans.

The pelican population at Lone Tree is increasing despite the fact that WS has conducted DCCO nest and egg destruction activities at that site and the fact that the small size of the island makes it harder for WS crews to stay away from Pelican nests. Informal observations from personnel conducting the CDM indicate that, because of the smaller size of Lone Tree Island, more pelicans leave their nests when boats approach and stay away from the nests for a longer period than during visits to Cat Island.

An additional unquantified factor which may also affect nest success on the islands is the impact of curious sightseers visiting the islands. Data from automatic camera systems at other DCCO colonies indicates that there may be far more visitors to the islands than previously understood (B. Doerr, NWRC, pers. comm.). The higher amount of sandy shore and relatively shallow approach to the island makes it easier to approach Cat Island by boat than Lone Tree Island which has a deeper, rocky approach to the island. Disease may also be a factor impacting pelicans, as avian botulism and other bird diseases have been documented on Cat Island.

At Cat Island, WS has collected data on Herring Gull predation on DCCO nests. In 2008, Herring Gull nest predation was observed at 108 total nests out of 5,310[13] nests with eggs present during 3 visits to oil eggs at Cat Island, or about 2% of total DCCO nests. This is likely an underestimate of the extent of gull predation since some predation may also occur after the crews leave the nests but before adults return. However, even if predation rates would double that recorded, this information would appear to indicate that the majority of nests on the island are not subject to gull predation during CDM visits.

59. Nest take-overs by colonial waterbird species are fairly common and are often facilitated by human disturbance. There have been no studies documenting adverse impacts of DCCO s on the islands, so the idea that reducing their numbers will benefit other species is speculative.

The PRDO allows agencies to take action in situations where there is a reasonable expectation that damage will occur. In the FEIS, the USFWS stated that they "do not believe that agencies should have to wait until impacts occur and are proven with absolute certainty before they are allowed to manage DCCOs. One of the benefits of the PRDO is that agencies in areas where risks of significant DCCO impacts are greatest are given more flexibility in taking action including preventive action." (USFWS 2003). The imminent threat of damage or loss of resources is often deemed sufficient for wildlife damage management actions to be initiated (U.S. District Court of Utah 1993). Section

[13] This is the sum of the nests observed during each of 3 egg-oiling visits. The same nest may be counted during multiple visits. This does not mean that there were 5,310 nesting pairs at Cat Island.

1.5.4 provides information on adverse impacts of DCCOs on co-nesting species, including information on nest take-overs. Additionally, data collected at West Sister Island in Lake Erie documented shifts in distribution of co-nesting species such as Black-crowned Night Herons in response to increasing numbers of nesting DCCOs (USDA 2006*a*). Based on this information, the agencies believe there is reasonable expectation that increasing DCCO numbers at colonies with co-nesting colonial waterbirds could have adverse impacts on some species. See also Response 9.

60. EA lacks historical perspective, is selective in data used, and lacks holistic perspective of the perceived problems. There is no mention in the EA that one of the Strawberry islands was clear-cut in the 1930s with the intent of growing grapes. Did anyone object to that change? Cat Island started as a dredge dump site. Today it looks like it did when it was first created. Current conditions should be viewed in light of historic context. Recommends a complete historical survey of sites before they are managed

Public attitudes toward resources and resource management have changed significantly since the 1930s. Actions proposed in the EA are based on current resource uses and values. The fact that a site may have had different characteristics in the past does not preclude current owners/managers from seeking to maintain current conditions. See also response 61.

Historically, when colonial waterbird breeding colonies reached sufficient density that damage to the vegetation occurred and the site was no longer attractive to some species, the birds could move to new locations. Unfortunately, human population expansion and land use have limited the number of alternative sites available to colonial waterbirds and have placed sociological and biological constraints on the number of birds that can be supported at the remaining locations. The primary biological constraint is that many sites supporting colonial waterbirds must be managed to sustain a wide variety of plant and animal species indefinitely. This may make it necessary to manage bird populations at breeding sites at lower densities to prevent habitat damage and loss that historically would not have been a problem. Sociological considerations also limit the number of birds that will be tolerated in recreational areas and/or in close proximity to human habitation. The challenge for managers is to maintain healthy wildlife populations and their habitats within the constraints posed by human land uses and tolerance for wildlife.

61. EA fails to acknowledge role of other colonial bird species in history of habitat loss on islands. The loss of trees on Spider Island was caused by Great Blue Herons. A review of gull population changes compared to vegetation changes on Hog, Spider, and Gravel Islands and those of the upper Green Bay indicates Herring and Ring-billed Gulls have altered habitat at a magnitude far greater than the cormorants have in the last two decades. At Cat Island, the first tree nesting species on the site in 1976 were Black-crowned Night-Herons followed by a gull population that has reached as high as 2,000 pair. As the herons killed trees, the gulls killed ground vegetation. DCCOs started on the site in the early 1980s. Eventually trees

died and DCCOs moved to ground nesting in the early 1990s. Habitat changes were not just due to DCCOs.

We agree that large numbers of any colonial waterbird can cause changes in island vegetation and that some of the changes that have occurred are not solely attributable to DCCOs. The EA in Section 1.5.4 notes that other bird species contributed to habitat loss at some islands. However, DCCO impacts are often more profound than the other species because of DCCO colonies at many sites are greater in size than colonies of other tree and shrub-nesting colonial waterbirds. Much of the recent loss of trees and shrubs at some islands has been concurrent with recent increases in DCCO numbers at the site.

62. Agencies need to reduce DCCO population more than is proposed in the EA.

The management objectives set in the EA represent a balance between the importance of DCCOs as a native predator and their role in Wisconsin ecosystems and the desire to reduce adverse impacts of DCCOs on property, aquaculture, natural resources and human safety. The management actions that will be implemented also take into consideration the limitations of the data on DCCO impacts to fishery resources. The agencies will use an adaptive management approach and will continue to collect and review information on DCCO impacts and the impacts of CDM as it becomes available. If new information indicates a greater reduction in DCCO numbers (i.e., below 5,000 pair in the Green Bay/Door County Area) may be warranted or if cumulative annual lethal DCCO take in the state will exceed 6,600 birds, the EA and proposed alternatives will be revised pursuant to NEPA.

63. High numbers of DCCOs contaminate land and water with tons of feces that can contain dangerous organisms. Water contamination in Door County Area is likely due to DCCOs.

The issue of DCCO impacts on water quality is addressed in the FEIS, but available information on DCCO impacts on water quality is limited. Many factors can impact water quality including feces from other bird species and will vary depending on the site. At this time there are no data indicating that DCCOs have contributed to any water quality problems in the Door County area.

64. DCCO population has stabilized over the last 5 years.

Data on the size of the largest Green Bay/Door County colonies is provided in Fig. 1-3. This statement appears to be true for the colony on Spider Island. It may also be true to a lesser extent for Cat Island, however, interpretation of data from Cat Island is complicated by the fact that adult DCCOs from the Cat Island Colony were removed for a diet study conducted from 2004-2006, and egg oiling was initiated at the colony in 2006. This is not true for the colonies on Pilot, Jack, and Hat Islands, nor is it true for some inland colonies including the colonies on Lake Winnebago.

65. Title of EA assumes there is sufficient damage to warrant action.

This is incorrect. The title of the EA indicates that there were sufficient concerns about DCCO damage to warrant requests for WS assistance and/or USFWS permits for CDM. One of the alternatives considered involves no federal involvement in CDM in Wisconsin which would indicate that there was not sufficient DCCO damage to warrant federal involvement.

66. DCCO colonies are only affecting a small portion of Lake Michigan shoreline. The proposed action does not take into consideration the small portion of the fishery resource impacted by the proposed action.

There is evidence that the DCCO colonies may be adversely affecting the fishery resources in the Green Bay/Door County area. These impacts can have adverse effects on local sport and commercial fishing opportunities and associated businesses. As stated in the Lake Michigan Management Plan (WDNR 2004), WDNR objectives for the fishery in Lake Michigan and Green Bay include providing a diverse, multi-species sport fishery within the productive capacity of the lake and a stable commercial fishery. The absence of DCCO colonies in other areas of the state does not negate the impacts on the local community or absolve the WDNR from its commitment to provide fishing opportunities for individuals in the affected areas.

67. EA is irretrievably flawed because it began with a pre-determined outcome based on goals set by a single agency, WDNR.

This is not accurate. In Section 1.5.8, the EA reviews management objectives of the WDNR, USFWS Refuges, and general objectives agreed upon by all the agencies. The WDNR proposal for CDM was useful for the analysis because it defined the maximum level of CDM that was considered. However, several of the alternatives that could have been selected by the agencies would not have achieved the population reductions proposed by the WDNR. Additionally, in the final Decision, the USFWS has determined that CDM will not be conducted on Pilot and Spider Islands, which are not part of the management plan proposed by the WDNR.

68. EA cannot meet the requirements of Wisconsin Environmental Policy Act or Wisconsin Act 287 because population objectives are without substantive foundation. They are based on beliefs and correlations not solid data. Without objective measure of damage, a case cannot be made that the mandate of Act 287 has been efficiently addressed.

The issue of the adequacy of the available data on DCCO impacts to public resources has been addressed in multiple responses to issues listed previously in this chapter. The WEPA requires state agencies to consider the environmental effects of their actions to the extent possible under their other statutory authorities. It also establishes the principle that broad citizen participation should be part of environmental decision-making. The EA provides a thorough review of the potential environmental impacts of the proposed action

using the best information available. The EA was made available for public review and comment. The WDNR also conducted its own public listening sessions prior to making its management recommendations to the Wisconsin Natural Resources Board. As such, these efforts meet the requirements of the WEPA.
Act 287 charges the WDNR, in cooperation with federal agencies, and compliance with the USFWS PRDO, to administer a program to control and manage DCCOs in order to reduce wildlife damage caused by DCCOs. The EA was prepared cooperatively by WS, the USFWS and the WDNR and addresses the management of all types of DCCO damage that may occur in the state including actions proposed under the PRDO. It is the WDNR' belief that this type of planning and cooperative effort was exactly what was intended by the act.

