

Focal Species Action Plan for the Dusky Canada Goose  
(*Branta canadensis occidentalis*)



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## INTRODUCTION

In 2005, the U.S. Fish and Wildlife Service (USFWS) initiated a focal species program to identify priority species for conservation work, develop effective management strategies through action plans, and measure success for accountability of federal programs. The dusky Canada goose (*Branta canadensis occidentalis*) was designated a focal species in 2005 as a “*game bird below desired condition*” for increased management emphasis by the Service, state wildlife agencies, and other cooperators.

Since the 1960s, dusky geese and other geese of the Pacific Coast have been closely managed to address a variety of issues. These management programs have been supported by a large body of research on goose ecology, population dynamics, varying harvest strategies, and potential management approaches. As a result, there is a great deal of biological and ecological information on dusky geese upon which to evaluate management strategies (see review by Bromley and Rothe 2003) and build a focal species action plan for the future.

The purpose of this document is to provide a focal species action plan for conservation of the dusky Canada goose in order to achieve population goals through specific cooperative management and research tasks. This action plan is based on the current Pacific Flyway management plan for this population (Pacific Flyway Council 2008) and includes actions addressing: (1) habitat and ecological factors on the breeding grounds; (2) habitat factors and crop depredation issues on wintering grounds; (3) management of harvest and other public uses; (4) population inventory and assessment; and (5) research necessary for successful management. This action plan contains specific tasks to be implemented, priorities of tasks, schedules for actions, specific responsibilities among cooperators, estimated costs of conservation measures, and coordination and evaluation processes.

## POPULATION STATUS, GOAL, AND OBJECTIVES

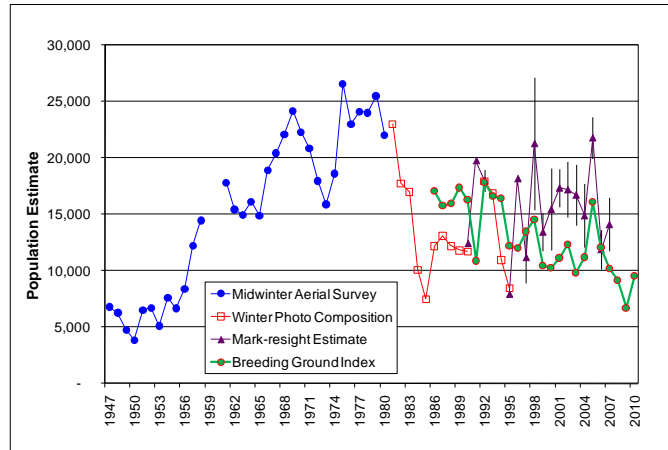
### Population Status

Dusky Canada geese have always constituted one of the smallest goose populations in North America and, because of their discrete breeding and winter ranges, they were considered one of the most manageable stocks subject to hunting. Through the 1950s until 1964, the dusky goose population averaged less than 11,000 geese as measured by aerial surveys on the wintering grounds. Population management largely amounted to regulating goose harvest in western Oregon where Canada geese were almost exclusively dusky.

From 1964 into the 1970s, two major developments affected the dusky goose population: (1) a major earthquake that uplifted and dried the breeding grounds, and (2) the creation of several

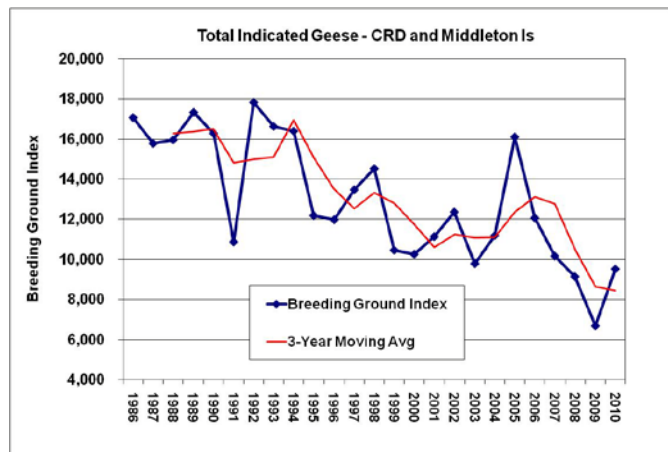
national wildlife refuges on the wintering grounds. The combination of favorable graminoid habitats on the Copper River Delta (CRD), rich winter forage, and judicious harvest regulations promoted population growth to an average of over 21,000 geese during 1965-1981, including a record high of 26,600 in 1975.

During the early 1980s, the dusky population declined markedly to about 15,000 birds and may have dropped below 10,000 in 1985; winter indexing by photo composition, however, was becoming less reliable. An indirect estimate from mark-recapture methods was implemented in 1990 (Sheaffer 1993) and adopted as the Pacific Flyway standard in 1995 because it offered an estimate of statistical precision lacking in previous inventories.



Several critical changes overtook dusky geese during the 1980s and 1990s. Perhaps foremost, succession toward shrub habitats on the nesting grounds favored nest predators (see below). Although dusky goose production always has been variable, during 1985-1995 late summer indices of production averaged only 12% goslings (six years <10%) or half the average of the preceding 16 years. The population model by Sheaffer (1993) suggested that annual production needed to average 20% young for a stable population—and indeed, the population declined as production faltered through the 1990s.

