FINAL SUPPLEMENT TO THE ENVIRONMENTAL ASSESSMENT: REDUCING DOUBLE-CRESTED CORMORANT DAMAGE IN OHIO

November 2013

I. 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 (*Phalacrocorax auritus;* hereafter, DCCOs; see Appendix A for a list of acronyms) are one of the wildlife species that engage in activities which sometimes 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, negative impacts of increasing DCCO populations on 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 1992). In 2006, the U.S. Department of Agriculture, Animal Plant Health Inspection Service, Wildlife Services (WS), the U.S. Department of the Interior Fish and Wildlife Service (USFWS) and the Ohio Department of Natural Resources Division of Wildlife (ODW) prepared an Environmental Assessment (EA) on alternatives for reducing DCCO damage to aquaculture, property, natural resources, and risks to human health and safety on private and public lands in Ohio (USDA 2006). Wildlife Services, the USFWS and the ODW have prepared this supplement to the EA to review the environmental impacts of cormorant damage management (CDM) carried out since 2006 in Ohio and proposed adjustments to compost monitoring activities.

The alternative selected in the WS and USFWS Decisions and Findings of No Significant Impact (FONSIs) involves the use of an integrated wildlife damage management (IWDM) approach, including non-lethal and lethal methods to manage DCCO damage. Available methods include physical exclusion, habitat modification, nest destruction, harassment, shooting, egg oiling/addling/destruction, and euthanasia following live capture. Preference is given to practical and effective non-lethal methods, but 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 may be instances where the application of lethal methods alone is the most appropriate strategy. All CDM actions in Ohio are conducted in accordance with USFWS Migratory Bird Depredation Permits (damage to property and risks to human health and safety), Scientific Collecting Permits or the Public Resource Depredation Order (PRDO) for DCCO management[1] and applicable state and local regulations.

[1] The PRDO was established by the USFWS after completion of a Final Environmental Impact Statement (FEIS) on DCCO management to reduce the actual occurrence, and/or minimize the risk, of adverse impacts of DCCOs to public resources including 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 (USFWS 2003). 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). Regulations implementing the PRDO are codified at 50 CFR 21.48 (http://www.fws.gov/migratorybirds/CurrentBirdIssues/Management/cormorant/cormorant.html).

This supplement adds to and updates material in the 2006 EA and FONSI and all information and analyses in the 2006 EA remain valid unless otherwise noted below.

II. SCOPE AND NEED FOR ACTION

The scope and need for action have not changed since the 2006 EA was written. Wildlife Services, in partnership with USFWS Ottawa National Wildlife Refuge (ONWR) and the Ohio Department of Natural Resources (ODNR), has been conducting CDM activities to reduce damage to native vegetation and wildlife including threatened and endangered species, fishery resources, aquaculture, property, and reduce the risk of collisions between aircraft and cormorants. Details on the need for CDM in Ohio are provided in the 2006 EA.

III. SUMMARY OF ACTIVITIES

Since the completion of the EA in 2006, the agencies (WS, ODW, and ONWR) comprising the Ohio Double-crested Cormorant Coordinating Group (ODCCG) have met annually to discuss progress and challenges with DCCO management in Ohio. The ODCCG reviews DCCO population data, impacts of proposed CDM actions in Ohio individually and collectively, and information on regional and national CDM activities to ensure that CDM efforts in Ohio will not jeopardize the viability of State, regional or national DCCO populations. While each agency has set their own objectives on their individual areas of responsibility, the USFWS, WS and ODW have agreed that decisions on future PRDO CDM projects will be made only after consulting with the ODCCG.

The 2006 EA established management objectives for each of Ohio's 5 known DCCO colonies. Objectives for each colony are provided below with a summary of the results of DCCO management actions which have been conducted since the EA was completed.

- West Sister Island. Managed by ONWR as a National Wildlife Refuge and Wilderness Area. Management Objective - 1,500 to 2,000 breeding pairs. The management objective for West Sister Island (WSI) was based on Habitat Objective 1 in the Comprehensive Conservation Plan (CCP) for WSI (USFWS 2000*a*) which calls for the refuge to maintain nesting habitat for approximately 1,000 pairs of Great Blue Herons (*Ardea herodias*), 800 pairs of Great Egrets (*Ardea alba*), 500 pairs of Black-crowned Night-Herons (*Nycticorax nycticorax*) and 1,500 pairs of DCCOs. It was also based on observations from refuge biologists that damage to vegetation appeared more pronounced when DCCO numbers at WSI exceeded 2,000 breeding pairs, starting in 1999.

  The number of breeding pairs at WSI decreased annually between 2006 and 2009 and was within management objectives from 2007-2009 (Figure 1, Appendix A). At WSI, population objectives were achieved for 3 consecutive years from 2007-2009. Using an adaptive management framework, control visits were limited to 1 per year from 2008-2011 to ensure the minimum population objective of 1,500 nesting DCCO pairs was maintained. Additionally, take caps of 600-1,000 individuals per year were set during this time period, although these cap levels were never reached. Finally, "no-entry" zones were established on the Northeast portion of the island where no entry or take is allowed. One of the lessons learned during this time period was that take is self-limiting on WSI when DCCOs are within target population levels. Cormorants are dispersed, fewer birds are taken, and habitat damage is limited. These results are encouraging for long-term management of the cormorant population, and

maintaining island habitats in a healthy condition. However, it remains to be seen if population levels can be consistently maintained within target population goals, or if there will be periodic spikes in population numbers. The number of DCCO pairs at WSI increased in 2010 and 2011 (Figure 1). In 2011 increases also occurred at other Ohio Lake Erie colonies. In 2012 following consecutive years of population increases, 2 control visits to the island were conducted and DCCO numbers decreased from the 2011 level. Adjustment of take levels and numbers of visits per year will continue as population levels warrant.

- Turning Point Island (TPI). Managed by the ODW. Management Objective - 400 breeding pairs. This goal involves maintaining the density of breeding pairs present at TPI in 2005. The 2005 DCCO density did not appear to be adversely affecting vegetation or co-nesting species on the island. However, given patterns observed on Middle Island in Canada and WSI, it was felt that adverse impacts could occur if the population increased much beyond 2005 levels. This management objective is the *minimum* number of birds to be maintained at the island. In all likelihood, the number of breeding pairs at the site was expected to be at or slightly above this level. Cormorant numbers increased in 2006 and have been over management objectives in all years with a substantial increase to 1,221 pairs in 2011 and only a slight decline to 1,163 pairs in 2012 (Figure 1, Appendix A). Despite management efforts, the number of nesting DCCOs on TPI continues to increase. Informal observations of the site by ODW staff indicate that there are signs the vegetation is being adversely impacted.

- Green Island. Managed by the ODW as a State Wildlife Refuge. Management Objective – no breeding pairs. Green Island is used as a nesting site by Great Egrets and Great Blue Herons. The State-listed Lake Erie watersnake (*Nerodia sipedon insularum*) also uses the island. Additionally six State-listed plants including the rock elm (*Ulmus thomasii*) are located on the island and in close proximity to nesting DCCOs. The rate of increase in DCCO nesting population from 2003-2005 (0 to 857 pairs) was a concern, especially given the relatively small size of the island (17.3 acres). The ODW was concerned that DCCO population increases and associated vegetation damage would be similar to that observed on other Lake Erie islands like Middle Sister Island (Hebert 2005, McGrath and Murphy 2012). Given that Green Island is less than a quarter of the size of WSI, biologists were concerned that the island will be more easily overrun and degraded by DCCOs than the larger islands. Reducing DCCO impacts on vegetation is intended to help return the species composition of the breeding bird community on the island to that observed in 2002. The number of DCCO pairs at Green Island has varied. Although the management objective for the site has not been reached, the number of DCCO pairs at Green Island has been lower than the initial levels observed in 2005. In 2010 a pair of bald eagles (*Haliaeetus leucocephalus*) initiated nesting on Green Island and CDM efforts were cut short in accordance with provisions in the EA and PRDO regulations for the protection of eagles. The reduced take in 2010 may explain some of the increase in DCCO pairs in 2011, but pairs declined again in 2012 (Figure 1, Appendix A).

- Grand Lake-St. Marys. Management Objective - 15 breeding pairs. Grand Lakes-St. Marys is a 13,657 acre lake and is a popular area for recreation and walleye fishing. The original location of this DCCO breeding colony was a small island near-shore and some cottonwood trees along the shoreline in the Mercer Wildlife Area managed by the ODW. The colony contained 80 DCCO breeding pairs in 2005. The state-owned land is also home to a pair of nesting Bald Eagles and a Great Blue Heron rookery. The site contains only a limited number of mature trees and there were concerns that that the growing DCCO colony could eliminate the vegetation upon which the herons and eagles depend. The DCCO population at this site was at or near the management objective for 2006-2009. During 2010 the

DCCO colony seemed to abandon the Mercer Wildlife Area and thus no CDM was conducted at this site in 2010 and no nesting activity was observed. However, there was a substantial increase in breeding pairs in 2011 with 180 breeding pairs observed on nearby Safety Island. Following management conducted in 2011 and 2012, the number of breeding pairs was reduced to 30 in 2012 (Figure 2, Appendix A). Since then, the Mercer Wildlife Area site has been abandoned by the cormorants and the nesting colony has relocated to Safety Island on Grand Lake-St Marys which is managed by the ODNR Division of Parks. In 2011, cormorants were observed nesting on Safety Island, located 2 miles offshore in the southwestern area of Grand Lake-St. Marys. The ODNR Division of Parks is concerned that DCCO nesting activity on the island will lead to a decline in the health of the trees on the island and that without trees the island will erode with wave action over time. In addition to its aesthetic and ecological role, the island is used as a safe haven for boaters when storms and other adverse weather threaten safety on the lake. Given the concerns at the new colony location, the agencies are retaining the management objective of 15 breeding pairs for Grand Lake-St Marys. This is the *minimum* number of birds to be maintained at the site. In all likelihood, the number of breeding pairs at the site would be at or slightly above this level.