69. The idea that DCCOs pose a risk to aircraft is only speculation. There have been no DCCO strikes in Wisconsin.

Even though risks to aircraft and property damage may occur infrequently, they are a legitimate concern for the wildlife agencies and measures need to be taken to reduce the risk and damage. The civil and military aviation communities, including the FAA recognize that the threat to human health and safety from aircraft collisions with wildlife is increasing (Dolbeer 2000). Airport operators must exercise "due diligence" in managing wildlife hazards including assessing wildlife hazards at the airport and, if needed, implementing a wildlife hazard management plan (FAA regulations in CFR 14 Part 139.337; Dolbeer 2004). As stated in the EA, because of the size and body characteristics of DCCOs (Section 1.5.6), the consequences of an aircraft striking a DCCO can be catastrophic. The goal of airport wildlife hazard management programs is to prevent serious accidents from happening. It is unrealistic and inappropriate to contend that airport hazard reduction practices should wait until after a serious accident has occurred.

70. Shooting should be used to bring DCCO numbers down at colonies more quickly.

The problem with CDM for the protection of fishery resources is, and will continue to be, that the data necessary to fully explore these issues don't exist in many locations and/or will be very costly and likely take time (years) to obtain. The EA provides the data and science-based inference that were used to identify the sites where CDM may be conducted (Sections 1.5.3 and 1.5.8 and responses to comments). The emphasis on egg oiling to achieve population reduction at the Door County and Green Bay Islands is far less aggressive than the shooting programs employed by other Great Lakes states. The agencies believe that the more gradual DCCO population reductions that will result from egg oiling are appropriate given the nature of the problem and limitations of the existing information. More aggressive CDM programs including shooting will be used in situations where more rapid reduction of DCCO numbers is warranted to protect existing trees and shrubs.

71. People other than agency personnel should be allowed to shoot DCCOs. Double-crested cormorant problems could be solved with a regulated hunting season for DCCOs.

Use of regulated hunting to address conflicts with DCCOs was analyzed in the FEIS (USFWS 2003) and was not selected as the management alternative. Therefore, use of regulated hunting is not an option legally available for CDM at this time. The FEIS acknowledged that regulated hunting would be an economical way to kill numerous DCCOs at minimal expense to the government. However, reasons provided in the FEIS for not selecting regulated hunting included: (1) concerns about monitoring and preventing adverse impacts on co-nesting and look-alike species; (2) the fact that birds taken during a hunting season might not be the ones causing problems, and (3) the agencies and numerous commenters had serious ethical reservations about permitting a non-traditional species to be hunted when it cannot be eaten or widely utilized.

72. Population reduction should not be limited to WI. The EA neglected to mention what neighboring states and Canada are doing.

Cormorant damage management programs in other states are outside the scope of the analysis. However, CDM is conducted in Michigan and Minnesota (USDA 2005, 2006*b*). Cumulative impacts on the DCCO population are monitored and managed by the USFWS under authority and guidelines established in the MBTA, the Aquaculture Depredation Order and the PRDO. The USFWS also sponsors an annual meeting in which U.S. and Canadian managers and research biologists exchange current information on DCCOs and DCCO management.

73. Has not seen evidence that killing and preventing DCCOs truly reduces their numbers. Data this individual has read indicates they merely relocate to other areas and rebound, sometimes in excess of original numbers.

Cormorant damage management programs which include shooting and egg oiling to reduce DCCO colony size are being conducted in several states including Minnesota, Michigan, and Ohio. Preliminary data from these areas indicate that the programs have been successful in reducing DCCO colony size in the Les Cheneaux Islands, MI (USDA 2006*b*), Leech Lake, Minnesota (Leech Lake Division of Resource Management 2008), and at West Sister Island, Ohio (USDA 2009).

74. Agencies should engage in habitat/nest destruction before DCCOs return to breeding grounds to resolve problem.

Habitat management and nest and egg destruction are among the methods used to discourage DCCO use of sites with tree and shrub vegetation. For example, the USFWS destroys nests of DCCOs attempting to colonize Hog Island. The USFWS strives to destroy nests before eggs are laid, but some eggs may also be destroyed. No DCCO chicks have hatched on Hog Island. Other habitat modifications such as removal of trees and shrubs have limited utility because DCCOs readily nest on the ground if tree and

shrub sites are not available.

75. Egg oiling and other alternatives tried to date aren't working.

We do not agree. As noted in the EA it will likely take longer to reduce colony size when only egg oiling is used, but the technique can eventually result in a reduction in DCCO numbers. Data from the 2008 CDM activities in Wisconsin indicate the peak number of nests observed on Cat, Hat and Jack Islands was lower in 2008 than in 2007 (USDA 2008). At Hat and Cat Islands where egg oiling started in 2006, the peak number of nests counted also decreased between 2007 and 2008.

76. Agencies need to take action before individuals take matters into their own hands.

On Little Galloo Island in Lake Ontario in 1998 and on Little Charity Island in Saginaw Bay in 2000, hundreds of adult and juvenile DCCOs were illegally killed by individuals frustrated over the perceived impact of DCCOs on local fisheries. Individuals taking action outside the law cause harm not only to DCCOs, but to other species that nest with them. In the case of Little Charity Island, this included herons, egrets, gulls, and terns. The agencies are aware that some individuals are also extremely frustrated with the perceived impact of DCCOs on fisheries and the perceived failure of the agencies to address DCCO damage and that these individuals have considered illegal actions like those taken at Little Galloo and Little Charity Islands.

The U.S. Fish & Wildlife Service is the federal agency with primary management responsibility over all migratory birds in the United States, including DCCOs. Without a permit, killing of DCCOs, or any migratory bird or their eggs, is subject to penalties of the Federal Migratory Bird Treaty Act that include a $5,000 fine and/or six months imprisonment. It also protects nests and eggs. The 10 individuals found guilty of the incident at Little Galloo Island received sentences of up to two years' probation and six months of in-home confinement, plus up to $2,500 each in fines. The judge also ordered the men to make a cumulative contribution of $27,500 to the National Fish and Wildlife Foundation.

77. Please provide clarification of agency roles in DCCO management.

The USFWS has responsibility for management of Green Bay and Gravel Islands National Wildlife Refuges which include Pilot, Spider, Hog and Plum Islands. CDM activities may not be conducted at these sites without the consent of the USFWS. Refuge biologists monitor the DCCO populations at these locations.

The USFWS also has primary authority for the management of all DCCOs under the MBTA. The USFWS may grant permits for the take of DCCOs for research or to resolve problems with damage to property, human health and safety, and aquaculture resources. The USFWS has granted the tribes, WS, and state wildlife agencies authority to conduct limited amounts of CDM for the protection of public resources without permits under the

PRDO. Actions undertaken to protect public resources which involve the lethal take of >10% of a local breeding population are subject to additional review by the USFWS. The USFWS has the authority to deny approval for PRDO actions. The USFWS monitors state, regional and national DCCO population data and summarizes reports on PRDO projects and DCCO take to help ensure that CDM actions do not jeopardize the DCCO population.

The WDNR has authority for management of the state's fish and wildlife resources. However, for migratory birds covered under the MBTA and federally-listed threatened or endangered species, the USFWS' authority supercedes that of the state. In general, the WDNR works collaboratively with the USFWS on management of migratory birds and federally listed threatened and endangered species. However, WDNR actions involving these species still need some level of authorization from the USFWS. The WDNR monitors the state DCCO population and CDM activities conducted in Wisconsin and may establish additional regulations for the management of DCCOs in the state. However, the state's regulations cannot be less restrictive than those established by the USFWS.

WS does not have regulatory authority for the management of DCCOs. WS provides technical and operational assistance with CDM only when requested by the landowner/manager or appropriate regulatory agency. All WS CDM actions are conducted in accordance with authorization granted by the USFWS and WDNR.

78. Harassment is not acceptable because it would just move the problem to other areas.

The preferred alternative would allow for access to a full range of CDM methods to reduce damage by DCCOs to habitat. An integrated approach will allow us to select, evaluate, and refine the best method to address the problem. Problems with harassment moving DCCOs and DCCO problems are discussed in the Chapter 4 analysis of impacts of Alternative 3.

79. Agencies should consider introducing a natural predator to the islands.

This method was not considered because predators that would feed on DCCO eggs would likely also adversely impact other co-nesting species directly by preying on eggs and young of co-nesting birds or indirectly by causing species like DCCOs which can use the ground or trees for nesting to quit using ground nests thereby increasing pressure on and competition for nesting sites in vegetation.

80. Agencies should try nonlethal to see if it works before trying to kill thousands of DCCOs.

Use of nonlethal methods to resolve DCCO damage problems is included in the preferred alternative, and preference will be given to nonlethal methods where practical and effective. However, many nonlethal methods such as harassment and habitat

management may not be suitable for use in mixed species colonies of colonial waterbirds because they may have adverse impacts on co-nesting species.

Egg oiling is classified as a lethal method because it involves killing the embryo in the egg, but it is considered by many animal welfare organizations to be preferable to lethal removal of adults and young of the year. At Cat, Hat, and Jack Islands, the agencies are attempting to achieve management objectives through the use of egg oiling. Shooting would only be used if the agencies are unable to achieve management objectives through the use of egg oiling. If successful (see Response 75) the use of egg oiling would prevent the need to shoot thousands of DCCOs.

81. EA needs a good definition of what constitutes a viable nesting colony.

The agencies interpret a viable nesting colony as one large and productive enough to sustain itself over time. If the population is reduced too far, there is the chance that the birds may leave the site in favor of one with more DCCOs. The exact number of nesting birds that constitutes a viable colony varies depending on the site. In the EA, a colony is generally considered viable if there is evidence that, in the absence of CDM, the population has increased from the target level (e.g., 500 pairs per island on Hat and Jack Islands, and 1,000 pairs on Cat Island) in recent years or that the population has remained for several years at or near the target level.