In recent years, results from spring aerial surveys, ground nest plot surveys, and breeding biology studies on the CRD have been integrated in a breeding ground index of dusky geese (Eldridge et al. 2005; Fischer 2006). The new index includes adjustments for visibility and reneating, and adults on Middleton Island. It was adopted as the population standard in 2007 because it more directly focuses on the breeding population and avoids the



problems of mixed Canada goose populations on the wintering grounds. From back-calculated breeding ground indices, the dusky population began a substantial decline after 1993 and fell to a record low of 6,700 indicated total dusky geese on CRD and Middleton Island in 2009.

Although population effects on duskys from competition in winter are difficult to assess, dusky geese have faced increasing winter sympatry with other white-cheeked geese, beginning with the creation of Willamette Valley refuges in the mid-1960s and the resettlement of lesser Canada (*B. c. parvipes*) and Taverner's (*B. hutchinsii taverneri*) geese in the 1970s (Simpson and Jarvis 1979). By the early 1990s, cackling geese (*B. h. minima*) were rebounding rapidly from a historic low population and also shifted their wintering grounds from California to western Oregon and southwest Washington (see Jarvis and Bromley 1998). Thus, where duskys used to occur almost exclusively, by the late 1970s into the 1980s they shared winter habitats with 30-60,000 other Canadas; by the 1990s from 100,000 to 200,000 Canada geese wintered in the region. Regardless of the biological effects, this aggregation of geese complicated inventories and harvest regulation for goose management, and added demands to address crop depredation.

### **Goals and Objectives**

The goal of this action plan and the Pacific Flyway management plan is to maintain and enhance the dusky Canada goose population. Objectives of the Pacific Flyway plan are to:

1. Manage the number of dusky geese to sustain the population within a range of 10,000 to 20,000 geese, as measured by indices of geese on Copper River Delta and Middleton Island, with primary consideration to:
  - a. Maintain the breeding population on Copper River Delta; and
  - b. Maintain the dusky goose population to withstand an incidental harvest of duskys when harvests of abundant subspecies are desired to assist in depredation control.
2. Maintain and enhance breeding ground habitat conditions to achieve average annual production of 20% young, measured as the most recent 10-year average.
3. Manage and enhance wintering and migration habitat for dusky and other geese, with an emphasis on habitat objectives outlined in the NW Oregon/SW Washington Canada Goose Agricultural Depredation Control Plan (Pacific Flyway Council 1998).

### **LIMITING FACTORS, RISKS, AND THREATS**

Until the 1970s, the small population of dusky Canada geese faced no major threats. Their breeding grounds were secure, nesting was occasionally subject to flooding, and nest predation was light. Also, they had a short migration to western Oregon where good grazing habitat was increasing and they had little competition from other geese. The principal management issue was regulation of hunting for this relatively discrete population.

The primary conservation challenges for dusky geese have arisen from major ecological changes to the breeding grounds after the 1964 Alaska earthquake, shifts in the array and impacts of nest

predators, and impaired production that has caused a declining population trend since the late 1970s. The tectonic uplift of the Copper River Delta reduced tidal influence that sustained extensive graminoid marsh. Continued drying and desalination of the nesting grounds reached a stage that “released” shrubs like alder and willows and accelerated succession toward emerging forest. By the 1980s, these habitat changes improved conditions for mammalian predators (brown bears, coyotes) and avian predators (eagles, ravens), such that dusky nest success during 1985-95 averaged only 18.4%, with four years <10%. Most nest predation was attributed to brown bears. During this period, goslings comprised, on average, only 13.4% of duskys on the CRD in late July.

By the 1990s, habitats on the dusky nesting grounds included extensive coverage of tall shrubs and emerging spruce and cottonwood trees which provided perches and nest sites for avian nest predators. Bald eagles (*Haliaeetus leucocephalus*) became the primary nest predator. Despite a few good years, average nest success was poor during the late 1990s, averaging 20-30% during 1997-2000 (Grand et al. 2006) and 40% during 1997-2004 (Fondell et al. 2006). Production has averaged 22.4% young since 1996, but the dusky goose population has continued to decline.

Although there has been considerable research on dusky goose breeding biology and ecology in recent years, several key impediments to conservation action remain: (1) unclear relationships between habitat succession patterns and goose production hinder development of effective habitat enhancement concepts; (2) incomplete information on the dynamics of nest and goose predators, particularly bald eagles, as well as social concerns about predator control, limit acceptable options for predator management; and (3) inconsistencies between July production indices and the declining breeding population index suggest that production indicators are not precise, or there may be post-fledging recruitment problems (see Research Priorities).

In western Washington and Oregon, dusky geese are now the smallest minority component of a large aggregation of wintering white-cheeked geese, which creates management constraints that complicate hunting programs and limit efforts to reduce agricultural depredation. Current harvest strategies for various goose populations are difficult to reconcile because they aim to minimize the harvest of dusky geese through very restrictive hunting regulations, carefully regulate the harvest of more abundant cackling geese to reach objectives, and focus harvest on western Canada geese (*B. c. moffitti*) and other populations. Recent research shows high annual survival rates of adult dusky geese, suggesting that harvest effects are small (and that poor annual production is the critical problem).

