

**Appendix A**



Gary Zahm/USFWS

*American Bittern*

**Species of Concern at Supawna Meadows NWR**



Table A.1 Species of Conservation Concern for Supawna Meadows						
Species	Potential Seasons on Refuge <sup>1</sup>	Global Rank <sup>2</sup>	Federal Rank <sup>3</sup>	NJ State Rank <sup>4</sup>	BCR 30 <sup>5</sup>	PIF Area 44 <sup>6</sup>
<b>WATERBIRDS</b>						
American Bittern ( <i>Botaurus lentiginosus</i> )	YR,B	G4		BE,NC	M	
Black-crowned Night-heron ( <i>Nycticorax nycticorax</i> )	YR,B	G5		BT	M	
Black Tern ( <i>Chlidonias niger</i> )	SM	G4		NC		
Bonaparte's Gull ( <i>Chroicocephalus philadelphia</i> )	YR					
Caspian Tern ( <i>Hydroprogne caspia</i> )	SM	G5		BC		
Cattle Egret ( <i>Bubulcus ibis</i> )	SM,B			X		
Clapper Rail ( <i>Rallus longirostris</i> )	YR,B			G	H	1A
Common Tern ( <i>Sterna hirundo</i> )	M	G5		BC	M	
Double-crested Cormorant ( <i>Phalacrocorax auritus</i> )	YR					
Forster's Tern ( <i>Sterna forsteri</i> )	SM,B			X	H	2B
Glossy Ibis ( <i>Plegadis falcinellus</i> )	YR,B	G5		X	H	
Great Black-backed Gull ( <i>Larus marinus</i> )	YR					
Great Blue Heron ( <i>Ardea Herodias</i> )	YR,B	G5		BC		
Great Cormorant ( <i>Phalacrocorax carbo</i> )	WM					
Great Egret ( <i>Ardea alba</i> )	YR,B			X		
Green Heron ( <i>Buorides virescens</i> )	SM,B			X		
Herring Gull ( <i>Larus argentatus</i> )	YR					
Horned Grebe ( <i>Podilymbus auritus</i> )	M	G5		X	H	
King Rail ( <i>Rallus elegans</i> )	SM,B	G4G5		BC	M	
Laughing Gull ( <i>Leucophaeus atricilla</i> )	YR					
Least Bittern ( <i>Ixobrychus exilis</i> )	SM,B	G5		BC	M	
Least Tern ( <i>Sternula antillarum</i> )	M	G4		E	H	
Lesser Black-backed Gull ( <i>Larus fuscus</i> )	WM					
Little Blue Heron ( <i>Egretta caerulea</i> )	YR,B	G5		C	M	
Pied-billed Grebe ( <i>Podilymbus podiceps</i> )	YR,B			BE,NC		
Ring-billed Gull ( <i>Larus delawarensis</i> )	YR					
Red-throated Loon ( <i>Gavia stellata</i> )	WM				HH	
Snowy Egret ( <i>Egretta thula</i> )	YR,B	G5		X	M	
Sora ( <i>Porzana carolina</i> )	SM,B			G	M	

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Tricolored Heron ( <i>Egretta tricolor</i> )	SM,B	G5		BC	M	
Virginia Rail ( <i>Rallus limicola</i> )	YR,B			G		2A
Yellow-crowned Night-heron ( <i>Nyctanassa violacea</i> )	SM,B			T	M	
<b>WATERFOWL</b>						
American Black Duck ( <i>Anas rubripes</i> )	YR,B			G	HH	1A
American Wigeon ( <i>Anas Americana</i> )	WM				M	
Atlantic Canada Goose ( <i>Branta canadensis canadensis</i> )	WM			G	HH	
Black Scoter ( <i>Melanitta nigra</i> )	WM			G	H	
Blue-winged Teal ( <i>Anas discors</i> )	YR,B					
Bufflehead ( <i>Bucephala albeola</i> )	WM			G	H	
Canvasback ( <i>Aythya valisineria</i> )	WM			G	H	
Common Goldeneye ( <i>Bucephala clangula</i> )	WM				M	
Common Merganser ( <i>Mergus merganser</i> )	WM					
Gadwall ( <i>Anas strepera</i> )	YR,B				M	
Greater Scaup ( <i>Aythya marila</i> )	WM			G	H	
Green-winged Teal ( <i>Anas crecca</i> )	YR				M	
Hooded Merganser ( <i>Lophodytes cucullatus</i> )	WM				M	
Lesser Scaup ( <i>Aythya affinis</i> )	WM			G	H	
Long-tailed Duck ( <i>Clangula hyemalis</i> )	WM			G	H	
Mallard ( <i>Anas platyrhynchos</i> )	YR,B				H	
North Atlantic Canada Goose ( <i>Branta canadensis</i> )	M				H	
Northern Pintail ( <i>Anas acuta</i> )	YR			G	M	
Northern Shoveler ( <i>Anas clypeata</i> )	WM					
Red-breasted Merganser ( <i>Mergus serrator</i> )	WM				M	
Red-throated Loon ( <i>Gavia stellata</i> )	WM			X		
Redhead ( <i>Aythya americana</i> )	WM					
Ring-necked Duck ( <i>Aythya collaris</i> )	WM					
Ross's Goose ( <i>Chen rossii</i> )	WM					