82. Criteria for conducting CDM is so low, when won't the agencies conduct CDM?

Comment appears to focus on CDM actions conducted under the PRDO. In section 1.5.8.1, the EA notes that CDM activities may result in movement of some DCCOs to existing, historic or new inland sites. It seems likely that opportunities exist for the establishment or increase of inland colonies which would allow for increased opportunities to view and enjoy DCCOs without necessarily having the adverse impacts that are currently being addressed at large colonies in the Lower Green Bay/Door County Area. CDM would not be conducted in situations where the presence of DCCOs will not result in loss of sensitive vegetation (e.g., state listed species), loss of trees and shrubs that are used by other colonial waterbirds or adversely affect state or federally-listed birds. CDM actions will not be conducted for the protection of fishery resources unless there is adequate information to convince the agencies that DCCOs may be having an adverse impact on fishery resources (See also Responses 24, 35 and 36).

83. Since the document does mention that "humane" is a murky and contentious word it should be eliminated from the document altogether.

The EA acknowledges that there will be variations in interpretations of what constitutes a humane action based on individual values and beliefs regarding wildlife. The fact that there is not a universal definition of what constitutes a humane action does not mean that this isn’t an issue important to individuals commenting on the EA or an important factor that needs to be considered by agency decision-makers.

84. Regardless of human desires, species composition on islands changes due to environmental (e.g., weather) or biological (e.g., colonial waterbirds) factors. Many species of wildlife alter the habitat they occupy and this is a natural process, enhancing carrying capacity for some species while reducing it for others. Double-crested cormorants play an important role as predators in ecosystems.

We agree that species composition, as well as population numbers and distribution, are in a constant state of change. During pre-settlement times, these processes were self-regulating. However, today because of the vastly altered landscape, management actions must sometimes be taken to keep species in balance with the available habitat, or to mitigate unacceptable damage to other species that are in decline due to loss of habitat. We believe that failure to manage DCCO impacts will result in an increasingly adverse effect on the habitat and co-nesting bird populations on the islands. The proposed action does not involve eliminating DCCOs or the important role they play in ecosystems, but rather is intended to use an adaptive management approach which will allow for continued support of DCCOs and other colonial waterbirds and their habitats.

85. People do not need to eat fish. DCCOS do. The EA proposes to punish DCCOs for doing what they have evolved to do. It is not appropriate to kill DCCOs when they are only engaging in a natural response to conditions we created.

CDM, whether lethal or nonlethal, is not intended to be a form of punishment, but rather is a means to alleviate damage problems. All organisms alter the environment they occupy as well as the species they share it with. The question being addressed in this EA is how to balance the competing demands on fish and habitat resources. This determination is based on cultural values, and economic interests as well as ecology and biology. For example, the Green Bay/Door County area could probably sustain current fish removal and probably even more by DCCOs, but the total fish biomass might decrease and/or the fish community could shift and not be of the species mix or size range of interest to humans. Similarly, depending upon the status of the species affected, many bird, vegetation and wildlife populations could sustain DCCO impacts, but the species composition and local ecosystem would shift. In an ideal world it would be nice to let nature take its course. We, however, do not live in an ideal world and humans have drastically altered the natural environment to the point that it no longer can function naturally or we are unwilling to let it do so.

Population and range expansions of certain wild species are environmental phenomena that can be either “natural”, directly associated with human activities, or indirectly associated with human activities. DCCOs do have a long history of co-nesting with other colonial waterbird species, but when one species increases in numbers to a point that there is competition for nesting space or elimination of habitat, it can cause a detrimental effect on other species. We, as a society, may chose to give the species that are not doing as well extra protection that they would not receive under normal ecosystem processes.

86. By your own report, DCCOs have moved from inland colonies to Green Bay, now you propose controlling birds in Green Bay, to what end?

The purpose of the EA, as established in Chapter 1, is to manage damage caused by DCCOs. The EA states that survey data from 1995 indicate that inland populations have remained relatively stable or decreased while populations in the Bay have increased. This increase may be attributable to a statewide increase in the DCCO population or it is possible that some of the increase *might have* resulted from birds shifting from inland nest sites to sites in the Green Bay area. WS and the WDNR are receiving reports of increasing numbers of DCCOs at inland colonies including Lake Winnebago.

One of the general management objectives of the EA is to manage colonization or increase of inland sites on a case-by-case basis (Section 1.5.8.1). Historically, several inland sites supported DCCO colonies that were higher than current levels without reports of adverse impacts of DCCOs. CDM activities may result in movement of some DCCOs to existing, historic or new inland sites. It seems likely that opportunities exist for the establishment or increase of inland colonies which would allow for increased opportunities to view and enjoy DCCOs without necessarily having the adverse impacts that are currently being addressed at large colonies in the Lower Green Bay/Door County Area. However, as noted for Lake Winnebago, some management of inland colonies may also be needed.

87. EA lacks long-term foresight. After terrorizing and killing thousands, perhaps millions of DCCOs will we still be spending copious amounts of time and money doing the exact same thing years from now? Proposals don't address root of problem, only symptoms.

The agencies have stated that they intend to use egg oiling and not the shooting of adults to reduce the DCCO colonies at Hat, Jack and Cat Islands unless egg oiling proves ineffective. Current data indicates that egg oiling is helping to reduce colonies at these sites (USDA 2008).

The agencies agree that unless the underlying factors that support large DCCO populations in the Green Bay/Door County Area are addressed, or CDM proves ineffective in achieving management goals and is discontinued, some level of regular maintenance will be needed to keep DCCO colonies near management objectives. However, the amount of effort needed to maintain a population at a lower level is likely to be considerably less than the effort required to reduce the populations at these sites.

Management alternatives which would address the cause of the DCCO population increase would be ideal. However, in this instance, there are few, if any, such alternatives. Factors which contributed to increases in Great Lakes DCCO populations include increases in populations of non-native forage fish, increase in Southern aquaculture which may have resulted in birds arriving at the breeding grounds in better physical condition, reductions in environmental contaminants and protections provided under the MBTA. A return to previous levels of contamination with chemicals such as

DDT is unacceptable. Other than chemical control for sea lamprey, there are no other proven methods for controlling non-native fishes in the Great lakes, certainly not to levels that would impact DCCOs. Additionally, DCCOs are opportunistic predators that do not differentiate between native and non-native fish. They take whatever species are most abundant and easy to catch. With the current DCCO population, even if the agencies were able to reduce non-native fish populations, the reductions could have the undesired impact of increasing DCCO foraging pressure on native fish. Habitat alterations that may render sites unsuitable for DCCOs would likely also have adverse impacts on co-nesting species. Reduction in southern aquaculture industry is untenable and outside the scope of the EA. The remaining choice, a controlled reduction in protections of the MBTA, is, in a sense, what has occurred with the establishment of the PRDO.

88. There is no proof that DCCO removal would protect/enhance target fish populations. Given the complexity of the factors impacting Great Lakes fish populations, how can the agencies be sure the proposed actions will alleviate conflicts? The EA should try to quantify anticipated benefits.

The intent of the proposed program is not to manage fish populations, but is to manage DCCO damage to specific resources, including fisheries. We cannot be entirely sure that CDM activities will have the desired effect (although we are confident that they will) which is why the principles of adaptive management are being used as CDM is implemented. The level of potential increase in fish populations will be dependent upon not only the reduction of DCCO predation on the resource, but also on environmental and human-induced factors that affect aquatic ecosystems and fish populations. The decision to continue the proposed action or terminate CDM will be reviewed annually and will ultimately depend on the magnitude of the extent of the potential fish population increase and the value Wisconsin citizens place on the increase.

89. The DCCO population can be expected to eventually outstrip its food supply, drop in numbers and eventually stabilize itself.

While this is true, the impacts that would occur to vegetation, local fish populations and co-nesting waterbird species before the DCCOs outstripped available food or habitat would be unacceptable. As discussed in the EA, historically, when colonial waterbird breeding colonies reached sufficient density that damage to the vegetation occurred and the site was no longer attractive to some species, the birds could move to new locations. Unfortunately, human population expansion and land use have limited the number of alternative sites available to colonial waterbirds and have placed sociological and biological constraints on the number of birds that can be supported at the remaining locations. The primary biological constraint is that many sites supporting colonial waterbirds must be managed to sustain a wide variety of plant and animal species indefinitely. This may make it necessary to manage bird populations at breeding sites at lower densities than were previously there to prevent habitat damage and loss that historically would not have been considered a problem.

90. DCCOs have colonized most if not all Green Bay islands

This is not true. There are still numerous islands in Green Bay which have not been colonized by breeding DCCOs including Adventure, Chambers, Green, Pirate, Sister, Horseshoe, Plum, Gravel, Detroit, Washington, Rock, Fish and Snake Islands. However, the agencies are aware that some of these islands are occasionally used by non-breeding and migrating birds.