Regardless that dusky harvest is low, balancing objectives for all of the goose populations requires a risk averse approach involving complicated regulations and harvest monitoring programs that frustrate hunters. Because reducing goose populations (i.e., cacklers and others) to address crop depredation entails conflicts with other resource values, there is greater emphasis on



increasing the amount and quality of winter habitat, redistributing geese to public lands, and providing agricultural producers assistance to manage depredation. In this environment, the politics of agriculture and goose management have become an important factor shaping the scope and nature of conservation actions. Development of specific conservation actions requires more research on winter goose distribution, including analysis of hunting and depredation deterrence programs, and prescriptions for improving habitat quality on managed areas.

## **CONSERVATION STRATEGY**

### **Management History**

Dusky Canada geese were defined as a population and subject to new management and research efforts in the early 1950s (Timm et al. 1979). Through the 1960s and early 1970s, cooperative management programs developed in the Pacific Flyway, mostly focused on baseline studies of productivity on the Alaska breeding grounds and managing fall and winter harvest on the relatively small, well-defined winter range in western Oregon where duskys were the predominate goose. Since 1973, the dusky Canada goose has been cooperatively managed among wildlife agencies through formal management plans of the Pacific Flyway Council (PFC), which have been revised periodically to adapt to dynamic management needs. The evolution of conservation challenges and management approaches are reviewed in Bromley and Rothe (2003) and the current flyway plan (PFC 2008).

Primary management responsibilities are carried out by USFWS Region 7 in Alaska and Region 1 in Washington and Oregon; Alaska Department of Fish and Game (ADFG), Washington Department of Fish and Wildlife (WDFW), Oregon Department of Fish and Wildlife (ODFW), and the U.S. Forest Service (USFS) Chugach National Forest (principal land manager on Copper River Delta breeding grounds).

As a result of declines in dusky geese since the 1980s and a shift in the wintering grounds of cackling geese (*Branta hutchinsii minima*) from California to western Oregon and Washington by the mid-1990s, management of white-cheeked geese in the Northwest became complicated. Additional cooperators and affected parties expanded to include agricultural producers and Farm Bureaus concerned about crop depredation, hunters and their organizations concerned about complex harvest regulations, and Alaska subsistence hunters who harvest cackling geese in western Alaska (see cackling goose plan, Pacific Flyway Council 1999).

### **Actions Necessary for Conservation**

This action plan is built on the tasks and priorities of the Pacific Flyway Council in their most recent (2008) population management plan for dusky geese and subsequent discussions and reviews with cooperators. During fall 2009, each agency involved in management of dusky

geese and their habitats reviewed and evaluated the tasks for which they are responsible, estimates of current expenditures for those tasks, and additional funding needs to adequately implement all tasks in the future. In addition, cooperators re-evaluated the merits of each task listed in the plan, recommended modifications to task priorities, and proposed a short list of top-priority research topics.

The Pacific Flyway Study Committee (PFSC), Dusky Goose Subcommittee, met in December 2009 and provided collective input on “actions necessary for conservation” in this plan. Appendix A contains worksheets of conservation tasks, cooperators, priority ranks, schedules, and budgetary costs and future needs. Tasks in this plan include those in the 2008 Pacific Flyway management Plan, with revised priorities based on the recent evaluation, modification of some tasks, emphasis on those tasks expected to provide conservation benefits in the immediate future, and effective use of available funding. During the review process, several critical new tasks were identified as essential top priorities—these are annotated in Appendix A.

## **COORDINATION AND EVALUATION**

### **Coordination**

The Service intends to work with the Pacific Flyway Council and the Pacific Flyway Study Committee as the primary means of coordinating management and research tasks for dusky Canada geese. The PFSC Dusky Goose Subcommittee has long served as an effective forum on management issues and source of conservation planning and coordination; participation includes state and federal wildlife agencies, public land management agencies, government and university researchers, hunting and other conservation organizations, agriculture interests, and private landowners. Appendix B lists current and potential cooperators who can play an important role in implementing this plan. In addition to collaboration with PFC, the Service will coordinate internally among the Migratory Bird Management, Refuges, and Ecological Services Divisions in Regions 7 and 1, and with Washington Office program staff to develop and implement conservation actions.

### **Evaluation**

The degree of success achieved under this action plan may be evaluated most simply by tracking several primary measures of dusky goose population status, as well as measures of key management initiatives. The following quantitative evaluation elements are currently being assessed.

*Breeding Season*—the primary measures of population status on the breeding grounds include:

1. The size and trend of the breeding population index (total indicated geese) on the Copper River Delta and Middleton Island;
2. The proportion of goslings estimated from the annual July production survey;

3. Nest success on artificial nest islands (annual); and
4. Nest success from the extensive CRD plot survey (every three years).