- Portage Lakes. Management Objective – at least six breeding pairs. This is the *minimum* number of birds to be maintained at the site. In all likelihood, the number of breeding pairs at the site would be at or slightly above this level. The Portage Lakes complex (478 ha) consists of a string of 10 lakes in northeast Ohio, near Akron. Cormorants initially established a small colony (6 pairs) on a 0.1 ha island in the West Reservoir managed by the ODNR Division of Parks. In 2011 DCCOs established an additional colony (64 pairs) on another small island nearby that is also managed by the ODNR Division of Parks. Because of the highly dynamic nature of colonies on the Portage Lakes complex (rising and falling nest counts from 2006-2008, shifting colony location), no CDM activities had been conducted within the Portage Lakes until 2013. Because the past 3 years have seen a gradual and steady increase in the number of nesting DCCOs on the Portage Lakes (Figure 2, Appendix A), the ODNR Division of Parks plans to conduct harassment measures during 2013 to protect the island vegetation at the second and larger island colony (64 pairs). The ODNR Division of Parks is concerned that DCCO nesting activity on the island will lead to a decline in the health of the remaining trees on the island (they have already lost several trees) and that without trees the island will erode with wave action over time. For the Portage Lakes complex as a whole, the ODW will continue to monitor DCCO nesting and migrant activity in response to public complaints regarding property damage or large flocks of migrating DCCOs utilizing this area.

All CDM activities carried out by the ODCCG since 2006 have been consistent with the objectives listed above. Despite the annual removal of adult breeding DCCOs the breeding populations at Green Island, Turning Point Island and Grand Lakes St. Marys remained above the objectives; although there has been a general decreasing trend for Green Island (Figures 1 & 2). The agencies did achieve target population levels on WSI for three consecutive years (2007-2009). Consequently, the agencies reduced management activities at WSI as part of an adaptive management approach to identify the minimum take needed to maintain management objectives at the site. Following rising population levels in 2011, additional visits and take resulted in a decline in 2012, although the WSI population was still above target level. Fine tuning annual take through adaptive management will continue for the foreseeable future as the ODCCG gains additional knowledge through experience and can better predict the amount of take necessary to maintain a desired population level.

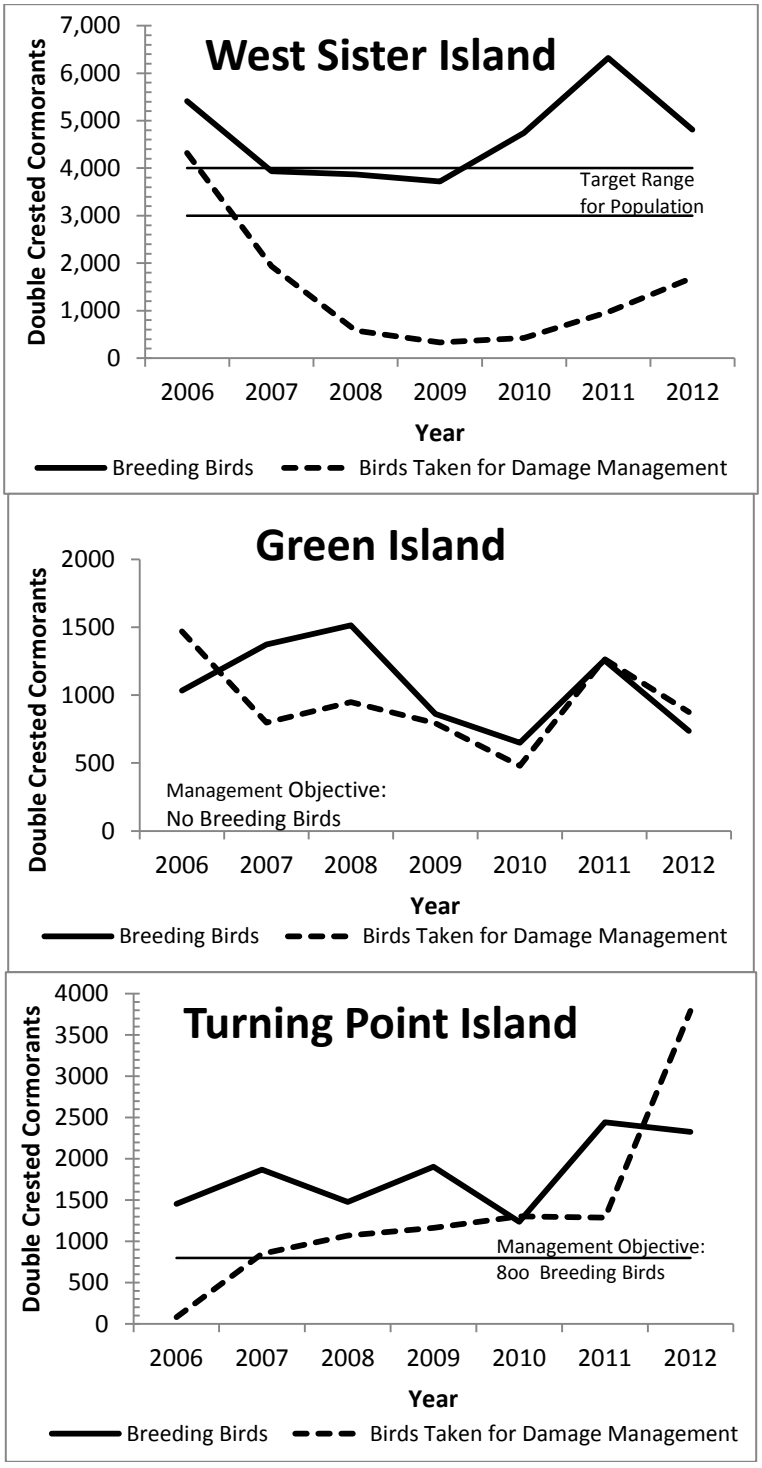

Figure. 1 Number of individual breeding Double-crested Cormorants (DCCOs, thick solid line), DCCO Management Objectives (thin solid line) and the number of DCCOs taken for damage management in Ohio (dotted line) for Ohio Lake Erie DCCO colonies, 2006-2012.

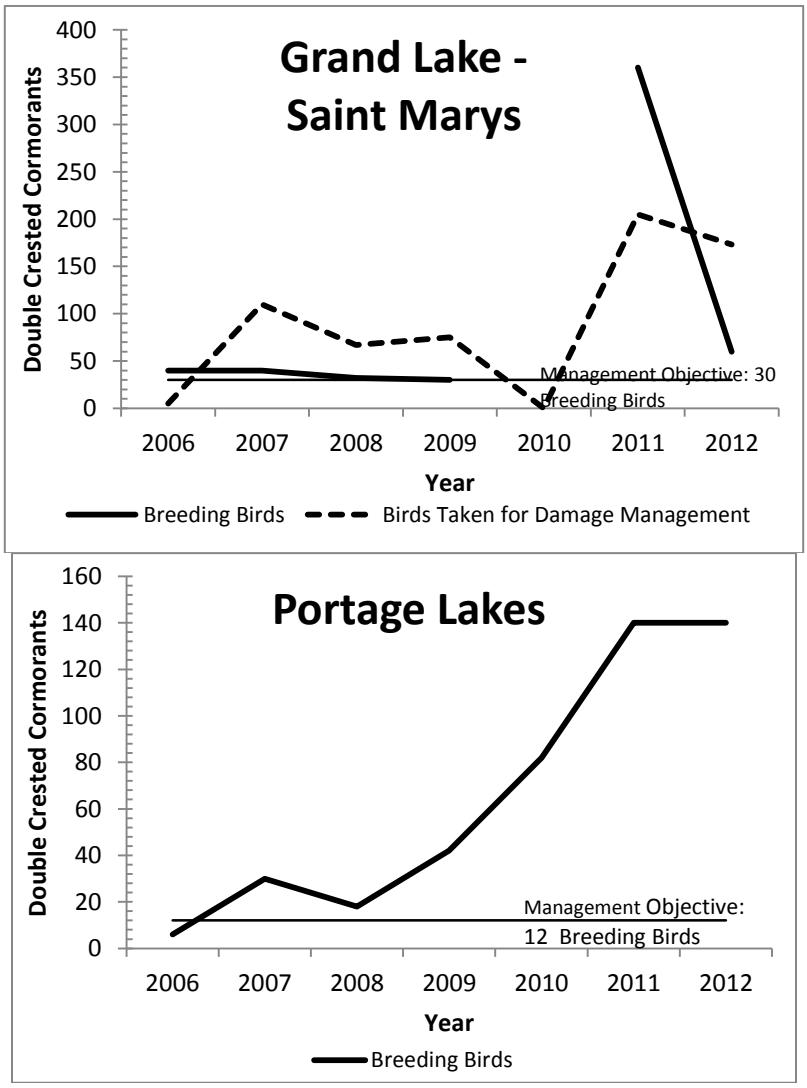

Figure. 2 Number of individual breeding Double-crested Cormorants, DCCO Management Objectives and the number of DCCOs taken for protection of public resources at Ohio inland DCCO colonies, 2006-2012. No birds have been taken for damage management at Portage Lakes.