APPENDIX A

LIST OF SCIENTIFIC NAMES OF SPECIES MENTIONED IN TEXT

(Scientific names for state and federally-listed threatened and endangered species are provided in Appendix D)

BIRDS
American White Pelican (*Pelecanus erythrorhynchos*)
Bald Eagle (*Haliaeetus leucocephalus*)
Black-crowned Night-Heron (*Nycticorax nycticorax*)
Blue Jay (*Cyanocitta cristata*)
Canada Geese (*Branta canadensis*)
Caspian Tern (*Sterna caspia*)
Cattle Egret (*Bubulcus ibis*)
Crows (*Corvus* spp.)
Common Tern (*Sterna hirundo*)
Double-crested Cormorant (*Phalacrocorax auritus*)
Forster's Tern (*Sterna forsteri)*
Golden Eagle (*Aquila chrysaetos*)
Great Black-backed Gull (*Larus marinus)*
Great Blue Heron (*Ardea herodias*)
Great Egret (*Ardea alba*)
Great Horned Owl ((*Bubo virginianus)*
Green Heron (*Butorides virescens)*
Herring Gull (*Larus argentatus*)
Magpie (*Pica* spp)
Mallard (*Anas platyrhynchos*)
Piping Plover (*Charadrius melodus*)
Ravens (*Corvus* spp.)
Red-breasted Merganser (*Mergus serrator*)
Ring-billed Gull (*Larus delawarensis)*
Snowy Egret (*Egretta thula*)
Trumpter Swan (*Cygnus buccinators)*
Yellow-crowned Night-Heron (*Nyctanassa violacea)*

FISH
Alewife (*Alosa pseudoharengus*)
Banded Killifish (*Fundulus diaphanous*)
Bluegill (*Lepomis macrochirus*)
Brook trout (*Salvelinus frontinalis*)
Brown trout (*Salmo trutta*)
Burbot (*Lota lota*)
Channel catfish (*Ictalurus punctatus*)
Chinook salmon (*Oncorhynchus tshawytscha*)
Coho salmon (*Oncorhynchus kisutch*)
Common Carp (*Cyprinus carpio*)
Crappie (*Pomoxis* spp.)
Fathead minnow (*Pimephales promelas*)
Freshwater drum (*Aplodinotus grunniens*)
Gizzard shad (*Dorosoma cepedianum*)
Golden shiner (*Notemigonus crysoleucas*)
Lake/northern chub (*Couesius plumbeus*)
Lake sturgeon (*Acipenser fulvescens*)
Lake trout (*Salvelinus namaycush*)

Largemouth bass (*Micropterus salmoides salmoides*)
Logperch (*Percina caprodes*)
Muskellunge (*Esox masquinongy*)
Northern pike (*Esox lucius*)
Nine Spine Stickleback (*Pungitius pungitius*)
Rainbow trout (*Oncorhynchus mykiss)*
Round goby (*Dorosoma cepedianum*)
Saugeye (*Sander vitreus* x *Sander canadense*)
Sea Lamprey (*Petromyzon marinus*)
Smallmouth bass (*Micropterus dolomieu*)
Splake (*Salvelinus namaycush X Salvelinus fontinalis*)
Spottail shiner (*Notropis hudsonius*)
Stickleback (*Eucalia inconstans*)
Striped bass (*Morone saxatilis x M. chrysops*)
Talapia (*Oreochromis* spp.)
Trout perch (*Percopsis omiscomaycus*)
Walleye (*Sander vitreus*)
White bass (*Morone chrysops*)
White perch (*Morone Americana*)
White suckers (*Catostomus commersoni*)
Yellow perch (*Perca flavescens*)

PLANTS
Balsam fir (*Abies balsamea*)
Basswood (*Tilia americana*)
Bittersweet nightshade (*Solanum dulcamara*)
Blueflag iris (*Iris virginica*)
Canada yew (*Taxus canadensis*)
Catnip (*Nepeta cataria*)
Cheeses (*Malva neglecta*)
Chokecherry (*Prunus virginiana*)
Cottonwoods (*Populus deltoides* subsp. *monilifera*)
Dune goldenrod (*Solidago simplex* subsp. *randii* var. *gillmanii*)
Dune thistle (*Cirsium pitcheri*)
Dwarf lake iris (*Iris lacustris*)
Elk sedge (*Carex garberi*)
Fowl meadowgrass (*Poa palustris*)
Fringed bindweed (*Polygonum cilinode*)
Harebell (*Campanula rotundifolia*)
Indian paintbrush (*Castilleja coccinea*)
Juneberries (*Amelanchier* spp.)
Lamb's quarters (*Chenopodium album*)
Motherwort (*Leonurus cardiaca*)
Nettles (*Urtica dioica* subsp. *gracilis*)
Northern bog violet (*Viola nephrophylla*)
Red-berried elder (*Sambucus racemosa* subsp. *pubens*)
Red osier dogwood (*Cornus stolonifera*)
Red raspberry (*Rubus idaeus* var. *strigosus*)
Rock elm (*Ulmus thomasii*)
Small-flower grass-of-parnassus (*Parnassia parviflora*)
Sprengel's sedge (*Carex sprengelii*)
Sticky false-asphodel (*Tofieldia glutinosa*)
Sugar maple (*Acer saccharum*)
Tamarack (*Larix laricina*)
Thickspike (*Psammophilus*)
Thistles (*Cirsium* spp.)

Western fescue (*Festuca occidentalis*)
White birch (*Betula papyrifera*)
White cedar (*Thuja occidentalis*)
Wild black currant (*Ribes americanum*)
Wood lily (*Lilium philadelphicum*)

APPENDIX B

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APPENDIX C

SELECT TABLES AND FIGURES FROM "FOOD HABITS OF DOUBLE-CRESTED CORMORANTS IN SOUTHERN GREEN BAY WITH EMPHASIS ON IMPACTS ON THE YELLOW PERCH FISHERY FINAL SUMMARY REPORT"

(Meadows 2007)

Table 1. Number, biomass and relative importance indices of prey species found in stomachs of Double-crested Cormorants collected from Southern Green Bay from May 19 to September 30, 2004.

Species	N	% Number	% Frequency of Occurrence	Individual Fish Weight (g)		Total Weight (kg)	% Weight	Relative Importance
				Mean	SE			
Alewife	232	4.92	10.73	18.43	0.98	4.27	6.89	6
Banded Killifish	4	0.08	0.35	2.22	0.27	0.01	0.02	0
Channel Catfish	2	0.00	0.35	97.66	13.26	0.20	0.00	0
Common Carp	0	0.00	0.00	0.00	0.00	0.00	0.00	0
Freshwater Drum	18	0.38	4.84	57.63	15.78	0.66	1.07	2
Gizzard Shad	1348	28.61	25.26	3.31	0.14	4.41	7.11	15
Logperch	1	0.02	0.35	1.94	0.00	0.00	0.00	0
Nine Spine Stickleback	1	0.02	0.35	1.80	0.00	0.00	0.00	0
Northern Pike	6	0.13	1.38	59.82	17.17	0.36	0.58	1
Round Goby	545	11.57	20.07	12.96	0.47	4.15	6.69	10
Smelt	0	0.00	0.00	0.00	0.00	0.00	0.00	0
Spottail Shiner	524	11.12	25.26	5.97	0.14	3.12	5.03	10
Trout Perch	49	1.04	3.81	7.18	0.65	0.35	0.57	1
Walleye	64	1.36	15.92	125.54	12.52	7.55	12.17	7
White Bass	38	0.81	7.96	9.66	1.79	0.31	0.50	2
White Perch	64	1.36	13.49	18.36	10.05	1.18	1.89	4
White Sucker	73	1.55	23.53	366.82	17.45	24.93	40.16	16
Yellow Perch	1743	36.99	43.60	6.23	0.53	10.56	17.01	25
Total	4712	100	-	-	-	62.08	100	100

Table 2. Number, biomass and relative importance indices of prey species found in stomachs of Double-crested Cormorants collected from Southern Green Bay from April 28 to September 21, 2005.

Species	N	% Number	% Frequency of Occurrence	Individual Fish Weight (g)		Total Weight (kg)	% Weight	Relative Importance
				Mean	SE			
Alewife	121	2.74	6.67	32.39	0.79	3.92	3.60	3
Banded Killifish	0	0.00	0.00	0.00	0.00	0.00	0.00	0
Bluegill	0	0.00	0.00	0.00	0.00	0.00	0.00	0
Channel Catfish	1	0.02	0.22	4.00	0.00	0.00	0.00	0
Common Carp	16	0.36	1.11	16.80	2.67	0.27	0.25	0
Freshwater Drum	88	2.00	6.45	74.96	35.68	6.60	6.06	4
Gizzard Shad	2327	52.78	35.79	10.72	2.15	24.94	22.91	29
Logperch	0	0.00	0.00	0.00	0.00	0.00	0.00	0
Nine Spine Stickleback	0	0.00	0.00	0.00	0.00	0.00	0.00	0
Northern Pike	2	0.05	0.44	221.81	113.84	0.44	0.41	0
Round Goby	589	13.36	15.78	10.63	0.34	5.71	5.24	9
Smelt	5	0.11	0.89	6.75	2.06	0.01	0.01	0
Spottail Shiner	233	5.28	13.78	9.01	0.31	2.10	1.93	5
Trout Perch	307	6.96	14.01	12.27	0.33	3.77	3.46	6
Walleye	36	0.82	8.00	244.77	19.87	8.81	8.10	5
White Bass	9	0.20	0.67	18.10	11.48	0.13	0.12	0
White Perch	60	1.36	9.34	23.65	4.31	1.85	1.70	3
White Sucker	180	4.08	33.12	198.83	36.32	39.97	36.72	20
Yellow Perch	435	9.87	32.24	21.82	1.53	10.34	9.49	14
Total	4409	100	-	-	-	-	100	100

Table 3. Number, biomass and relative importance indices of prey species found in stomachs of Double-crested Cormorants collected from Southern Green Bay from April 28 to September 21, 2006.