*Fall/Winter Season*—the primary measures of conservation success on the wintering grounds include:

1. The size and trend of dusky goose harvest in the Alaska permit hunt zone and Northwest Quota Zones of western Oregon and southwest Washington , based on check station data, band recoveries, and other information;
2. The number of acres of suitable goose wintering habitat on public lands or otherwise under management control, and the number of dusky and other geese supported on managed habitats; and
3. The relative number of crop depredation complaints.

These measures are reviewed and evaluated annually by the PFSC Dusky Goose Subcommittee, as well as managers of state and federal waterfowl management units.

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## Appendix A

Summary of Tasks, Participating Cooperators, Priorities, Schedules, and Estimated  
Costs of Actions Necessary for Conservation of Dusky Canada Geese





**Recommended Management Strategies and Research Needs - Dusky Canada Goose**  
Focal Species Action Plan

**Final Draft**  
September 2010

PFC PLAN TASK	SHORT TITLE	LEAD	PARTICIPATING	PRIORITY	SCHEDULE STATUS	OPERATING COSTS \$K	OPERATING NEEDS \$K	PERSONNEL COSTS (\$K)	PERSONNEL NEEDS (\$K)	COMMENTS
<b>HABITAT AND ECOLOGICAL FACTORS - Breeding Grounds</b>										
1.1	Complete CRD vegetation mapping at 10-year increments.	USFS		1	2010-2011					Contract with Ducks Unlimited, Inc.
		USFS				285.0		32.0		Funds needed for completion in 2011. USFS multi-year \$317K
1.2	Continue stringent habitat protection through management of USFS lands for fish and wildlife, and management of the state Critical Habitat Area	USFS, ADFG		1	Ongoing Annual					Routine vigilance in land use planning, permitting, project reviews
		USFS				20.0		65.0		Part of base workload
		ADFG				0.0		3.5		Habitat Division permit review
1.3.1 (mod)	Continue to maintain and monitor dusky Canada goose artificial nest islands	USFS		1	Ongoing Annual					
		USFS				38.0	25.0	72.0	10.0	\$25K for every 100 islands added
		USFWS				10.0		1.0		Assistance 1 person
1.3.2 (new)	Evaluate potential pond sites for more artificial nest islands	USFS		1	2010					New imagery acquired and analyzed.
		USFS				2.2		14.7		Funded for completion 2010
1.4	Increase the number of artificial nest islands by 200 in increments of 50/year	USFS	ADFG, ODFW, WDFW, USFWS-7, USFWS-1, DU	1	Ongoing					
		USFS				16.0	16.0	34.0	34.0	Funded and approved for 2010
		ADFG				20.0	20.0			
		WDFW				10.0	30.0			
		ODFW				10.0				\$40K for all 4 years paid 2010
		USFWS-7				10.0	30.0			
		USFWS-1				10.0	30.0	10.0		
		DU						10.0	10.0	Lead for coordination and funding
		NFWF				80.0				Matching grant for 50-80 islands in 2010-11
1.5	Evaluate concepts to enhance productivity on barrier islands of CRD	ADFG, USFWS-7	USFS	2	Ongoing					Look at causes of decline from nest plots and production surveys; design projects (habitat or predator factors)
		ADFG				1.0		3.0		
		USFWS-7				1.0		3.0		
1.6	Monitor all habitat enhancement techniques to determine success and feasibility	All	USFS, ADFG, USFWS, USGS	2	Concepts in discussion					
							10.0		5.0	Artif. islands are only concept in play. USFS and ADFG discussing alternative habitat techniques.
1.7	Manage mammalian predator populations through public hunting and trapping	ADFG	USFS	2	Ongoing Annual					Part of base workload
		ADFG					0.0		0.0	Current regulations at maximum sustainable harvests. Moderate priority consistent with the small role of mammalian predators and questionable viability of predator control.
		USFS								USFS role as needed for NEPA on USFS lands

