1	Figures
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25	NOTE: This information is distributed solely for the purpose of pre-dissemination
26	peer review under applicable information quality guidelines. It has not been
27	formally disseminated by the U.S. Environmental Protection Agency. It does not
28	represent and should not be construed to represent any agency determination or
29	policy.
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## **1** Figures for Chapter 5, National Wildlife Refuges

2 Figure 5.1. Structure of the NWRS. Adapted from Fischman (2003), Refuge

3 Administration Act (1966), and FWS Regulations – CFR 50.



- 1 **Figure 5.2.** The National Wildlife Refuge System. Adapted from Pidgorna (2007).
- 2





## 1 **Figure 5.3.** Organizational chart (U.S. Fish and Wildlife Service, 2007a). Level of Organization Jurisdiction



## 1 Figure 5.4. Timeline of milestone events of the NWRS (U.S. Fish and Wildlife Service,

2 2007d).

3



- 1 **Figure 5.5.** Blackwater National Wildlife Refuge, Chesapeake Bay, Maryland. Current
- 2 land areas and potential inundation due to climate change (Larsen *et al.*, 2004b).
- 3



- 1 **Figure 5.6.** Results of the Sea Level Affecting Marshes Model (SLAMM) for Ding
- 2 Darling National Wildlife Refuge. Source: USFWS unpublished data (McMahon,
- 3 Undated, 2007).
- 4

	Ding	Darling	SLAN	IM Re	sults
	Habitat Type	Initial Condition	2100	Reduction	Percentage of Initial Refuge Area
	Dry Land	823 hectares	271 hectares	67%	18%
	Tidal Flats	967 hectares	12 hectares	99%	21%
	Hardwood Swamp	650 hectares	271 hectares	58%	14%
	Salt Marsh	28 hectares	16 hectares	43%	1%
	Estuarine Beach	14 hectares	0.002 hectares	99%	<1%
	Ocean Beach	2 hectares	0 hectares	100%	<1%
	Inland Freshwater Marsh	6 hectares	1 hectare	83%	<1%
	Mangrove	1,282 hectares	2,238 hectares	Increase of 75%	27%
	Estuarine Open Water	863 hectares	1,891 hectares	Increase of 119%	18%
	Inland Open Water	35 hectares	5 hectares	86%	1%
	Open Ocean	0 hectares	2 hectares	?	0%
	ALL AND ADD ADD ADD ADD ADD ADD ADD ADD ADD	STANDARD STATES IN STATES	and the second second	20	

- 1 Figure 5.7. Ecoregions of North America (Level 1) (U.S. Environmental Protection
- 2 Agency, 2007).
- 3



## SAP 4.4. Adaptation Options for Climate-Sensitive Ecosystems and Resources | Figures

- 1 **Figure 5.8**. Potential climate change vegetation shifts across North America. A.
- 2 Vegetation 1990. B. Projected vegetation 2100, HadCM3 general circulation model,
- 3 IPCC (2000) SRES A2 emissions scenario. C. Projected change as fraction of ecoregion
- 4 area. D. Potential refugia (Gonzalez, Neilson, and Drapek, 2005).
- 5



0.8-1.0

**Vulnerable Areas** 

6

0

0.01-0.2

0.2-0.4

0.4-0.6

0.6-0.8

Refugia

1 **Figure 5.9.** Annual mean temperature trends 1901–2003. Note warming in northern two-thirds of

Central Flyway and cooling in southern third of the flyway. Data are from NOAA National Climatic
Data Center (2006).



- 1 **Figure 5.10.** Central Flyway Waterfowl Migration Corridor (U.S. Fish and Wildlife
- 2 Service, 2007b).



- 1 **Figure 5.11.** Heterogeneity in closed-basin lakes with increasing and decreasing surface area, 1950–
- 2 2000, Yukon Flats NWR, Alaska. Net reduction in lake area was 18% with the area of 566 lakes
- 3 decreasing, 364 lakes increasing, and 462 lakes remaining stable. Adapted from Riordan, Verbyla, and
- 4 McGuire (2006).
- 5