Reasons for the difficulty in achieving management objectives at Green Island, Turning Point Island, and Grand Lake St. Mary's are unclear, although it is noteworthy that increases in nesting DCCOs occurred at all Ohio colonies in 2011. Several different factors may contribute to challenges in managing DCCOs in Ohio, including:

1) CDM actions initiated on Canadian Lake Erie Islands or in other areas. However, review of management actions on the Middle Island in Lake Erie and surrounding states did not reveal any changes in ongoing management strategy which would appear to explain the population shift in 2011;

2) High fledging success for birds at the Ohio colonies. The majority of birds at the Ohio colonies nest in trees with other co-nesting species so egg oiling is often not a preferred option. Continued reproduction by the remaining birds could contribute to challenges in reducing colony size;
3) Birds in the Ohio colonies born before the initiation of CDM returning to reproduce;
4) Other unquantified environmental variables including but not limited to food availability in and around the Ohio colonies and climate conditions elsewhere in the range of DCCO (e.g., Canadian breeding areas).

IV. AUTHORITY OF FEDERAL AND STATE AGENCIES IN CORMORANT DAMAGE MANAGEMENT IN OHIO

Effective management of cormorants and cormorant damage requires coordination among state and federal agencies. The roles and authority of the primary agencies involved in cormorant management in Ohio are listed below and summarized in Table 1.

4.1 United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (WS)

Wildlife Services is the Federal program authorized by law to reduce damage caused by wildlife. The primary statutory authorities for the WS program are the 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). Wildlife damage management is the alleviation of damage or other problems caused by or related to the presence of wildlife, and is recognized as an integral part of wildlife management (The Wildlife Society 1992). Wildlife Services uses an IWDM approach, commonly known as Integrated Pest Management (WS Directive 2.105) in which a combination of methods may be used or recommended to reduce damage. Wildlife Services wildlife damage management is not based on punishing offending animals but as one means of reducing damage and is used as part of the WS Decision Model (Slate et al. 1992, USDA 1997, WS Directive 2.201). All WS wildlife damage management activities are conducted in compliance with relevant laws, regulations, policies, orders and procedures, including the Endangered Species Act of 1973.

4.2 United States Department of the Interior, Fish and Wildlife Service (USFWS)

The primary responsibility of the USFWS is conserving fish, wildlife, plants and their habitats. 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 Migratory Bird Treaty Act (MBTA) gives the USFWS primary statutory authority to manage migratory bird populations in the United States. 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.

Ottawa National Wildlife Refuge Complex (ONWR). The ONWR was established in 1961 under the authority of the Migratory Bird Conservation Act "....for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." The Refuge was also established to preserve a portion of the remaining Lake Erie marshes. Cedar Point National Wildlife Refuge was established in 1964 under this same authority and purpose. Today the Refuge Complex consists of three separate refuges (Ottawa, Cedar Point and West Sister Island) that total approximately 9,749 acres. The focus of the ONWR Complex is to

protect, enhance, and restore habitat for threatened and endangered species; provide suitable nesting habitat for migratory birds; provide spring and fall migration habitat for waterfowl and other migratory birds; provide habitat for native resident flora and fauna; and provide the public with wildlife-dependent recreation opportunities.

West Sister Island National Wildlife Refuge (WSINWR) is the oldest member of the ONWR Complex and the most isolated. The 80-acre island became a national wildlife refuge by Executive Order 7937 on August 2, 1937, and in 1975 was designated as a Federal wilderness area under the Wilderness Act of 1964. The USFWS manages 77 acres of the island and the U.S. Coast Guard owns the remaining acreage and a lighthouse. The island is home to the largest Great Blue Heron and Great Egret rookery in the United States Great Lakes and is also home to Snowy Egrets and one of the largest Black-crowned Night-Heron colonies on the United States Great Lakes. In fact, data from the Great Lakes Colonial Waterbird Survey (Cuthbert and Wires 2010) show that WSINWR is the largest and most diverse wading bird colony in the U.S. Great Lakes indicating that it has significant regional importance. The island is not accessible to the public.

4.3 Ohio Department of Natural Resources, Division of Wildlife (ODW)

As authorized by Ohio Revised Code (ORC) 1531.04, "the division of wildlife, at the direction of the chief of the division, shall do all of the following: (A) Plan, develop, and institute programs and policies based on the best available information, including biological information derived from professionally accepted practices in wildlife and fisheries management, with the approval of the director of natural resources; (B) Have and take the general care, protection, and supervision of the wildlife in the state parks known as Lake St. Marys, The Portage Lakes, Lake Loramie, Indian Lake, Buckeye Lake, Guilford Lake, such part of Pymatuning Reservoir as lies in this state, and all other state parks and lands owned by the state or in which it is interested or may acquire or become interested, except lands and lakes the care and supervision of which are vested in some other officer, body, board, association, or organization; (C) Enforce by proper legal action or proceeding the laws of the state and division rules for the protection, preservation, propagation, and management of wild animals and sanctuaries and refuges for the propagation of those wild animals, and adopt and carry into effect such measures as it considers necessary in the performance of its duties" (ORC §1531.04).

WS is in the process of updating the current MOU that defines USDA-APHIS-WS participation in a cooperative wildlife damage management program in Ohio. The MOU establishes a cooperative relationship between WS, Ohio Department of Agriculture, Ohio Department of Health (ODH), Ohio Department of Natural Resources (ODNR), Ohio Department of Transportation (ODOT), The Ohio State University Extension (OSUE), and Ohio Agricultural Research and Development Center (OARDC), for planning, coordinating and implementing wildlife damage management policies to prevent or minimize damage caused by wild animal species (including threatened and endangered species) to agriculture, horticulture, aquaculture, animal husbandry, forestry, wildlife, public health/safety, property, natural resources and to facilitate the exchange of information among the cooperating agencies.

All WS CDM actions are conducted in accordance with permits issued by the ODW which authorize WS, on an annual basis, to take, possess, and transport at any time and in any manner specimens of wild animals, subject to certain conditions and restrictions set forth by the chief of the ODW.

Table 1. Roles and responsibilities for DCCO damage management in Ohio.

Management Entity	Activities Covered by the PRDO	DCCO Take Not Covered by the PRDO[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 – Ottawa National Wildlife Refuge	• Approves/authorizes take of birds on WSINWR. • Takes birds as agents of ODW or WS. • Aids in monitoring local DCCO population.	• May take birds for research under scientific collecting permits. • Provides limited technical assistance.
Ohio Division of Wildlife	• 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 population.	• Takes birds for aquaculture damage and research with permits. • Provides limited technical assistance.
Wildlife Services	• Takes birds at request of landowners/ managers. • Provides technical assistance. • Takes birds (less than 10% of local colony) after notifying USFWS and ODW. • Takes birds (more than 10% of local colony) with approval of USFWS and ODW. • 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 WS Form 37 for USFWS consideration when issuing depredation permits. • May take DCCOs under federal scientific collecting and depredation permits.

Management Entity	Activities Covered by the PRDO	DCCO Take Not Covered by the PRDO[1]
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, university researchers, etc.

V. ALTERNATIVES

Five alternatives were developed in the EA to respond to conflicts with DCCOs and DCCO damage. The PRDO has been implemented in the state since the completion of the EA in 2006, so Alternative 1 has become the Current Action/No Action Alternative. The following is a summary of the Alternatives. Three additional alternatives that were considered but not analyzed in detail and are addressed in the EA.

Alternative 1. Integrated CDM Program, including implementation of the Public Resource Depredation Order and Migratory Bird Depredation Permits (Preferred Alternative//No Action Alternative)

The lead and cooperating agencies propose to implement an integrated CDM program in the State of Ohio, including working under the PRDO and Migratory Bird Depredation Permits (MBPs). An integrated wildlife damage management (IWDM) approach would be implemented to reduce, as needed, DCCO damage to and conflicts with public resources, aquaculture, private 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, the lead and cooperating agencies 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.

Double-crested cormorant conflict management activities would be conducted in the State, when requested and funded, on private or public 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 issuing MBPs (with input from WS) and 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.

Lake Erie: If this alternative is selected, the agencies would work to meet the management objectives set in EA Section 1.5.6.3 (USDA 2006) as quickly as possible. Consideration will be given to non-lethal techniques such as hazing to encourage the DCCOs to move to other areas (not on Lake Erie islands). Hazing could also be used to discourage high densities of migrating DCCOs from remaining in areas where they may contribute to damage to public resources. However, experience of the cooperating agencies indicates that lethal techniques would also be needed to adequately reduce the number of birds nesting on Lake Erie. Carcasses of DCCOs killed at WSI and Green Island would be disposed of in composting sites on the respective islands. Carcasses of DCCOs killed for reduction of damage to public resources on TPI or other near shore areas would be transported for disposal in a landfill. Composting sites would be built and maintained in accordance with Ohio Division of Soil and Water (ODSW) requirements. The compost sites typically consist of an eight foot square area with a 3 foot tall perimeter fence consisting of ½ inch mesh hardware cloth with a sheet of plastic on the bottom. A one foot layer of wood shavings is placed on the plastic. Alternating layers of carcasses and wood shavings are then placed inside the perimeter fence with a foot of wood shavings over the top layer of carcasses. There currently is one compost site on Green Island and three sites on West Sister Island. Personnel from ODW and ONWR would be specifically trained in the design and maintenance of these sites by the Ohio State University Extension. Carcasses from other CDM activities would be disposed of in landfills in accordance with State and Federal regulations.