Species	N	% Number	% Frequency of Occurrence	Individual Fish Weight (g)		Total Weight (kg)	% Weight	Relative Importance
				Mean	SE			
Alewife	154	3.90	9.21	10.14	0.69	3.43	2.96	3
Banded Killifish	1	0.03	0.32	0.32	0.00	0.01	0.01	0
Bluegill	2	0.05	0.32	1.41	0.00	0.06	0.05	0
Channel Catfish	0	0.00	0.00	0.00	0.00	0.00	0.00	0
Common Carp	9	0.23	2.54	41.66	7.92	1.68	1.45	1
Freshwater Drum	96	2.43	18.10	59.46	15.13	7.77	6.70	4
Gizzard Shad	2203	55.84	40.63	7.16	0.22	26.81	23.13	38
Logperch	0	0.00	0.00	0.00	0.00	0.00	0.00	0
Nine Spine Stickleback	0	0.00	0.00	0.00	0.00	0.00	0.00	0
Northern Pike	1	0.03	0.32	7.47	0.00	0.16	0.14	0
Round Goby	536	13.59	17.46	21.68	1.54	11.70	10.09	11
Smelt	42	1.06	3.81	4.31	0.16	0.53	0.46	1
Spottail Shiner	171	4.33	11.11	6.09	0.23	1.89	1.63	3
Trout Perch	41	1.04	3.49	2.41	0.33	0.75	0.65	2
Walleye	4	0.10	1.27	57.86	0.00	1.27	1.10	1
White Bass	3	0.08	0.95	4.28	0.00	0.09	0.08	0
White Perch	47	1.19	10.16	21.75	5.21	1.61	1.39	2
White Sucker	119	3.02	30.16	262.69	15.23	45.11	38.92	21
Yellow Perch	515	13.08	39.37	8.77	7.45	13.02	11.24	12
Total	3944	100	-	-	-	-	100	100

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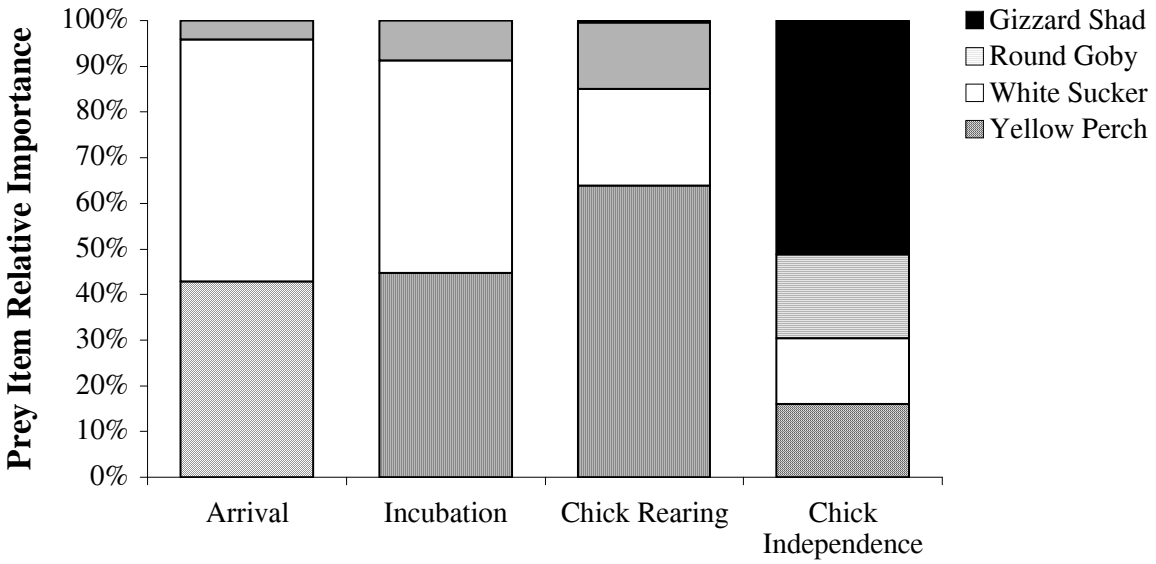

Figure 1. Relative importance of four primary prey species to one another in the diet of Double-crested Cormorants nesting on Cat Island, southern Green Bay, WI during each period of the 2004 breeding season.

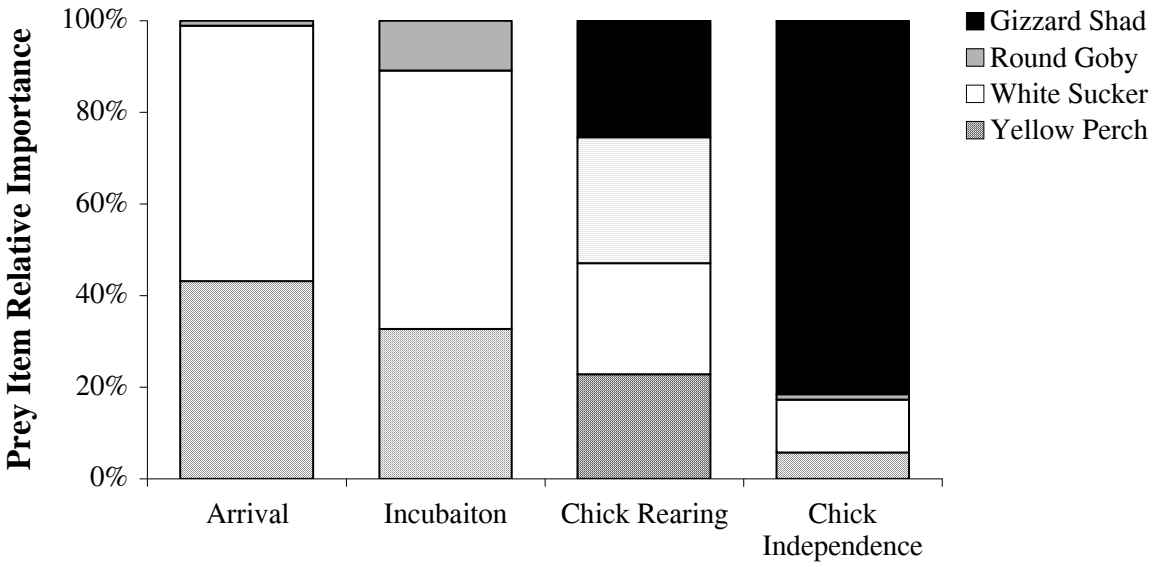

Figure 2. Relative importance of four primary prey species to one another in the diet of Double-crested Cormorants nesting on Cat Island, southern Green Bay, WI during each period of the 2005 breeding season.

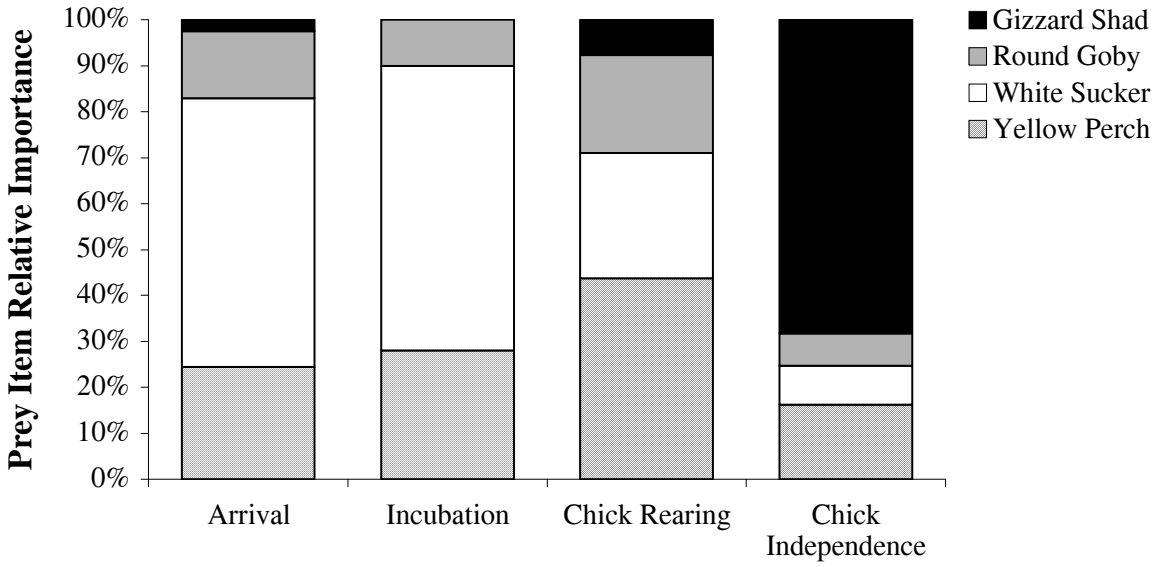

Figure 3. Relative importance of four primary prey species to one another in the diet of Double-crested Cormorants nesting on Cat Island, southern Green Bay, WI during each period of the 2006 breeding season.

APPENDIX D

STATE AND FEDERALLY-LISTED THREATENED AND ENDANGERED SPECIES IN WISCONSIN

COMMON NAME	LATIN NAME	FEDERAL STATUS	STATE STATUS
MAMMALS			
Canada Lynx	*Lynx canadensis*	Threatened	
American Marten	*Martes americana*		Endangered
BIRDS			
Henslow's Sparrow	*Ammodramus henslowii*		Threatened
Great Egret	*Ardea alba*		Threatened
Red-shouldered Hawk	*Buteo lineatus*		Threatened
Piping Plover	*Charadrius melodus*	Endangered	Endangered
Yellow Rail	*Coturnicops noveboracensis*		Threatened
Trumpeter Swan	*Cygnus buccinator*		Endangered
Cerulean Warbler	*Dendroica cerulea*		Threatened
Yellow-throated Warbler	*Dendroica dominica*		Endangered
Kirtland's Warbler	*Dendroica kirtlandii*	Endangered	
Snowy Egret	*Egretta thula*		Endangered
Acadian Flycatcher	*Empidonax virescens*		Threatened
Spruce Grouse	*Falcipennis canadensis*		Threatened
Peregrine Falcon	*Falco peregrinus*		Endangered
Worm-eating Warbler	*Helmitheros vermivorus*		Endangered
Loggerhead Shrike	*Lanius ludovicianus*		Endangered
Yellow-crowned Night-Heron	*Nyctanassa violacea*		Threatened
Kentucky Warbler	*Oporornis formosus*		Threatened
Osprey	*Pandion haliaetus*		Threatened
Red-necked Grebe	*Podiceps grisegena*		Endangered
Caspian Tern	*Sterna caspia*		Endangered
Forster's Tern	*Sterna forsteri*		Endangered
Common Tern	*Sterna hirundo*		Endangered
Greater Prairie-chicken	*Tympanuchus cupido*		Threatened
Barn Owl	*Tyto alba*		Endangered
Bell's Vireo	*Vireo bellii*		Threatened
Hooded Warbler	*Wilsonia citrina*		Threatened
REPTILES AND AMPHIBIANS			
Blanchard's Cricket Frog	*Acris crepitans blanchardi*		Endangered
Wood Turtle	*Clemmys insculpta*		Threatened
Blanding's Turtle	*Emydoidea blandingii*		Threatened
Western Slender Glass Lizard	*Ophisaurus attenuatus*		Endangered
Queen Snake	*Regina septemvittata*		Endangered
Eastern Massasauga Rattlesnake	*Sistrurus catenatus*		Endangered
Ornate Box Turtle	*Terrapene ornata*		Endangered