PFC PLAN TASK	SHORT TITLE	LEAD	PARTICIPATING	PRIORITY	SCHEDULE STATUS	OPERATING COSTS \$K	OPERATING NEEDS \$K	PERSONNEL COSTS (\$K)	PERSONNEL NEEDS (\$K)	COMMENTS
1.8	Determine if eagles from CRD could be used for eagle restoration programs outside Alaska.	USFWS-7	USFS, ADFG	1	TBD					Significant policy and regulatory issues to be explored since there is no present program.
		USFWS					TBD		TBD	USFWS Region 7 to provide a report on status of restoration programs, procedural options, and feasibility for use of CRD eagles.
1.9	Develop an options paper for a comprehensive predator management program	ADFG	USFS, USFWS	1	Completed					Conclusions the same as 1988 review. Need to evaluate the ability to influence eagle predation.
		ADFG						3.5		
1.10	Test and evaluate deterrence and redistribution of coyotes and other mammalian predators. Includes experimental feeding at lure sites	ADFG		1	Completed					Preliminary evaluation indicates lure sites are not feasible nor efficacious on a large scale. Too many factors involved and there are many unknown consequences.
		ADFG								
1.11	Test and evaluate the use of avian predator deterrence and redistribution. Includes experimental feeding at lure sites	ADFG, USFWS-7, USGS		1	Completed					Preliminary evaluation indicates lure sites are not feasible nor efficacious on a large scale. Too many factors involved and there are many unknown consequences.
		ADFG								
		USFWS	USFWS Region 7 to provide a report on relevant experiments, feasibility, and potential consequences.							USGS preliminary work suggests this management alternative is not effective in reducing avian predation, based on high rates of raven predation on dummy nests.
2.1	Install maximum number of artificial nest islands in suitable habitats on the Copper River Delta.	USFS	ADFG, ODFW, WDFW, USFWS-7, USFWS-1, DU	2	TBD		280.0			Depends on analysis in 2010; see 1.32. 70 additional islands to a total 600 islands @\$4,000/ island installed.
		USFS					TBD		25.0	O & M costs needed. USFS Region 10 approval required
		ADFG					TBD			Requires new funds
		WDFW					TBD			Requires new funds
		ODFW					TBD			Requires new funds
		USFWS-7					TBD			Requires new funds
		USFWS-1					TBD			Requires new funds
		DU					TBD			Requires new funds
2.2	Implement enhancement of productivity on the barrier islands	USFS	ADFG	2	TBD					Depends on concepts developed in 1.5
		USFS								
		ADFG								
2.3	Develop brown bear guided hunt areas on the Copper River Delta to increase bear harvest	USFS	ADFG	1	2012					
		USFS							20.0	Chugach Forest Plan amendment to allow guided brown bear hunts on west CRD (at least Castle island)
		ADFG								Not excluded under state regulations

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2.4	Implement deterrence, redistribution, and further liberalized hunting and trapping of coyotes and other mammalian predators	ADFG		3						Preliminary evaluation indicates lure sites are not feasible nor efficacious on a large scale. Too many factors involved and there are many unknown consequences.
		ADFG								Bear season liberalized again (2009) to max. extent. Further liberalization of coyote season and bag would not affect harvest. Enhancement of mink harvest may be explored. Priority reduced because mammalian predators have minor role.
2.5	Implement avian predator deterrence and redistribution	USFWS-7, ADFG		3						Preliminary evaluation indicates lure sites are not feasible nor efficacious on a large scale. Too many factors involved and there are many unknown consequences.
		USFWS								Deterrence and redistribution not feasible (see 1.11)
2.6	Initiate an environmental analysis for NEPA compliance on directed predator control	USFS, USFWS	ADFG	2						
		USFS					TBD		TBD	Because predator control is complex and controversial, NEPA process better reserved for a situation of population jeopardy.
		USFWS					TBD		TBD	Needs policy discussion among PFC, USFS, FWS. NEPA analysis may indicate that predator control is not effective or efficient.
2.7	Develop an assessment of the feasibility and costs of captive-rearing dusky geese on CRD	ADFG, USFWS-7	USFS, ODFW, WDFW, USFWS-1	1	2010					More appropriate consideration in the event of population jeopardy.
		ADFG					5.0		42.0	
		USFWS-7								USFWS Region 7 to provide a report on feasibility and considerations.
		USFS								Cost share considerations; land use permits
		WDFW								Cost share considerations
		ODFW								Cost share considerations
3.1	Implement directed predator control programs that have been deemed feasible	ADFG, USFWS	USFS	3						Predator control not feasible on mainland CRD. Controversy, NEPA process, costs, and potential litigation warranted only in the event of population jeopardy.
		ADFG								Coyote control, Egg Is. only, under hunting and trapping regulations. Mainland CRD bear and coyote options not feasible.
		USFWS								Eagle control not politically feasible.
3.2	Implement a program of captive brood-rearing	ADFG, USFWS-7	USFS, ODFW, WDFW, USFWS-1	3	TBD					Depends on feasibility from Task 2.7 and need
		USFS								Cost share considerations; land use permits
		ADFG								Cost share considerations
		USFWS-7								Cost share considerations
		WDFW								Cost share considerations
		ODFW								Cost share considerations
		USFWS-1								Cost share considerations