Alternative 2. Only Non-lethal CDM by Federal Agencies

Under this alternative, the Federal agencies would only use and permit non-lethal techniques for DCCO management. 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. Permits are not required from the USFWS for non-lethal CDM techniques. Entities requesting CDM assistance for damage concerns from the lead and cooperating agencies would only be provided information and assistance with non-lethal methods such as harassment, empty nest destruction, resource management, exclusionary devices, or habitat alteration. Depending upon which agency(ies) select this alternative, information on lethal CDM methods could still be available through sources such as USDA Agricultural Extension Service offices, USFWS, ODW, universities, or pest control organizations.

The USFWS FEIS on DCCO management permits PRDO actions that will result in the take of less than 10% of the local DCCO population (USFWS 2003). Decisions made by the USFWS in this EA cannot affect this type of CDM action on non-Federal land. The ODW would use lethal methods to take up to 10% of local DCCO in combination with non-lethal methods to try and meet management goals (EA Section 1.5.6.3; USDA 2006) at all sites under its jurisdiction (i.e., not at WSINWR). Only non-lethal methods could be used for CDM at WSINWR because Federal agency (USFWS) approval would be needed to work there. Overall management goals for the Lake Erie islands and near shore areas would be as described for Alternative 1.

Alternative 3. Only Technical Assistance by 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 (ODW) 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 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 a National Wildlife Refuge (See EA Section 2.2.3; USDA 2006).

Under this alternative, the Federal agencies would not be able to conduct operational CDM in Ohio, 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., WSINWR). Cormorant conflict management for the protection of public resources on the remaining Lake Erie islands and near shore areas and the inland colonies could only be conducted by ODW and would be the same as described for Alternative 1. WS would not be involved in operational CDM.

Alternative 4. No CDM by Federal Agencies

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. Depending upon which agency(ies) select this alternative, information on CDM methods would still be available through other sources such as USDA Agricultural Extension Service offices, ODW, 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. The selection of this alternative by the USFWS would not affect ODW's use of lethal CDM methods under the PRDO that would result in the take of less than 10% of the local population. The ODW has made it clear that it would use lethal methods to take less than 10% of local DCCO in combination with non-lethal methods to try and meet management goals (EA Section 1.5.6.3; USDA 2006) at all sites under its jurisdiction (i.e., not at WSINWR). No CDM would be conducted at WSINWR because Federal agency (USFWS) approval would be needed for any activities at that location.

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

As defined by the Council on Environmental Quality (CEQ), the no action alternative can be interpreted as the continuation of current CDM practices. At the time the EA was written, none of the action agencies had taken action under the PRDO. Consequently, this alternative evaluated the impacts of a CDM program in which the USFWS would not conduct/authorize CDM under the PRDO. The lead and cooperating agencies have been implementing Alternative 1 since the EA was completed in 2006 including managing DCCO in accordance with the PRDO. Consequently, Alternative 1 is now the "no Action" alternative and this alternative will not be analyzed further.

VI. CDM STRATEGIES AND METHODOLOGIES

The strategies and methods employed thus far for CDM in Ohio have not changed and are discussed extensively in the 2006 EA. However, the lead and cooperating agencies are proposing a modification to the compost and vegetation monitoring program.

When the EA was prepared, there was concern that composting cormorants on the Lake Erie islands would concentrate unsafe levels of mercury in the soil that might harm the environment. In response to this concern the ODW and USFWS agreed to test the compost sites at WSI, Green Island, and TPI for mercury. Cormorants taken on WSI were composted within 3 sites on that island. A single compost site has been used at Green Island and at TPI, though composting has ceased on TPI in recent years. Cormorants taken at TPI are now collected and disposed of in a landfill. At each island, samples were collected under 4 different conditions: compost sites, soil adjacent to compost sites, soil at locations of high cormorant nest concentrations, and soil at locations that have a history of little or no colonial bird nesting activity. Compost sites were tested for mercury levels in 2007 and 2010 and results show mercury levels below the legal threshold of 0.2 mg/L as set by the Ohio Environmental Protection Agency (EPA) (Table 2). Future composting at these sites (excluding TPI) is expected to continue to have a low level of impact. Given that

Table 2. Results from compost and soil testing for mercury levels by island for 2007 and 2010. An * indicates that no samples were tested for the site. Cormorants are no longer composted on TPI and thus no testing was conducted in 2010. The red "X" illustrates where the soil samples were collected under 4 different conditions: compost sites, soil adjacent to compost sites, soil at locations of high cormorant nest concentrations, and soil at locations that have a history of little or no colonial bird nesting activity.

Site	In Compost		Near Compost		Bird Colony		Lightly Impacted Areas	
	2007 mg/L	**2010 mg/L**	**2007 mg/L**	**2010 mg/L**	**2007 mg/L**	**2010 mg/L**	**2007 mg/L**	**2010 mg/L**
Turning Point Island	0.01315	*	<0.00025	*	<0.00025	*	<0.00025	*
Green Island	0.02455	0.04700	0.00835	0.01650	<0.00025	0.01200	0.00640	0.00550
West Sister Island - Site 1	0.06250	0.03550	<0.00025	0.00400	0.00545	0.00600	<0.00025	*
West Sister Island - Site 2	<0.00025	0.06550	0.00530	0.00450	0.00565	0.00250	<0.00025	0.00300
West Sister Island - Site 3	<0.00025	0.08600	0.00665	0.00600	<0.00025	*	0.00780	0.00450

current evidence appears to indicate that material in the compost sites is well below the legal threshold of 0.2 mg/L as set by the Ohio EPA (Table 2) and the cost of testing is substantial, the agencies are proposing to increase the interval between tests to once every 4 years. This proposed change is contingent upon future management requirements as defined by the USFWS. The USFWS is currently working on a supplement to the 2003 FEIS on DCCO management. One of the issues to be addressed in the FEIS is the question of whether collecting carcasses should be required in situations where carcass retrieval could result in substantial disturbance of nesting nontarget birds. Leaving cormorants where they lay reduces the amount of time that biologists spend within the colony, thus reducing disturbance to co-nesters as well as eliminating the need to compost carcasses. If, after NEPA review, the USFWS no longer requires agencies to collect cormorant carcasses for some PRDO actions then the ODCCG may opt to leave cormorant carcasses on the Lake Erie Islands where they lay following CDM activities. For DCCO take outside of the Lake Erie Islands, carcasses will be collected and disposed of according to standard condition 7 for Migratory Bird Depredation Permits (50 CFR 21.41; i.e. burial, incineration, or donation to an approved/permitted institution).

Figure 3. Perimeter photographs of the same point on West Sister Island documenting vegetative change from before management actions 2002 (top left) and 2005 (top right) and after management began 2007 (bottom left) and 2011 (bottom right).

Vegetation surveys and monitoring at WSI have occurred at both DCCO removal and non-removal areas in an effort to determine the effects of culling operations on the regrowth of herbaceous vegetation and canopy cover. Baseline canopy and understory herbaceous data were gathered in 2006 and subsequent surveys were conducted in 2007, 2008 and 2010. While no statistically significant conclusions can be made from the data, there does seem to be an overall, positive vegetation response to DCCO management island-wide. The ODW and ONWR staff will continue to monitor vegetation response to CDM and will cooperate with other agencies and organizations including Parks Canada on studies to assess the impact of CDM on island vegetation.

Photography has also been used to capture snapshots of the vegetation at WSI beginning before management actions (2002) and continuing through to 2009. Photographs of WSI were taken during June or July in 2002, 2005, 2007, and 2011 from the same location offshore. Figure 3 shows the change in vegetation beginning before management began through to present including the increase in vegetation since the start of CDM. Perimeter photographs of this nature will continue to be taken and evaluated.

VII. ISSUES

The EA describes the alternatives considered and evaluated using the identified issues. The following issues were identified as important to the scope of the analysis (40 CFR 1508.25). The impact of the Preferred Alternative on each of these issues is analyzed below.

- Effects on double-crested cormorants
- Effects on other wildlife species, including T&E species
- Effects on human health and safety
- Effects on aesthetic values
- Humaneness and animal welfare concerns of methods used
- Impacts on recreation

7.1 Effects on Double-crested Cormorants

Information on local, state, and regional DCCO populations and DCCO management activities is exchanged among WS, ODW and the USFWS. This coordination among agencies facilitates review of cumulative impacts on the DCCO population and helps to ensure that the viability of state and regional DCCO populations will not be jeopardized.

The number of DCCOs taken under the Public Resource Depredation Order (PRDO) and other authorities in Ohio during 2006-2012 was within the estimated level of lethal take analyzed in the 2006 EA (Table 3). As discussed in Section III above the EA also established minimum numbers of breeding pairs that would be maintained at WSI, TPI, Grand Lakes – St. Mary and Portage Lakes in order to ensure the viability of the state DCCO population. The number of breeding pairs at each of these sites was either at or exceeded the minimums established for the protection of the state DCCO population. The objective at Green Island remains zero nesting pairs and thus there is no minimum breeding population objective for this site. Two new breeding colonies have been located in Ohio. One colony is in Franklin County near the city of Columbus. Forty-three nests were counted within this colony in 2011. No plans to manage this colony are currently proposed.