Butler's Gartersnake	*Thamnophis butleri*		Threatened
Western Ribbon Snake	*Thamnophis proximus*		Endangered
Northern Ribbon Snake	*Thamnophis sauritus*		Endangered
FISH			
Skipjack Herring	*Alosa chrysochloris*		Endangered
Crystal Darter	*Crystallaria asprella*		Endangered
Blue Sucker	*Cycleptus elongatus*		Threatened
Gravel Chub	*Erimystax x-punctatus*		Endangered
Bluntnose Darter	*Etheostoma chlorosoma*		Endangered
Starhead Topminnow	*Fundulus dispar*		Endangered
Goldeye	*Hiodon alosoides*		Endangered
Black Buffalo	*Ictiobus niger*		Threatened
Longear Sunfish	*Lepomis megalotis*		Threatened
Striped Shiner	*Luxilus chrysocephalus*		Endangered
Redfin Shiner	*Lythrurus umbratilis*		Threatened
Shoal Chub	*Macrhybopsis aestivalis*		Threatened
River Redhorse	*Moxostoma carinatum*		Threatened
Black Redhorse	*Moxostoma duquesnei*		Endangered
Greater Redhorse	*Moxostoma valenciennesi*		Threatened
Pallid Shiner	*Notropis amnis*		Endangered
Pugnose Shiner	*Notropis anogenus*		Threatened
Ozark Minnow	*Notropis nubilus*		Threatened
Slender Madtom	*Noturus exilis*		Endangered
Gilt Darter	*Percina evides*		Threatened
Paddlefish	*Polyodon spathula*		Threatened
MUSSELS AND CLAMS			
Slippershell Mussel	*Alasmidonta viridis*		Threatened
Rock Pocketbook	*Arcidens confragosus*		Threatened
Spectacle Case	*Cumberlandia monodonta*		Endangered
Purple Wartyback	*Cyclonaias tuberculata*		Endangered
Butterfly	*Ellipsaria lineolata*		Endangered
Elephant Ear	*Elliptio crassidens*		Endangered
Snuffbox	*Epioblasma triquetra*		Endangered
Ebony Shell	*Fusconaia ebena*		Endangered
Higgins' Eye	*Lampsilis higginsii*	Endangered	Endangered
Yellow & Slough Sandshells	*Lampsilis teres*		Endangered
Bullhead	*Plethobasus cyphyus*		Endangered
Winged Mapleleaf	*Quadrula fragosa*	Endangered	Endangered
Monkeyface	*Quadrula metanevra*		Threatened
Wartyback	*Quadrula nodulata*		Threatened
Salamander Mussel	*Simpsonaias ambigua*		Threatened
Buckhorn	*Tritogonia verrucosa*		Threatened
Ellipse	*Venustaconcha ellipsiformis*		Threatened
Rainbow Shell	*Villosa iris*		Endangered
TERRESTRIAL MOLLUSCS			
Wing Snaggletooth	*Gastrocopta procera*		Threatened

Cherrystone Drop	*Hendersonia occulta*		Threatened
Midwest Pleistocene Vertigo	*Vertigo hubrichti*		Endangered
INSECTS			
Swamp Metalmark Butterfly	*Calephelis muticum*		Endangered
Frosted Elfin Butterfly	*Callophrys irus*		Threatened
Northern Blue Butterfly	*Lycaeides idas*		Endangered
Karner Blue Butterfly	*Lycaeides melissa samueli*	Endangered	
Powesheik Skipperling	*Oarisma powesheik*		Endangered
Silphium Borer Moth	*Papaipema silphii*		Endangered
Phlox Moth	*Schinia indiana*		Endangered
Regal Fritillary	*Speyeria idalia*		Endangered
Spatterdock Darner	*Aeshna mutata*		Threatened
Extra-striped Snaketail	*Ophiogomphus anomalus*		Endangered
Pygmy Snaketail	*Ophiogomphus howei*		Threatened
Saint Croix Snaketail	*Ophiogomphus susbehcha*		Endangered
Hine's Emerald Dragonfly	*Somatochlora hineana*	Endangered	Endangered
Warpaint Emerald	*Somatochlora incurvata*		Endangered
Knobel's Riffle Beetle	*Stenelmis knobeli*		Endangered
Pecatonica River Mayfly	*Acanthametropus pecatonica*		Endangered
Wallace's Deepwater Mayfly	*Spinadis simplex*		Endangered
Red-tailed Prairie Leafhopper	*Aflexia rubranura*		Endangered
Prairie Leafhopper	*Polyamia dilata*		Threatened
Lake Huron Locust	*Trimerotropis huroniana*		Endangered
PLANTS			
Northern Wild Monkshood	*Aconitum noveboracense*	Threatened	Threatened
Musk-root	*Adoxa moschatellina*		Threatened
Roundstem Foxglove	*Agalinis gattingeri*		Threatened
Pale False Foxglove	*Agalinis skinneriana*		Endangered
Yellow Giant Hyssop	*Agastache nepetoides*		Threatened
Round-leaved Orchis	*Amerorchis rotundifolia*		Threatened
Carolina Anemone	*Anemone caroliniana*		Endangered
Early Anemone	*Anemone multifida var. hudsoniana*		Endangered
Lake-cress	*Armoracia lacustris*		Endangered
Woolly Milkweed	*Asclepias lanuginosa*		Threatened
Mead's Milkweed	*Asclepias meadii*	Threatened	
Dwarf Milkweed	*Asclepias ovalifolia*		Threatened
Purple Milkweed	*Asclepias purpurascens*		Endangered
Prairie Milkweed	*Asclepias sullivantii*		Threatened
Lobed Spleenwort	*Asplenium pinnatifidum*		Threatened
Green Spleenwort	*Asplenium viride*		Endangered
Forked Aster	*Aster furcatus*		Threatened
Alpine Milkvetch	*Astragalus alpinus*		Endangered
Ground-plum	*Astragalus crassicarpus*		Endangered
Cooper's Milkvetch	*Astragalus neglectus*		Endangered
Kitten Tails	*Besseya bullii*		Threatened
Prairie Dunewort	*Botrychium campestre*		Endangered
Moonwort Grape-fern	*Botrychium lunaria*		Endangered

Little Goblin Moonwort	*Botrychium mormo*		Endangered
Prairie Indian Plantain	*Cacalia tuberosa*		Threatened
Sand Reedgrass	*Calamovilfa longifolia var. magna*		Threatened
Large Water-starwort	*Callitriche heterophylla*		Threatened
Floating Marsh-marigold	*Caltha natans*		Endangered
Fairy Slipper	*Calypso bulbosa*		Threatened
Wild Hyacinth	*Camassia scilloides*		Endangered
Carey's Sedge	*Carex careyana*		Threatened
Beautiful Sedge	*Carex concinna*		Threatened
Ravenfoot Sedge	*Carex crus-corvi*		Endangered
Coast Sedge	*Carex exilis*		Threatened
Handsome Sedge	*Carex formosa*		Threatened
Elk Sedge	*Carex garberi*		Threatened
Smooth-sheath Sedge	*Carex laevivaginata*		Endangered
Shore Sedge	*Carex lenticularis*		Threatened
False Hop Sedge	*Carex lupuliformis*		Endangered
Intermediate Sedge	*Carex media*		Endangered
Michaux Sedge	*Carex michauxiana*		Threatened
Drooping Sedge	*Carex prasina*		Threatened
Schweinitz's Sedge	*Carex schweinitzii*		Endangered
Brook Grass	*Catabrosa aquatica*		Endangered
Hill's Thistle	*Cirsium hillii*		Threatened
Dune Thistle	*Cirsium pitcheri*	Threatened	Threatened
Canada Horse-balm	*Collinsonia canadensis*		Endangered
Hemlock Parsley	*Conioselinum chinense*		Endangered
Ram's-head Lady's-slipper	*Cypripedium arietinum*		Threatened
Small White Lady's-slipper	*Cypripedium candidum*		Threatened
Beak Grass	*Diarrhena obovata*		Endangered
Lanceolate Whitlow-cress	*Draba lanceolata*		Endangered
English Sundew	*Drosera anglica*		Threatened
Slenderleaf Sundew	*Drosera linearis*		Threatened
Pale-purple Coneflower	*Echinacea pallida*		Threatened
Slender Spike-rush	*Eleocharis nitida*		Endangered
Squarestem Spikerush	*Eleocharis quadrangulata*		Endangered
Beaked Spikerush	*Eleocharis rostellata*		Threatened
Wolf Spikerush	*Eleocharis wolfii*		Endangered
Thickspike	*Elymus lanceolatus ssp. Psammophilus*		Threatened
Harbinger-of-spring	*Erigenia bulbosa*		Endangered
Western Fescue	*Festuca occidentalis*		Threatened
Hairy Fimbristylis	*Fimbristylis puberula*		Endangered
Blue Ash	*Fraxinus quadrangulata*		Threatened
Dwarf Umbrella-sedge	*Fuirena pumila*		Endangered
Yellow Gentian	*Gentiana alba*		Threatened
Northern Comandra	*Geocaulon lividum*		Endangered
Cliff Cudweed	*Gnaphalium obtusifolium var. saxicola*		Threatened
Roundfruit St. John's-wort	*Hypericum sphaerocarpum*		Threatened
Dwarf Lake Iris	*Iris lacustris*	Threatened	Threatened