PFC PLAN TASK	SHORT TITLE	LEAD	PARTICIPATING	PRIORITY	SCHEDULE STATUS	OPERATING COSTS \$K	OPERATING NEEDS \$K	PERSONNEL COSTS (\$K)	PERSONNEL NEEDS (\$K)	COMMENTS
<b>HABITAT AND ECOLOGICAL FACTORS - Migration Areas (All Levels)</b>										
1	Identify and protect habitat along migration routes	USFS, ADFG, WDFW, ODFW, USFWS-1 PCJV	CWS, BCMOE	2	Ongoing Annual					This task routine planning and permitting. See research task below to determine whether there are migration stops east of CRD and in SE AK.
		USFS								USFS would include Tongass NF if migration includes portions of SE Alaska.
		ADFG						3.5		Habitat Division planning and permit review
		WDFW				2.0		18.0		Ongoing protection includes review of SEPA documents, acquisition and management of migration habitat.
		ODFW								No migration habitat
		USFWS-1	Willamette Valley NWR			5.0	10.0	10.0	50.0	Ridgefield NWR staff could serve a variety of habitat and land mgmt functions
		CWS				0.0	2.0			
<b>HABITAT AND ECOLOGICAL FACTORS - Wintering Areas (All Levels)</b>										
1	Maintain existing state and federal areas for goose resting, feeding, and sanctuary	WDFW, ODFW, USFWS-1		1	Ongoing Annual					
		WDFW				50.0		72.0		Ongoing Vancouver/Shilapoo costs
		ODFW	Sauvie Is			112.0	150.0	37.0	58.0	Farming, pasture mgmt for geese
			E.E. Wilson			7.0	14.0	12.0	24.0	Farming, pasture mgmt for waterfowl
		USFWS-1	All NWRs			872.0	1271.0	533.7	665.0	Farming, pasture mgmt for waterfowl
2	Develop new cooperative management programs for public lands, other than national wildlife refuges and state management areas	WDFW, ODFW, USFWS-1	Other Federal, State, and private organizations	1	Ongoing Annual					
		WDFW					40.0		7.0	New funds. Habitat enhancements on other state (DNR) and Clark County lands to expand public land capacity.
		ODFW					75.0		15.0	Dept Corrections, state parks, etc.
3	Analyze survey and neck-collar information to identify high goose use areas, review management plans for these areas and develop cooperative land management agreements	USFWS-DMBM	WDFW, ODFW, USFWS-1	1	Ongoing					
		USFWS-1	Ridgefield			5.0	5.0	30.0	30.0	
		WDFW					15.0		18.0	New funds. Identification of dusky use areas and development of landowner agreements.
		ODFW					75.0		15.0	

PFC PLAN TASK	SHORT TITLE	LEAD	PARTICIPATING	PRIORITY	SCHEDULE STATUS	OPERATING COSTS \$K	OPERATING NEEDS \$K	PERSONNEL COSTS (\$K)	PERSONNEL NEEDS (\$K)	COMMENTS
<b>Public Use</b>										
1.1 & 1.2	<b>Regulatory prescriptions</b>									<b>Excluded from Action Plan</b>
1.3	Maintain check stations at appropriate locations in southwest Washington and western Oregon	WDFW, ODFW, USFWS-1		1	Ongoing Annual					
		WDFW				12.0	2.0	90.0	18.0	Ongoing regular season costs for check stations, and new funds to replace check station reduction at Ridgefield Marina
		ODFW	OSP			40.0	20.0	160.0	55.0	Add 4 stations; Police funded \$50K
		USFWS-1				0.0	0.0	0.0	0.0	
1.4	Encourage hunters in Alaska GMUs 5 and 6 to participate in a voluntary check of harvested Canada geese	ADFG	USFWS-7, USFS	1	Ongoing Annual					
		ADFG			N/A					Voluntary checks N/A in Level 2. Expansion to Unit 5 and SE Alaska and BC depends on telemetry study and band returns.
		USFWS-7			N/A					
		USFS			N/A					
1.5	Evaluate harvest levels of birds wintering in British Columbia, and develop and implement complementary regulatory packages	CWS	BCMOE	1	2009					
		CWS				0.0	2.0			
1.6	Maintain efforts to educate hunters on goose identification and the rationale for current regulations	ADFG, USFWS-7, WDFW, ODFW, USFWS-1		1	Ongoing Annual					
		ADFG								Geographic focus depends on telemetry and band returns for SE AK
		USFWS-7								
		WDFW				2.0		14.0		Improve testing opportunities, update identification materials.
		ODFW				2.0		10.0		
		USFWS-1	Ridgefield NWR					1.0		
1.7	Maintain interpretive programs such as visitor centers	ADFG, USFWS-7, WDFW, ODFW, USFS, USFWS-1		2	Ongoing Annual					
		ADFG						3.5		New materials in Cordova office
		USFWS-7								
		USFS					10.0		20.0	USFS will put in for 2011 funds to improve interpretive sites for Dusky's. (Cordova office and Ten-mile kiosk)
		WDFW				2.0		18.0		Outreach regarding dusky Canada geese at Wildlife Areas and offices.
		ODFW								Integrated with field office operations
		USFWS-1				5.0	10.0	10.0	10.0	All NWRs