Table 3. Summary of cumulative DCCO take for Ohio 2006-2012.

Source of Take	2006	2007	2008	2009	2010	2011	2012	Maximum annual take anticipated under Alternative 1
PRDO WSI	4,320	1,932	579	328	423	968	1,694	N/A
PRDO Green Island	1,468	798	949	792	479	1,267	876	N/A
PRDO TPI	80	849	1,069	1,162	1,304	1,287	3,790	N/A
PRDO Grand Lake	5	110	67	75	0	205	173	N/A
PRDO Portage Lakes	0	0	0	0	0	0	0	N/A
Total PRDO	5,868	3,689	2,664	2,357	2,206	3,727	6,533	6,352
Scientific Collecting Permits	230	0	0	0	0	0	0	300
Migratory Bird Depredation Permits	99	8	116	33	28	27	54	300
TOTAL	6,197	3,697	2,780	2,390	2,234	3,754	6,587	6,952

At WSI, agency personnel monitored cormorant nesting activity in areas where removals occurred and in areas where removals did not occur to determine if culling operations are having an impact on the number of nests constructed and used by cormorants. For the years 2008, 2009, and 2010 the average number of cormorant nests per tree was higher (3.13, 3.27, 2.08 nests/tree respectively) in areas where cormorant removal did not occur than in areas where cormorants were removed (1.78, 1.48, 1.11 nests/tree respectively).

The 2006 EA concluded that the cumulative impact of all CDM actions could reduce the state DCCO population to between 1,921 and 2,421 breeding pairs, and that this level of reduction would not jeopardize the state, regional or national DCCO population. The estimated number of nesting DCCOs in the state has ranged from 3,279 to 5,302 breeding pairs over the period of 2006-2012. Implementation of the CDM program in Ohio has had less impact on the state DCCO population than anticipated prior to the start of CDM when an estimated 5,165 DCCO breeding pairs were in the state.

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 or 159,635 DCCOs (USFWS 2003). Maximum annual take under the PRDO analyzed in the FEIS was 99,360. The FEIS concluded that the proposed level of take would be sustainable at the State, regional and national level (USFWS 2003). Table 4 summarizes cumulative DCCO take nationally since the implementation of the PRDO. Cumulative take has been well below the level analyzed in the FEIS.

Table 4. Double-crested Cormorant take in the 24 states included in the Public Resource Depredation Order (PRDO) and the 13 states included in the Aquaculture Depredation Order (AQDO). The AQDO is not applicable to Ohio.

Year	PRDO Take	AQDO and Depredation Permits Take	Total Take
2004	2,395	27,822	30,217
2005	11,221	23,869	35,090
2006	21,428	32,617	54,045
2007	19,960	18,818	38,776
2008	18,745	21,523	40,268
2009	24,973	20,192	45,165
2010	18,363	19,516	37,879
2011	28,389	16,146	44,535
2012	26,112	NA	NA

Based on the above information, although the local DCCO breeding populations were reduced at several sites, the cumulative impact of CDM activities in Ohio did not reach levels that would jeopardize the state, regional or national DCCO population. Program activities and their impacts on target DCCO populations have not changed from those analyzed in the 2006 EA and will not have a significant adverse impact on the state, regional or national DCCO population.

7.2 Effects on Other Wildlife Species

The 2006 EA concluded that the effects of CDM activities on other wildlife species would be insignificant. Moreover, the main objective for DCCO management in Ohio was protection of habitat for Great Blue Herons, State-listed Black-crowned Night-Herons, Great and Cattle Egrets, and rare plant communities, particularly those occurring on WSI and Green Island, from adverse impacts associated with high densities of nesting DCCOs.

Ohio CDM activities did not result in the direct mortality of any nontarget bird species. Agency employees are experienced in identification of avian species in the area and are trained in appropriate collection and management techniques. All lethal methods were conducted during daylight hours by trained personnel. Agency personnel implemented a variety of techniques, including use of suppressed .22 caliber rifles, slow movement, and camouflage clothing, in an effort to minimize indirect take through nest abandonment of co-nesting colonial waterbirds.

It is possible that CDM activities might have an indirect impact on nontarget species by disturbing nesting birds. Shooters were paired with observers who studied the co-nesting species and recorded disturbance behavior (or lack thereof) at WSI during 2006-2010. Observations were used to improve management operations in order to reduce disturbance to co-nesting species. Data from the observers showed that approximately 60% of observed waterbirds did not leave their nests during cormorant removal and waterbirds that did leave were only away for an average of approximately 8 minutes (Division of Wildlife, unpublished data). Based on data collected, the ODCCG implemented additional management standards for minimizing risks to nesting waterbirds. These standards included minimizing number of trips to the colony during the nesting season and conducting management visits only when temperatures were warm enough to protect eggs if an incubating bird was flushed from the nest. Other standards included staying

more than 30m from colonial wader nests whenever possible, and conducting research and culling trips as quickly and efficiently as possible. Additionally, on WSI, the ONWR has established 3 no-entry zones where no CDM was conducted. The northeast corner of the island is the core of the cormorant population, and a no-entry zone was established there to help ensure that the refuge does not go below the minimum population target of 1,500 nesting pairs.[2] The second no-entry zone contains the core of the Great Blue Heron population. This zone was established to minimize disturbance to this species, which tends to be concentrated in one general area more than the other co-nesting birds. Finally, in general, we do not enter the area used by the Black-crowned Night-Heron population, which is concentrated within the habitat management area for the species. Within this area, trees are cut on a rotational basis to provide preferred shrub-nesting and early successional habitat for Black-crowned Night-Herons.

Nest counts for Great Blue Herons, Black-crowned Night-Herons and Great Egrets have varied since before the start of the CDM program at WSI (Table 5). Reasons for the annual changes are unclear. For Black-crowned Night-Herons the answer may lie in the amount of suitable habitat on the island which has been decreasing in recent years. An area of the island historically used by the lighthouse keeper to graze livestock had changed to early succession growth suitable for Black-crowned Nigh-Heron nesting after grazing was discontinued. However, the area has subsequently matured, creating less than optimal habitat for the species. A new area on the island managed for optimal Black-crowned Night-Heron nesting habitat by the ONWR is actively used and can be seen in the breeding colony maps of WSI (Figures 4 and 5). Figures 4 and 5 represent population distributions and relative abundance for 2005 (pre-control) and 2012. The black dots and codes represent the permanently marked grid system where species nests are counted in a 25' radius around the plot center. The nest counts at these plots are used to derive a population estimate for the island for each species. The populations of the 4 primary species are color and symbol coded (green triangle—Black-crowned Night-Heron, teal cross—Great Blue Heron, blue star—Great Egret, red circle—DCCO). The two figures allow a visual comparison of the effects of cormorant control on their nesting patterns. An interesting note is the contraction of the Black-crowned Night-Heron population to the habitat management area for the species, which minimizes the chance of disturbance to this species because we do not enter the habitat management area during control operations. The figures also illustrate the variable nature of nesting patterns of Great Egrets, which shift around more than any other species on the island.

For Great Blue Herons and Great Egrets, nest numbers increased in 2006 when the most intensive control operations were being conducted and also the most trips were made to the island, so the sporadic declines do not seem to be related to the CDM program. Moreover, the minimal bird response to the shooting program mentioned above and the increased measures for minimizing disturbance of nontarget species indicate that the island has been more hospitable in subsequent years than it was in 2006.

Severe storm events on Lake Erie could also be cause for some declines. High winds during these storm events causes noticeable damage to trees on the islands and may have some impact on species which prefer nesting in taller trees (e.g., Great Blue Herons, Great Egrets), especially early nesters. Great Blue Herons are the earliest nesters on WSI establishing their nests usually during late March (Peterjohn 2001). Great Egrets and Black-crowned Night-Herons establish their nests 2-3 weeks later in late April (Peterjohn 2001). Alternatively, the variation in nest numbers could be a reflection of normal annual variability for the populations, a consequence of sampling error, or unknown environmental factors. It should be noted that due to the sub-sampling methodology used to arrive at population estimates, in conjunction with the patchy

[2] As noted in the discussion of WSI in Section III above, DCCO take on WSI is self-limiting when the DCCO population is near the management objective. Consequently, the need for the no-entry zone for DCCO in the Northeast portion of WSI is being reevaluated in light of concerns about habitat impacts in accordance with adaptive management approach used for CDM.

nature of colonial waterbird nesting locations, the annual population estimates have a high degree of variability. Thus, relatively large year-to-year changes in the point estimate for a species may not necessarily reflect a true change in actual population levels.

Table 5. PRDO take of DCCO and breeding numbers for all colonial waterbirds at West Sister Island National Wildlife Refuge, 2002-2012.