Moor Rush	*Juncus stygius*		Endangered
Prairie Bush-clover	*Lespedeza leptostachya*	Threatened	Endangered
Slender Bush-clover	*Lespedeza virginica*		Threatened
Silver Bladderpod	*Lesquerella ludoviciana*		Threatened
Dotted Blazing Star	*Liatris punctata var. nebraskana*		Endangered
Auricled Twayblade	*Listera auriculata*		Endangered
Broad-leaved Twayblade	*Listera convallarioides*		Threatened
Fly Honeysuckle	*Lonicera involucrata*		Endangered
Smith Melic Grass	*Melica smithii*		Endangered
Large-leaved Sandwort	*Moehringia macrophylla*		Endangered
Soft-leaf Muhly	*Muhlenbergia richardsonis*		Endangered
Brittle Prickly-pear	*Opuntia fragilis*		Threatened
Clustered Broomrape	*Orobanche fasciculata*		Threatened
Louisiana Broomrape	*Orobanche ludoviciana*		Endangered
Fassett's Locoweed	*Oxytropis campestris var. chartacea*	Threatened	Endangered
Marsh Grass-of-parnassus	*Parnassia palustris*		Threatened
Small-flower Grass-of-parnassus	*Parnassia parviflora*		Endangered
American Fever-few	*Parthenium integrifolium*		Threatened
Arrow-leaved Sweet-coltsfoot	*Petasites sagittatus*		Threatened
Smooth Phlox	*Phlox glaberrima ssp. Interior*		Endangered
Common Butterwort	*Pinguicula vulgaris*		Endangered
Heart-leaved Plantain	*Plantago cordata*		Endangered
Pale Green Orchid	*Platanthera flava var. herbiola*		Threatened
Prairie White-fringed Orchid	*Platanthera leucophaea*	Threatened	Endangered
Bog Bluegrass	*Poa paludigena*		Threatened
Western Jacob's Ladder	*Polemonium occidentale ssp. Lacustre*		Endangered
Pink Milkwort	*Polygala incarnata*		Endangered
Braun's Holly-fern	*Polystichum braunii*		Threatened
Prairie Parsley	*Polytaenia nuttallii*		Threatened
Algae-like Pondweed	*Potamogeton confervoides*		Threatened
Spotted Pondweed	*Potamogeton pulcher*		Endangered
Sheathed Pondweed	*Potamogeton vaginatus*		Threatened
Rough Rattlesnake-root	*Prenanthes aspera*		Endangered
Nodding Rattlesnake-root	*Prenanthes crepidinea*		Endangered
Long-beaked Baldrush	*Psilocarya scirpoides*		Threatened
Giant Pinedrops	*Pterospora andromedea*		Endangered
Lesser Wintergreen	*Pyrola minor*		Endangered
Seaside Crowfoot	*Ranunculus cymbalaria*		Threatened
Small Yellow Water Crowfoot	*Ranunculus gmelinii*		Endangered
Lapland Buttercup	*Ranunculus lapponicus*		Endangered
Lapland Azalea	*Rhododendron lapponicum*		Endangered
Canada Gooseberry	*Ribes oxyacanthoides*		Threatened
Hairy Wild-petunia	*Ruellia humilis*		Endangered
Sand Dune Willow	*Salix cordata*		Endangered
Satiny Willow	*Salix pellita*		Endangered
Tea-leaved Willow	*Salix planifolia*		Threatened

Tufted Bulrush	*Scirpus cespitosus*	Threatened
Hall's Bulrush	*Scirpus hallii*	Endangered
Reticulated Nutrush	*Scleria reticularis*	Endangered
Small Skullcap	*Scutellaria parvula var. parvula*	Endangered
Low Spike-moss	*Selaginella selaginoides*	Endangered
Plains Ragwort	*Senecio indecorus*	Threatened
Snowy Campion	*Silene nivea*	Threatened
Fire Pink	*Silene virginica*	Endangered
Bluestem Goldenrod	*Solidago caesia*	Endangered
Dune Goldenrod	*Solidago simplex var. gillmanii*	Threatened
Northern Bur-reed	*Sparganium glomeratum*	Threatened
Lake Huron Tansy	*Tanacetum huronense*	Endangered
Hairy-jointed Meadow-parsnip	*Thaspium barbinode*	Endangered
Heart-leaved Foam-flower	*Tiarella cordifolia*	Endangered
Sticky False-asphodel	*Tofieldia glutinosa*	Threatened
Snow Trillium	*Trillium nivale*	Threatened
Purple False Oats	*Trisetum melicoides*	Endangered
Narrow False Oats	*Trisetum spicatum*	Threatened
Dwarf Huckleberry	*Vaccinium cespitosum*	Endangered
Mountain Cranberry	*Vaccinium vitis-idaea ssp. Minus*	Endangered
Marsh Valerian	*Valeriana sitchensis ssp. Uliginosa*	Threatened
Squashberry	*Viburnum edule*	Endangered
Sand Violet	*Viola fimbriatula*	Endangered

APPENDIX E

INTERACTION AMONG AGENCY DECISIONS

This appendix provides details on how the decisions made by one of the lead agencies would impact the actions and decisions available to the other lead agencies, cooperating agencies, and other individuals that may need CDM or wish to conduct CDM research. Information on the selection of Alternative 1 is not provided because selection of this alternative by any of the lead agencies would not restrict alternatives and actions available to any other entity.

Table 1. Impacts of agency selection of Alternative 2 – Only Non-lethal CDM by Federal Agencies

Agency Choosing Alternative 2 – Only Non-lethal CDM by Federal Agencies	Choices Available to Other DCCO Management Entities				
	USFWS		Wildlife Services (WS)	Wisconsin Department of Natural Resources (WDNR)	Others
	Migratory Bird Office (MBO)	National Wildlife Refuges (NWRs)			
USFWS Migratory Bird Office (MBO)	___	The NWRs can choose the same alternative as the MBO or they can choose to be more, but not less restrictive than the alternative selected by the MBO. Therefore, if the MBO selects Alternative 2, the NWRs may select Alternatives 2,3 or 4.	WS could select any other alternative. However, the only entity that could receive WS assistance with lethal CDM is the WDNR because the only type of lethal CDM that could be conducted would be take of less than 10% of a local DCCO population under the PRDO. There could be no other types of lethal DCCO removal because it would require permits/consent from the MBO. A permit is not required for non-lethal CDM	WDNR could use lethal methods to take less than 10% of a local DCCO population under the PRDO because this action does not require approval or a permit from the MBO. Non-lethal CDM does not require a permit from the MBO.	No lethal CDM could be conducted by any entity other than WS or WDNR because the MBO office would not be issuing MBPs for take of DCCOs. WS and WDNR would be able to take up to 10% of a local DCCO population under the PRDO because this action does not require approval or a permit from the MBO. Non-lethal CDM does not require a permit

Agency Choosing Alternative 2 – Only Non-lethal CDM by Federal Agencies	Choices Available to Other DCCO Management Entities				
	USFWS		Wildlife Services (WS)	Wisconsin Department of Natural Resources (WDNR)	Others
	Migratory Bird Office (MBO)	National Wildlife Refuges (NWRs)			
USFWS National USFWS National Wildlife Refuges (NWRs)	No impact on decisions made by the MBO. NWRs can only select alternatives that are more but not less restrictive than the MBO.	___	WS could select any alternative. However, it would only be able to assist the NWRs with non-lethal CDM. This decision would have no impact on WS CDM actions at any other location.	No impact on decisions available to state. However, selection of this alternative will likely have an impact on the need for action and the efficacy of CDM on nearby lands managed by the state.	Entities wishing to conduct research at NWRs would not be able to use lethal methods. Decision by NWRs have no impact on availability of CDM alternatives at any other location, but may impact efficacy of CDM at other locations.
Wildlife Services (WS)	No Impact	No impact on alternatives available to NWRs. However, NWRs would have to go to WDNR for assistance with lethal take under the PRDO. WS would only assist with research and CDM using non-lethal methods.	___	No impact on decisions available to state under the PRDO. WS would not assist with consultation and Form 37 required for a depredation permit from the USFWS. WDNR would not be able to obtain a depredation permit. WS would only assist WDNR with non-lethal CDM and research using non-lethal methods.	WS would not assist with consultation and form 37 required for a depredation permit from the USFWS. These entities would not be able to obtain a depredation permit. These entities would be able to obtain research permits. WS would only assist with research using non-lethal methods.

Agency Choosing Alternative 2 – Only Non-lethal CDM by Federal Agencies	Choices Available to Other DCCO Management Entities				
	USFWS		Wildlife Services (WS)	Wisconsin Department of Natural Resources (WDNR)	Others
	Migratory Bird Office (MBO)	National Wildlife Refuges (NWRs)			
Wisconsin Department of Natural Resources (WDNR)	No impact on decisions made by the MBO.	No impact on alternatives available to NWRs. NWRs would have to work with WS for assistance with lethal CDM. Selection of this alternative will likely have an impact on the need for action and the efficacy of NWRs.	WS could select any alternative. However, it would only be able to assist WDNR with non-lethal CDM. This decision would have no impact on WS CDM actions on lands that are not owned or managed by the state.	___	Entities wishing to conduct research on lands owned or managed by the state would not be able to use lethal methods. Decision by WDNR has no impact on availability of CDM alternatives at any other location.

Table 2. Impacts of agency selection of Alternative 3 – Only Technical Assistance from Federal Agencies.