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2.1	Regulatory prescriptions									Excluded from Action Plan
2.2	In Washington and Oregon, all Canada goose hunting in the Northwest Oregon/Southwest Washington Quota Zones would be targeted to optimize depredation control	WDFW, ODFW	USFWS-1	1						
		WDFW				1.5		12.0		Ongoing late-late season costs for coordinator and check stations.
		ODFW								Very little public land hunting
2.3	In Alaska, implement a permit-only Canada goose hunt in the core dusky goose area (Alaska GMU 6-C and parts of D), hunter education program, and mandatory check-in	ADFG	USFWS-7, USFS	1	Ongoing					
		ADFG				0.5	40.0	7.0	10.5	New video, classes, flyers, etc. Geographic scope defined from telemetry & bands
		USFWS-7								Assist as necessary
3.1 - 3.3	Regulatory prescriptions									Excluded from Action Plan
<b>CROP DEPREDAION CONTROL - (All Levels)</b>										
1	Take advantage of opportunities to secure additional goose use areas for resting, feeding, and sanctuary	ODFW, WDFW, USFWS-1	Other agencies, private organizations	1	Ongoing Annual					
		WDFW					120.0		36.0	New funds. Easements and management costs of private lands; expand public land carrying capacity.
		ODFW					1000.0		30.0	
		USFWS-1	Ridgefield, Tualatin				3000.0			
<b>INVENTORIES - Breeding Grounds (Most at All Levels)</b>										
1	Conduct a spring aerial survey of birds on the nesting grounds	USFWS-7		1	Ongoing Annual					
		USFWS-7				20.0	4.0			Continue annually
2	Conduct a survey of dusky geese and productivity on Middleton Island	ADFG	USFWS, ODFW, WDFW	1	Biennial 2010					
		ADFG				15.0		7.0		
		USFWS-7						2.0		Tech assistance, pending need
		WDFW				1.0		1.0		Tech assistance, pending need
		ODFW				1.0		1.0		Tech assistance, pending need
		USFWS-1				1.0		1.0		Tech assistance, pending need
3	Monitor stratified random nest plots to determine correction factors for aerial surveys and trends in nest densities and nest success	USFS	USFWS, ADFG, ODFW, WDFW	2	3-yr cycle 2010					USFS recommends cooperative interagency funding. Also, evaluation of the frequency of plot surveys.
		USFS				7.0	3.0	30.0	18.0	Avg annual cost \$18K
		ADFG					0.5		3.5	Usually not involved
		USFWS-7							2.0	Integrate w/aerial survey adjustments
		WDFW				1.0		1.0		Tech assistance, pending need
		ODFW					1.0		1.0	Tech assistance, pending need
		USFWS-1	also DMBM					10.0		Tech assistance, pending need
4	Conduct annual aerial production surveys on CRD	ADFG		1	Ongoing Annual					
		ADFG				15.0	2.0	3.5		Add investigation and survey of moraine molting areas, western PWS.

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5	Periodically band dusky geese on CRD	ADFG	USFS, USFWS	1	Biennial 2010					
		ADFG				12.0		6.0	Combined with prod. survey costs	
		USFS				1.0		2.0	Logistic & staff support	
		USFWS-7							2.0	Tech assistance as needed
6	Conduct a winter survey of Canada geese in Prince William Sound	ADFG	USFWS, USFS	2	2007-08					
		ADFG							Delay for results of telemetry migration project	
		USFS					12.0		13.0	
		USFWS-7								
7	Compile breeding season records of Canada geese in Prince William Sound, evaluate potential methods for an index survey	ADFG	USFWS, USGS, USFS	2	Ongoing					
		ADFG							7.0	Historical data in-hand; ongoing consideration of survey concepts
		USFS								
		USFWS-7								
		USGS								
8	Conduct fall distribution surveys of Canada geese on CRD	USFS		3	Intermittent					
		USFS					10.0		8.0	Priority 3 - Depends on Region and Forest funding priorities
<b>INVENTORIES - Wintering Grounds (Most at All Levels)</b>										
1	Conduct the annual midwinter waterfowl inventory	USFWS-1	WDFW, ODFW	1	Ongoing Annual					
		USFWS-1				1.0	3.0	3.0	5.0	All NWRs
		WDFW				0.5		3.0		WDFW participation
		ODFW						1.5		
2	Conduct periodic Canada goose monitoring in the WV-LCR, Tillamook to acquire data on the total wintering goose population	USFWS-1	WDFW, ODFW	1	Ongoing Annual					
		USFWS-1	also DMBM			18.0	10.0	53.0	4.0	Add Tillamook surveys
		WDFW				2.0	1.0	6.0	2.0	Reinstatement of collar observation program in SW WA, and new funds to expand to all potential use areas
		ODFW				25.0	12.5	45.0	22.5	
3	Continue a banding and marking program on dusky and western-dusky hybrids	WDFW, ODFW	USFWS-1, OSP	1	Ongoing Annual					
		WDFW				2.0		6.0		WDFW participation
		ODFW				2.0		1.5		OSP boats
		USFWS-1				2.0		1.5		JBH NWR support
4	Evaluate existing information on dusky migration and wintering areas in B.C.	CWS	BCMOE	1	2009					
		CWS					10.0	7.0	5.0	0.0