Year	PRDO Take	DCCO	Great Egret	Great Blue Heron	Black-crowned Night-Heron	Snowy Egret	Cattle Egret
2002	0	2,787	733	1,007	393	13	0
2003	0	2,613	700	987	460	14	0
2004	0	3,780	707	1,027	433	14	0
2005	0	3,813	827	927	500	14	10
2006	4,320	2,707	1,067	1,267	480	15	4
2007	1,932	1,967	760	953	460	12	16
2008	579	1,933	800	860	373	10	12
2009	328	1,860	907	793	460	15	7
2010	423	2,373	913	827	393	10	8
2011	968	3,160	1,280	993	460	10	6
2012	1,694	2,407	740	927	480	8	0

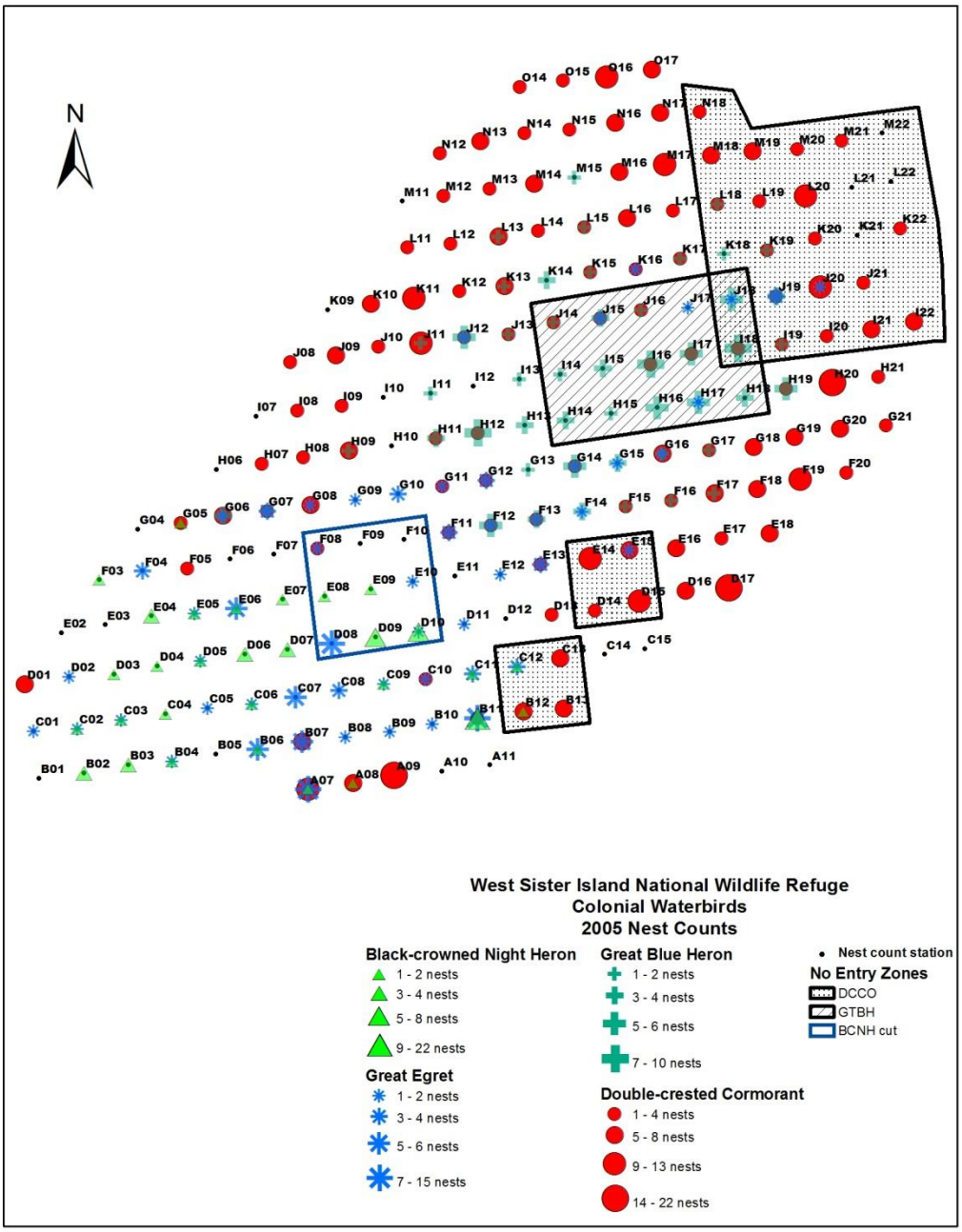

Figure 4. West Sister Island waterbird colony data before cormorant damage management activities began (2005).

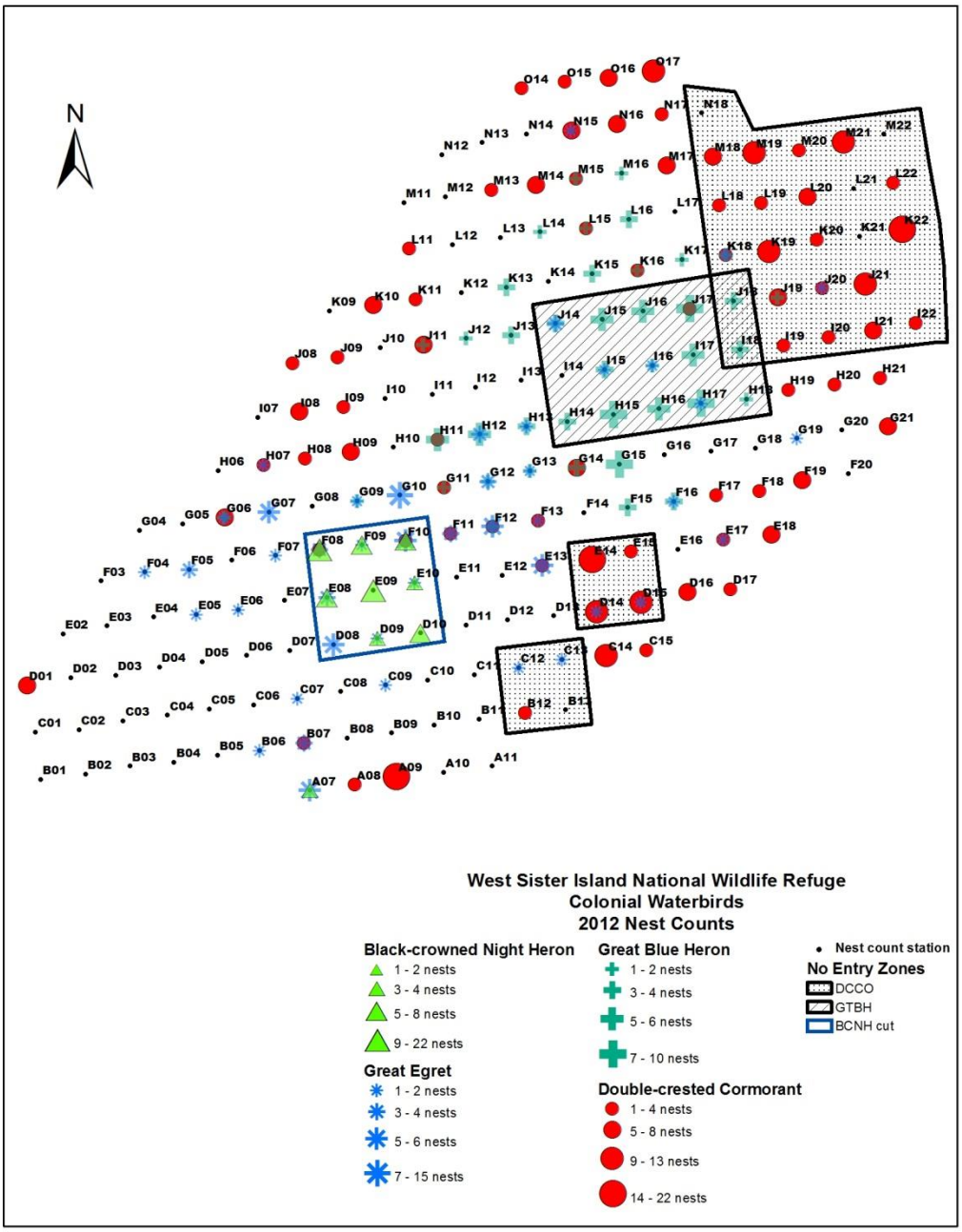

Figure 5. West Sister Island waterbird colony data for 2012 following 7 years of cormorant damage management.

Efforts were made on Green Island to reduce disturbance to colonial waders using the same techniques employed on West Sister. Due to the smaller size of Green Island, shooters were not able to maintain a 30m distance from the egrets and herons, but all other disturbance reduction strategies were employed. The numbers of both Great Egret and Great Blue Heron nests have shown a gradual increase over the past 7 years (Table 6), thus it is not likely that CDM activities negatively affected the nesting waders. Black-crowned Night-Heron nests are spread throughout the island and are infrequently seen during CDM operations.

Table 6. PRDO take of DCCO and breeding numbers for all colonial waterbirds at Green Island for a ten-year period, 2002-2012.

Year	PRDO Take	DCCO	Great Egret	Great Blue Heron	Black-crowned Night-Heron	Snowy Egret	Cattle Egret
2002	0	0	no data	no data	no data	no data	no data
2003	0	0	no data	no data	no data	no data	no data
2004	0	0	no data	no data	no data	no data	no data
2005	0	857	4	91	0	0	0
2006	1,468	517	3	62	6	0	0
2007	798	686	51	122	4	0	0
2008	949	757	12	117	2	0	0
2009	792	431	85	179	13	0	0
2010	479	325	56	154	1	0	0
2011	1,267	628	104	227	2	0	0
2012	876	368	103	211	4	0	0

Turning Point is a small island, so there is not an opportunity to maintain a 30m distance from nesting waterbirds; however, all other disturbance reduction strategies mentioned before are utilized at Turning Point. The Great Egret numbers have shown a gradual increasing trend over the past 7 years while the Black-Crowned Night-Herons have remained around 50 birds the past 7 years with sporadic population fluctuations, thus CDM activities do not seem to be negatively affecting the colonial waders on this island.