Agency Choosing Alternative 3 – Only Technical Assistance from Federal Agencies	Choices Available to Other DCCO Management Entities				
	USFWS		Wildlife Services (WS)	Wisconsin Department of Natural Resources (WDNR)	Others
	Migratory Bird Office (MBO	National Wildlife Refuges (NWRs)			
USFWS Migratory Bird Office (MBO)	___	NWRs can select alternatives that are the same or more restrictive than the MBO. Therefore, no CDM would be conducted at NWRs.	Permitting and approval processes are a form of technical assistance so no impact on CDM alternatives available to WS	Permitting and approval processes are a form of technical assistance so no impact on CDM alternatives available to WDNR. Lack of CDM at NWRs will likely have an impact on the need for action and the efficacy of CDM on lands near NWRs.	Permitting and approval processes are a form of technical assistance so no impact on availability of CDM and research alternatives
USFWS National Wildlife Refuges (NWRs)	NWRs can select alternatives that are the same or more restrictive than the MBO. No impact on decisions made by the MBO	___	WS could select any alternative. NWRs would not request assistance with CDM from WS.	No impact on decisions available to state. However, selection of this alternative will likely have an impact on the efficacy and need for action on lands near NWRs.	Decision by NWRs has no impact on availability of CDM alternatives at any other location.

Agency Choosing Alternative 3 – Only Technical Assistance from Federal Agencies	Choices Available to Other DCCO Management Entities				
	USFWS		Wildlife Services (WS)	Wisconsin Department of Natural Resources (WDNR)	Others
	Migratory Bird Office (MBO	National Wildlife Refuges (NWRs)			
Wildlife Services (WS)	No Impact	No impact on alternatives available to NWRs. However, NWRs would have to go to WDNR for operational assistance with CDM under the PRDO. WS would not provide operational assistance with research.	___	No impact on decisions available to state. WS would assist with consultation required for a depredation permit from the USFWS. WDNR would be able to obtain depredation and research permits. WS would only be able to provide technical assistance with CDM and research.	WS would assist with consultation and form 37 required for a depredation permit from the USFWS. These entities would be able to obtain a depredation permits. These entities would also be able to obtain research permits. WS would only be able to provide technical assistance with CDM and research.
Wisconsin Department of Natural Resources (WDNR)	No Impact	No impact on alternatives available to NWRs. NWRs would have to go to WS for operational assistance with CDM. Lack of CDM on state lands near NWRs would likely have an impact on the need for action and the efficacy of CDM at NWRs.	No impact on alternatives available to WS. WS would not assist WDNR with CDM. This decision would have no impact on WS CDM actions on lands that are not owned or managed by the state.	____	Decision by WDNR has no impact on availability of CDM alternatives at any other location.

Table 3. Impacts of agency selection of Alternative 4 – No Federal CDM.

Agency Choosing Alternative 4 – No Federal CDM	Choices Available to Other DCCO Management Entities				
	USFWS		Wildlife Services (WS)	Wisconsin Department of Natural Resources (WDNR)	Others
	Migratory Bird Office (MBO)	National Wildlife Refuges (NWRs)			
USFWS Migratory Bird Office (MBO)	___	NWRs cannot select an alternative that is less restrictive than that selected by the MBO. Therefore, there would be no CDM on NWRs.	WS could select any other alternative. However, the only entity that could receive WS assistance with lethal CDM would be WDNR because the only type of lethal CDM that could be conducted would be take of less than 10% of a local DCCO population under the PRDO. There could be no other types of lethal DCCO removal because it would require permits from the MBO. Non-lethal CDM does not require a permit from the MBO.	WDNR could take less than 10% of local DCCO populations on non-Federal lands under the PRDO because this action does not require approval or a permit from the MBO. Non-lethal CDM does not require a permit from the MBO. Lack of CDM at NWRs will likely have an impact on the need for action and the efficacy of CDM on lands near NWRs.	No lethal CDM could be conducted because the MBO office would not be issuing MBPs for take of DCCOs. WS, the WDNR and the tribes are the only Wisconsin entities that can take DCCOs under the PRDO. Non-lethal CDM does not require a permit from the MBO.
USFWS National Wildlife Refuges (NWRs)	No impact on decisions made by the MBO	___	WS could select any alternative. NWRs would not request CDM assistance from WS.	No impact on decisions available to state. However, selection of this alternative will likely have an impact on the need for action and the efficacy of CDM on lands near NWRs.	Decision by NWRs has no impact on availability of CDM alternatives or research at any other location.

Agency Choosing Alternative 4 – No Federal CDM	Choices Available to Other DCCO Management Entities				
	USFWS		Wildlife Services (WS)	Wisconsin Department of Natural Resources (WDNR)	Others
	Migratory Bird Office (MBO)	National Wildlife Refuges (NWRs)			
Wildlife Services (WS)	No Impact	No impact on alternatives available to NWRs. However, NWRs would have to go to WDNR for assistance with lethal take under the PRDO. WS would not assist with CDM or research.	___	No impact on decisions available to state under the PRDO. WS would not assist with consultation and form 37 required for a depredation permit from the USFWS. The WDNR would not be able to obtain a depredation permit. State would be able to obtain research permits. WS would not assist with CDM or research.	WS would not assist with consultation and Form 37 required for a depredation permit from the USFWS. These entities would not be able to obtain a depredation permit. These entities would be able to obtain research permits. WS would not assist with research.
Wisconsin Department of Natural Resources (WDNR)	No Impact	No impact on alternatives available to NWRs. NWRs would have to go to WS for operational assistance with CDM. Lack of CDM on state lands near NWRs would likely have an impact on the need for action and the efficacy of CDM at NWRs.	No impact on alternatives available to WS. WS would not assist WDNR with CDM. This decision would have no impact on WS CDM actions on lands that are not owned or managed by the state.	____	Decision by WDNR has no impact on availability of CDM alternatives at any other location.

Table 4. Impacts of agency selection of Alternative 5 – Integrated CDM Program, Excluding Implementation of the PRDO (No Action)

Agency Choosing Alternative 5 – Integrated CDM	Choices Available to Other DCCO Management Entities				
	USFWS		Wildlife Services (WS)	Wisconsin Department of Natural Resources (WDNR)	Others
	Migratory Bird Office (MBO)	National Wildlife Refuges (NWRs)			
USFWS Migratory Bird Office (MBO)	___	NWRs can only select alternatives that are the same or more restrictive than the alternative selected by the MBO. CDM activities would be restricted to the protection of vegetation and wildlife (not public fishery resources) under MBPs from the MBO. NWRs would not participate in actions to protect public fishery resources.	WS could select any other alternative. However, WS assistance with protection of public resources would be restricted to those activities permitted under MBPs, specifically the protection of wildlife and vegetation resources but not public fishery resources. All other types of CDM and research would not be affected.	CDM activities would be restricted to the protection of vegetation and wildlife (not public fishery resources) as would be allowed under MBPs from the MBO. All other types of CDM and research would not be affected.	No impact
USFWS National Wildlife Refuges (NWRs)	No impact	___	WS could select any alternative. CDM assistance for NWRs would be restricted to the protection of wildlife and vegetation (not public fishery resources) under MBPs This decision would have no impact on WS CDM and research actions at any other location.	No impact on decisions available to state. However, selection of this alternative would likely have an impact on the efficacy and need for action on nearby lands managed by the state if the need to protect public fishery resources is determining management objectives.	No impact

Agency Choosing Alternative 5 – Integrated CDM	Choices Available to Other DCCO Management Entities				
	USFWS		Wildlife Services (WS)	Wisconsin Department of Natural Resources (WDNR)	Others
	Migratory Bird Office (MBO)	National Wildlife Refuges (NWRs)			
Wildlife Services (WS)	No Impact	No impact on alternatives available to NWRs. However, the NWRs would have to go to the WDNR for assistance with lethal take for the protection of public fishery resources. WS could only assist with activities to protect public wildlife and vegetation resources as would be permitted under MBPs	___	No impact on decisions available to state. WS could only assist with activities to protect public wildlife and vegetation resources as would be permitted under MBPs. This decision would not restrict WS' ability to assist WDNR, NWRs and others with all other types of CDM and research.	No impact
Wisconsin Department of Natural Resources (WDNR)	No Impact	No Impact	No Impact. WDNR would not need WS' assistance with projects to protect public fishery resources.	_____	No Impact

APPENDIX F

NUMBER OF DOUBLE-CRESTED CORMORANT AND CO-NESTING SPECIES AT SELECT BREEDING COLONIES IN THE STATE OF WISCONSIN[14]

	Number of Nests								
Colony site name	**GRHE**	**DCCO**	**AWPE**	**CAEG**	**GBHE**	**GREG**	**BCNH**	**HERG**	**RBGU**
Lake Superior - Wisconsin									
Eagle Is		42			44			147	
API Little Manitou Is (Nav Aid)		20							
APIS Gull Island		639						685	
Lake Michigan - Wisconsin									
Hat Island GB		3,136	118					1,776	
Jack Is		2,793						1,502	
Hog Is WI		36			13		2	339	
Pilot Island		3,621			6		9	646	8
Spider Island		2132						2,491	
Lone Tree Island[11]		224	421			44	29		19
Cat Island[11]		2,096	397				2	387	
Inland Sites – Lake Winnebago									
Miller's Bay Island		1,114				58	108	60	3,884
Long Point Island	1	589		5	9	216	247	1	

DCCO – Double-Crested Cormorant
AWPE – American White Pelican
CAEG – Cattle Egret
GREG – Great Egret
BCNH – Black-Crowned Night Heron
GRHE – Green Heron
HERG – Herring Gull
RBGU – Ring-billed Gull
GBHE – Great Blue Heron

[14] 2007 data from L. Wires, Univeristy of Minnesota, unpublished data from the 2007 Great Lakes Colonial Waterbird Survey.
[11] 2008 data from T. Erndman, Richter Museum of Natural History, unpublished data, Green Bay, WI