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<b>RESEARCH (Only high-priority projects have been initiated; highlighted below)</b>										
1	The Subcommittee will make recommendations for research and review research proposals			1	Ongoing					Routine annual review and evaluation
2	Develop a comprehensive population model, based on results of recent research, to integrate information on factors that affect recruitment and population size	Auburn Univ.	USGS Alaska Sci Ctr, Iowa State Univ.	1	Ongoing					A working model is nearing completion, but status and final needs are not known.
3	Determine timing of migration and identify important fall staging areas of subadult and adult CRD and Middleton Island Dusky CAGO to better understand factors influencing recruitment.	TBD	ADFG, USFWS-7, USFS, USGS, WDFW, ODFW, USFWS-1	1	TBD		TBD		TBD	Scope of work, cooperative roles, and funding needs in development.
						0.0	300.0	7.0	60.0	
4	Examine survival rates and sources of mortality of adult dusky Canada geese during the nesting period			2						Potential to combine this with new broad recruitment study (see below)
5	Examine methods of improving production surveys on Copper River Delta to better reflect observed annual variation in nest success and gosling survival	ADFG	USFWS-7	1	TBD					Design discussions ongoing; no formal project
		ADFG								
6	Investigate the ecology and productivity of Canada geese breeding in Prince William Sound including Green, Hinchinbrook, and Montague Islands			2						
7	As an alternative to other methods, estimate recruitment on the Copper River Delta and elsewhere using DNA isolated from eggshell membranes			2						
8	Evaluate factors involved in the loss of goose nesting on Egg Island			1	TBD					
9	Determine changes in aquatic habitat on the breeding grounds and the implications to brood-rearing			1	TBD					
10	Investigate bald eagle movements and identify alternative prey resources during the dusky breeding season to examine the relation between eagle abundance, alternative prey sources, and goose predation			1	TBD					



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11	Initiate studies to better assess eulachon stocks on the Copper River Delta, including annual variation in strength and timing of runs, threat factors, and harvest potential			1	TBD					
12	Re-evaluate dusky goose habitat use patterns during nesting and brood-rearing in relation to plant community succession			2	TBD					Design discussions ongoing; no formal project
13	Mark and track Middleton Island progeny to determine emigration pattern	ADFG		1						Integrate with expanded Project # 3
14	Re-examine the genetic composition of hunter-killed Canada geese submitted at check stations and classified as dusky Canada geese (after Pearce et al. 2000) to identify source populations	USFWS-DMBM	WDFW, ODFW, USFWS-1	1	Ongoing					
15	Compare habitat requirements among subspecies of geese wintering in the Willamette Valley and Lower Columbia River region to evaluate how management options designed to reduce crop depredation will impact individual subspecies	Oregon State Univ		1	Ongoing					
16	Develop methods to determine the amount and type of winter habitat needed to support the dusky population and the growing aggregation of other Canada geese	OSU Oregon State Univ		1	Ongoing		TBD		TBD	
17	Compare nutritional quality among major forage types used by geese in SW Washington and NW Oregon and assess energetic carrying capacity of public lands	OSU Oregon State Univ		1	Ongoing		TBD		TBD	
18 NEW	Estimate recruitment of CRD and Middleton Island juveniles	TBD	ADFG, USFWS-7, USFS, USGS, WDFW, ODFW, USFWS-1	1	TBD		TBD		TBD	Project would require banding a significant portion of goslings to obtain survival estimates, natal fidelity, and recruitment. Can be combined with #4 above.
		USFWS-7					30.0		30.0	
<b>GRAND TOTALS (x \$1000)</b>						<b>1767.7</b>	<b>6703.0</b>	<b>1490.4</b>	<b>1385.5</b>	

Current	\$	3,258,100
Needs	\$	8,088,500
Total	\$	11,346,600



Appendix B. Current and Potential Cooperators Participating in Conservation Action for Dusky Canada Geese

U.S. Fish and Wildlife Service  
Division of Migratory Bird Management  
911 NE 11th Avenue  
Portland, OR 97232-4181

British Columbia Ministry of Environment  
Ecosystems Branch  
P.O. Box 9338 STN PROV GOVT  
Victoria, BC, Canada V8W 9M1

U.S. Fish and Wildlife Service, Region 1  
Migratory Birds and Habitat Programs  
911 NE 11<sup>th</sup> Avenue  
Portland, OR 97232-4181

Canadian Wildlife Service  
Pacific and Yukon Region  
RR 1, 5421 Robertson Road  
Delta, BC, Canada V4K 3N2

U.S. Fish and Wildlife Service, Region 7  
Migratory Birds and State Programs  
1011 E Tudor Road  
Anchorage, AK 99503

Auburn University, Alabama Cooperative Fish and  
Wildlife Research Unit  
108 White Smith Hall  
Auburn, AL 36849

U.S. Forest Service  
Chugach National Forest  
3301 C Street  
Anchorage, AK 99503

Oregon State University  
Dept. of Fish and Wildlife  
104 Nash Hall  
Corvallis, OR 97331

U.S. Geological Survey  
Alaska Science Center  
4210 University Drive  
Anchorage, AK 99508

Ducks Unlimited  
Pacific Northwest Initiative Office  
1101 SE Tech Center Drive, Suite 115  
Vancouver, WA 98663

Alaska Department of Fish and Game  
P.O. Box 25526  
Juneau, AK 99802

Oregon Farm Bureau  
3415 Commercial St. SE  
Salem, OR 97302

Oregon Department of Fish and Wildlife  
3406 Cherry Ave. NE  
Salem, OR 97303

Washington Farm Bureau  
975 Carpenter Rd NE, Suite 301  
Lacey, WA 98516

Washington Department of Fish and Wildlife  
600 N Capitol Way  
Olympia, WA 98504

Alaska Migratory Bird Comanagement Council  
c/o U.S. Fish and Wildlife Service  
1011 E. Tudor Road  
Anchorage, AK 99503