Table 7. PRDO take of DCCO and breeding numbers for all colonial waterbirds at Turning Point Island for a ten-year period, 2002-2012.

Year	PRDO Take	DCCO	Great Egret	Great Blue Heron	Black-crowned Night-Heron	Snowy Egret	Cattle Egret
2002	0	416	39	0	206	0	12
2003	0	401	31	0	187	0	6
2004	0	no data	no data	no data	no data	no data	no data
2005	0	409	41	0	47	0	0
2006	80	726	103	0	89	0	9
2007	849	934	132	1	53	0	0
2008	1,069	739	63	3	12	0	0
2009	1,162	952	171	4	73	0	0
2010	1,304	619	100	5	48	0	0
2011	1,287	1,221	175	7	44	0	2
2012	3,790	1,163	201	2	29	0	12

WS CDM activities did not result in the take of State or Federally listed Threatened or Endangered species. A review of the Federal list of threatened and endangered species indicates that there have been some changes to the list since the 2006 EA was completed. Four species of mussel have been listed since the EA was completed: Rayed Bean (*Villosa fabalis* - endangered), snuffbox (*Epioblasma triquetra* – endangered), sheepnose (*Plethobasus cyphyus* - endangered) and rabbitsfoot (*Quadrula cylindrical* – threatened). Additionally, the Northern long-eared bat (*Myotis septentrionalis*) is proposed for listing as endangered and the Red Knot (*Calidris canutus rufa*) is proposed for listing at threatened. In the 2006 EA and associated IntraService Section 7 consultation, the agencies concluded that the proposed action would have no effect on federally-listed mussels. After review of the newly listed species and the management methods proposed in the EA and this supplement, we conclude that the CDM program will also have no effect on the newly listed mussels and Northern long-eared bats. With implementation of protective measures similar to those established in the Section 7 consultation in the EIS for Piping Plovers, the proposed action may affect but is unlikely to adversely affect Red Knots.

Bald Eagles (*Haliaeetus leucocephalus*) were removed from the Federal list of threatened and endangered species in 2007. However, Bald Eagles are still protected under the Bald and Golden Eagle Protection Act and the MBTA. The 2006 EA and the 2003 USFWS EIS on cormorant management contained provisions for the protection of eagles. The lead and cooperating agencies have continued to implement the protective measures established while eagles were Federally-listed as a threatened species. In 2010, a pair of Bald Eagles nested on Green Island. Cormorant damage management activities on the island were curtailed in accordance with provisions of the EA and USFWS EIS. In 2011, the ODW obtained a take permit from the USFWS to address the risk that CDM actions could result in the potential incidental take of eagles (specifically, CDM could cause eagles to abandon a new nest site). The eagles were seen on the island during an early aerial DCCO survey, but were not observed on the island when ODW staff arrived to conduct CDM. Eagles were also not observed at the site during a post-treatment survey of DCCOs and, based on the presence of a DCCO on the edge of the eagle nest, it was assumed that the eagles had abandoned the site sometime during the spring. Given that no eagles were seen in the area by the staff conducting CDM it is unclear what role, if any, CDM had in the eagles leaving the site. However, even if the eagle departure from the site was associated with the CDM, based on the issuance of the take permit by the USFWS, the disturbance would not adversely affect the state, regional or national Bald Eagle population. No eagles were seen near the island in 2012.

The USFWS announced on August 16, 2011, the removal of the Lake Erie water snake (*Nerodia sipedon insularum*) from the Federal List of Endangered and Threatened Wildlife. While DCCO control within Ohio colonies was determined to have no effect on this species and its habitat, it was a point of concern addressed within the original EA.

The agencies also reviewed the 2010-2011 state list of threatened and endangered animals. Comparison of the list used in the preparation of the 2006 EA and the current list indicates there have been status changes for several species. Bald Eagles, Osprey (*Pandion haliaetus*), and Peregrine Falcons (*Falco peregrinus*) changed from endangered to threatened species. Blue catfish (*Ictalurus furcatus*) changed from endangered to species of concern, and the river jewelwing (*Calopteryx aequabilis*) changed from threatened to endangered. Evaluation of risk does not vary if a species changes from threatened to endangered or vice versa and the review in the 2006 EA remains valid for these species. Two mayflies (*Rhithrogena pellucida* and *Litobrancha recurvata*) were added to the state list of endangered species. The Blanding's turtle (*Emydoidea blandingii*), cavespring crayfish (*Cambarus tenebrosus*), harlequin darner (*Gomphaeschna furcillata*), green-faced clubtail (*Gomphus virifrons*), Boreal bluet (*Enallagma boreale*),

northern bluet (*E. cyathigerum*) and marsh bluet (*E. ebrium*) were added to the state list of threatened species. The preferred alternative will not have an adverse impact on newly listed insect species or their habitat. In general, cormorants do not nest near small streams and caves used by cavespring crayfish (NatureServe 2011). Therefore, the preferred alternative is not anticipated to have any effect on the cavespring crayfish. In Ohio, Blanding's turtles are primarily limited to the northern counties along Lake Erie and could, theoretically, occur in areas where CDM may be conducted. The preferred alternative will not result in direct take of Blanding's turtles or alteration of turtle habitat. In areas where CDM is proposed to reduce vegetation loss caused by high concentrations of DCCO, CDM may have a beneficial impact on Blanding's turtle habitat.

Review of the 2010-2011 state list of rare plants, lichens and mosses identified several status changes for Threatened and Endangered species and some species listed at the time the 2006 EA was completed are no longer listed. As noted above, no additional review is necessary for species which are removed from the list and species which have their status changed from threatened to endangered and vice-versa. Fifty-eight new species were added to the list (Section XII below). Species which are known to occur in counties where the proposed CDM currently occurs (Auglaize, Erie, Franklin, Lucas, Mercer, Ottawa, and Summit) are listed below (Table 8; Ohio Biodiversity Database 2011). Because the proposed CDM is intended to protect vegetation on the Ohio Lake Erie islands, this action is likely to have a beneficial impact on state-listed plant species. Prior to any control action at a new site, the lead and cooperating agencies will consult with the ODW to ensure that no actions taken under this plan will adversely affect Ohio's listed threatened and endangered species.

Table 8. State-listed plant species which occur in counties where CDM currently takes place (Auglaize, Erie, Franklin, Lucas, Mercer, Ottawa, and Summit).

Scientific Name	Common Name	Status
Buxbaumia aphylla	Bug-on-a-stick	Threatened
Cardamine pratensis var. palustris	American Cuckoo-flower	Endangered
Carex argyrantha	Silvery sedge	Threatened
Carex brunnescens	Brownish Sedge	Endangered
Carex diandra	Lesser panicled sedge	Threatened
Cinna latifolia	Northern wood-reed	Endangered
Eleocharis tenuis	Slender spike-rush	Threatened
Fallopia cilinodis	Mountain Bindweed	Endangered
Hesperostipa spartea	Porcupine Grass	Endangered
Hieracium umbellatum	Canada Hawkweed	Threatened
Ophioglossum pusillum	Northern adder's-tongue	Endangered
Packera paupercula	Balsam Squaw-weed	Threatened
Persicaria robustior	Course Smar tweed	Threatened
Phragmites australis spp. *americanus*	American Reed Grass	Threatened
Potamogeton zosteriformis	Flat-stemmed Pondweed	Threatened
Prunus nigra	Canada plum	Endangered
Ranunculus fascicularis	Early buttercup	Threatened
Symphyotrichum drummondii	Drummond's Aster	Threatened
Symphyotrichum dumosum	Bushy Aster	Threatened
Tetraneuris herbacea	Lakeside Daisy	Endangered
Trillium recurvatum	Prairie wake-robin	Threatened
Utricularia minor	Lesser bladderwort	Threatened

Veronica fasciculata	Prairie Ironweed	Threatened

The 2006 EA concluded that the proposed CDM activities would not adversely affect the viability of any wildlife species populations and would not have a significant cumulative adverse impact on non-target species. Review of the available information indicates that this is still the case.

7.3 Effects on human health and safety

The 2006 EA concluded that the effects of the WS IWDM activities on this issue would be insignificant. Program activities and their potential impacts on human health and safety have not changed from those analyzed in the EA. WS implementation of the program activities did not result in any adverse impacts to human health and safety. Impacts of the program on this issue are expected to remain insignificant.

7.4 Effects on aesthetic values

The 2006 EA concluded that public reaction to the IWDM program would be variable and mixed because there are numerous philosophical, aesthetic, and personal attitudes, values, and opinions about the best ways to reduce conflicts between humans and wildlife. Program activities and their potential impacts on this issue have not changed from those analyzed in the EA.

7.5 Humaneness and animal welfare concerns of methods used

WS personnel are experienced and professional in their use of management methods, and methods are applied as humanely as possible. Program activities and their potential impacts on this issue have not changed from those analyzed in the 2006 EA. Impacts of the program on this issue are expected to remain insignificant.

7.6 Impacts on recreation

The 2006 EA concluded that impacts to recreation from IWDM activities would be insignificant. Program activities and their potential impacts on recreation have not changed from those analyzed in the EA. WS implementation of the program activities did not result in significant adverse impacts to recreation. Impacts of the program on this issue are expected to remain insignificant.

VIII. CUMULATIVE IMPACTS

Cumulative impacts, as defined by the 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 Alternatives 1, 2, and 3,WS would address damage associated with cormorants in a number of situations throughout the State. The WS CDM program would be the primary Federal program with CDM responsibilities; however, the state agency will conduct CDM activities in Ohio as well, and governmental agencies and private individuals can take birds under migratory bird depredation and scientific collecting permits. Through ongoing coordination with these entities, WS is aware of such CDM activities and may provide technical assistance in such efforts. The potential cumulative impacts analyzed below could occur

either as a result of WS 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.

8.1 Cumulative Impacts on Wildlife Populations

Cormorant damage management methods used or recommended by the WS program and the other action agencies in Ohio could result in a reduction in the State DCCO population, but the reduction will not jeopardize the health or viability of the state or regional DCCO breeding population. The preferred alternative will likely have no cumulative adverse effects on non-target wildlife populations. The intent and expected result of this program is to address specific DCCO damage problems occurring within each of the colonies mentioned above and throughout the State as necessary. The action agencies' limited lethal take of DCCOs is anticipated to have minimal impacts on DCCO populations in Ohio, the region, and the U.S. Population trend data and information provided in the FWS FEIS (USFWS 2003) indicate that cormorant populations have increased for Ohio, the region and the U.S. over the past 20 years. When control actions are implemented by WS the potential lethal take of non-target wildlife species is expected to be minimal to non-existent. Conversely, there are expected beneficial impacts to non-target wading birds co-located within the DCCO colonies in that the goals of DCCO management are to protect critical habitat and minimize adverse impacts to vegetation by DCCO. Reduction in DCCO breeding numbers is expected to curb the degradation of habitat observed before management actions commenced in 2006.

8.2 Cumulative Impact Potential from CDM Methods

Cormorant damage management methods used or recommended by WS and the other action agencies in Ohio 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. No cumulative or long-term adverse effects are anticipated from implementation of these CDM methods.

8.3 Summary

No significant cumulative impacts on the human environment are expected from any of the alternatives. Lethal removal of DCCOs under the PRDO and Migratory Bird Permits would not have an adverse impact on the long-term sustainability of DCCO populations in the State, region or nation, but some local reductions would occur. Given the standards for the protection of nontarget species described in Section 7.2 above and the ODCCG's commitment to adhere to all USFWS and ODW recommendations and requirements for the protection of State and Federally-listed threatened and endangered species, the preferred alternative will not adversely impact nontarget species populations. No risk to public safety is expected when WS' services are provided and accepted by requesting individuals in Alternatives 1, 2, and 3, because only trained and experienced wildlife biologists/specialists and designated agents would conduct and recommend CDM activities. There is a slight increased risk to public safety when persons who reject WS assistance and recommendations conduct their own CDM activities, and when no WS assistance is provided in Alternative 4. In all four alternatives, however, this increase would not result in significant impacts.

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X. ACRONYMS

APHIS	Animal and Plant Health Inspection Service
CDM	Cormorant Damage Management
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DCCO	Double-crested Cormorant
EA	Environmental Assessment
EIS	Environmental Impact Statement
FEIS	Final Environmental Impact Statement
FONSI	Finding of No Significant Impact
IWDM	Integrated Wildlife Damage Management
MBP	Migratory Bird Permit
MBTA	Migratory Bird Treaty Act
NEPA	National Environmental Policy Act
OARDC	Ohio Agricultural Research and Development Center
ODA	Ohio Department of Agriculture
ODCCG	Ohio Double-crested Cormorant Coordinating Group
ODH	Ohio Department of Health
ODNR	Ohio Department of Natural Resources
ODOT	Ohio Department of Transportation
ODSW	Ohio Division of Soil and Water
ODW	Ohio Division of Wildlife
ONWR	Ottawa National Wildlife Refuge
ORC	Ohio Revised Code
OSUE	Ohio State University Extension
PRDO	Public Resource Depredation Order
T&E	Threatened and Endangered
TPI	Turning Point Island
USDA	U.S. Department of Agriculture
USDI	U.S. Department of Interior
USFWS	U.S. Fish and Wildlife Service
WS	Wildlife Services
WSI	West Sister Island
WSINWR	West Sister Island National Wildlife Refuge

XI. LITERATURE CITED

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XII. Plant and Lichen Species State-listed as Threatened or Endangered Since the Completion of the EA in 2006.

Lichens and Mosses

Anomodon viticulosus – Long tail moss – endangered
Anomobryum filiforme – Common silver moss – endangered
Buxbaumia aphylla – Bug-on-a-stick – threatened
Canoparmelia amabilis – Obed shield lichen – endangered
Canoparmelia carolinia – Carolina shield lichen – endangered
Dichelyma capillaceum – Awned dichelyma moss – endangered
Lycopodiella appressa – Southern bog club-moss – endangered
Phaeophysicia leana – Lea's shadow lichen – endangered
Thuidium allenii – Allen's fern moss – endangered

Plants

Ageratina aromatica - Small White Snakeroot - endangered
Aronia arbutifolia – Red chokeberry – endangered
Cardamine pratensis var. palustris - American Cuckoo-flower – endangered
Carex argyrantha – Silvery sedge – threatened
Carex brunnescens - Brownish Sedge – endangered
Carex diandra – Lesser panicled sedge – threatened
Carex gigantean – Large sedge – endangered
Carex gynandra – Nodding sedge – endangered
Carex mitchelliana – Mitchell's sedge – endangered
Carex reznicekii – Riznicek's sedge – endangered
Cinna latifolia – Northern wood-reed – endangered
Eleocharis tenuis – Slender spike-rush - threatened
Fallopia cilinodis - Mountain Bindweed – endangered
Hesperostipa spartea - Porcupine Grass – endangered
Hieracium umbellatum - Canada Hawkweed - threatened
Magnolia tripetala – Umbrella magnolia – threatened
Minuartia patula - Spreading Sandwort - endangered
Muhlenbergia glabrifloris – Hair grass – endangered
Ophioglossum pusillum – Northern adder's-tongue – endangered
Packera paupercula - Balsam Squaw-weed - threatened
Paspalum repens – Riverbank paspalum – threatened

Passiflora incarnata – Maypop - threatened
Persicaria robustior - Course Smartweed - threatened
Persicaria setacea - Bristly Smartweed - endangered
Phragmites australis spp. *americanus* – American Reed Grass - threatened
Piptochaetium avenaceum- Black-seeded Needle Grass - endangered
Pityopsis graminifolia - Silk-grass - endangered
Placidium sqaumulosum - Brown Stipplescale - endangered
Porteranthus trifoliatus – Bowman's root – threatened
Potamogeton zosteriformis - Flat-stemmed Pondweed – threatened
Prunus nigra – Canada plum – endangered
Pseudognaphalium macounii - Winged Cudweed – endangered
Ramalina farinacea - Dotted Ramalina – endangered
Ranunculus fascicularis – Early buttercup – threatened
Rhododendron periclymenoides - Pinxter-flower – threatened
Rubus trivialis – Southern dewberry – endangered
Sagina decumbens – Southern pearlwort – endangered
Sagittaria platyphylla – Elliptic-leaved arrowhead – endangered
Schoenoplectus saximontanus – Rocky Mountain bulrush – endangered
Schoenoplectus torreyi – Torrey's bulrush – endangered
Sericocarpus linnifolius - Narrow-leaved Aster – threatened
Symphyotrichum drummondii - Drummond's Aster – threatened
Symphyotrichum dumosum - Bushy Aster – threatened
Symphyotrichum oblongifolium - Shale Barren Aster – threatened
Tetraneuris herbacea - Lakeside Daisy – endangered
Trillium recurvatum – Prairie wake-robin – threatened
Utricularia minor – Lesser bladderwort – threatened
Veronica fasciculata – Prairie Ironweed – threatened
Viburnum alnifolium – Hobblebush – threatened

APPENDIX A

Number of breeding pairs of Double-crested Cormorants (DCCOs) in Ohio by colony and year, 2006-2012.

Colony	Breeding Pair Objective	Breeding Pair Count 2005[1]	Breeding Pair Count 2006	Breeding Pair Count 2007	Breeding Pair Count 2008	Breeding Pair Count 2009	Breeding Pair Count 2010	Breeding Pair Count 2011	Breeding Pair Count 2012
West Sister Island	1,500-2,000	3,813	2,707	1,967	1,933	1,860	2,373	3,160	2,407
Green Island	0	857	517	686	757	431	325	628	368
Turning Point Island	400	409	726	934	739	952	619	1,221	1,163
Franklin County	N/A	No Data	No Data	No Data	No Data	No Data	25[2]	43	No Data
Grand Lake- Saint Mary's	15	80	20	20	16	15	No Data[3]	180	30
Portage Lakes	6	6	3	15	9	21	41	70	70
TOTAL	1,921-2,421	5,165	3,973	3,622	3,454	3,279	3,383	5,302	4,038

[1] 2005 was the maximum state population estimate prior to the initiation of CDM in 2006.

[2] A new DCCO colony was discovered in 2010 in Franklin County on private property.

[3] A count of breeding pairs was not conducted during the normal breeding season at Grand Lake-Saint Mary's in 2010. Supposed nests were observed post-breeding/fledging and thus no reliable inferences could be made about the breeding population. It was thought that the colony had abandoned the site; however observations in 2011 showed that it had grown and moved nearby to an island.