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Ruddy Duck ( <i>Oxyura jamaicensis</i> )	YR				M	
Surf Scoter ( <i>Melanitta perspicillata</i> )	WM			G	H	
Tundra Swan ( <i>Cygnus columbianus</i> )	WM				H	
White-winged Scoter ( <i>Melanitta fusca</i> )	WM			G	H	
Wood Duck ( <i>Aix sponsa</i> )	YR,B			G	M	
<b>SHOREBIRDS</b>						
American Golden-Plover ( <i>Pluvialis dominica</i> )	M			X	H	
American Woodcock ( <i>Scolopax minor</i> )	YR,B			G	HH	1A
Baird's Sandpiper ( <i>Calidris bairdii</i> )	M					
Black-bellied Plover ( <i>Pluvialis squatarola</i> )	M				H	
Buff-breasted Sandpiper ( <i>Tryngites subruficollis</i> )	M				H	
Dunlin ( <i>Calidris alpina</i> )	WM				H	
Greater Yellowlegs ( <i>Tringa melanoleuca</i> )	YR			X	H	
Killdeer ( <i>Charadrius vociferous</i> )	YR,B				M	
Least Sandpiper ( <i>Calidris minutilla</i> )	M				M	
Lesser Yellowlegs ( <i>Tringa flavipes</i> )	YR				M	
Long-billed Dowitcher ( <i>Limnodromus scolopaceus</i> )	M					
Pectoral Sandpiper ( <i>Calidris melanotos</i> )	M					
Purple Sandpiper ( <i>Calidris maritima</i> )	M			X	H	
Red Knot ( <i>Calidris canutus</i> )	M	G5		NT	HH	
Ruddy Turnstone ( <i>Arenaria interpres</i> )	M			X	HH	
Sanderling ( <i>Calidris alba</i> )	M			NC	HH	
Semipalmated Plover ( <i>Charadrius semipalmatus</i> )	SM				M	
Semipalmated Sandpiper ( <i>Calidris pusilla</i> )	M			X	H	
Short-billed Dowitcher ( <i>Limnodromus griseus</i> )	M				H	
Solitary Sandpiper ( <i>Tringa solitaria</i> )	M				H	
Spotted Sandpiper ( <i>Actitis macularius</i> )	SM,B	G5		BC	M	
Stilt Sandpiper ( <i>Calidris himantopus</i> )	M					
Upland Sandpiper ( <i>Bartramia longicauda</i> )	SM,B	G5		E	M	2C

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Western Sandpiper ( <i>Calidris mauri</i> )	M				M	
White-rumped Sandpiper ( <i>Calidris fuscicollis</i> )	SM				H	
Willet ( <i>Tringa semipalmata</i> )	SM			X	H	2B
Wilson's Phalarope ( <i>Phalaropus tricolor</i> )	M			X	H	
Wilson's Snipe ( <i>Gallinago delicata</i> )	MW				M	
<b>LANDBIRDS</b>						
Acadian Flycatcher ( <i>Empidonax virescens</i> )	SM,B			X		2B
American Kestrel ( <i>Falco sparverius</i> )	YR,B	G5		BC		
Bald Eagle ( <i>Haliaeetus leucocephalus</i> )	YR,B	G4	T	BE, NT	M	
Baltimore Oriole ( <i>Icterus galbula</i> )	YR,B			X	H	
Barred Owl ( <i>Strix varia</i> )	YR,B	G5		T		
Bay-breasted Warbler ( <i>Dendroica castanea</i> )	M				H	
Black-and-white Warbler ( <i>Mniotilta varia</i> )	SM,B			X	H	
Black-billed Cuckoo ( <i>Coccyzus erythrophthalmus</i> )	SM,B			X		
Black-throated Blue Warbler ( <i>Dendroica caerulescens</i> )	M	G5		X		
Black-throated Green Warbler ( <i>Dendroica virens</i> )	M	G5		BC		
Blackburnian Warbler ( <i>Dendroica fusca</i> )	M			X	M	
Blue-headed Vireo ( <i>Vireo solitaries</i> )	M	G5		C		
Blue-winged Warbler ( <i>Vermivora pinus</i> )	SM,B			X		
Bobolink ( <i>Dolichonyx oryzivorus</i> )	SM,B	G5		BT		
Broad-winged Hawk ( <i>Buteo platypterus</i> )	SM,B	G5		BC	H	
Brown Thrasher ( <i>Toxostoma rufum</i> )	YR,B			X	H	2A
Canada Warbler ( <i>Wilsonia canadensis</i> )	M	G5		BC	M	
Carolina Chickadee ( <i>Poecile carolinensis</i> )	YR,B					2A
Cerulean Warbler ( <i>Dendroica cerulean</i> )	M	G4		C	M	1B
Chimney Swift ( <i>Chaetura pelagica</i> )	SM,B			X	H	2A
Chuck-will's Widow ( <i>Caprimulgus carolinensis</i> )	SM,B			X		
Cliff Swallow ( <i>Petrochelidon pyrrhonota</i> )	M	G5		BC		
Coastal Plain Swamp Sparrow ( <i>Melospiza</i>	SM,B				M	

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<i>georgiana nigrescens</i> )						
Common Barn Owl ( <i>Tyto alba</i> )	YR,B	G5		C		
Common Nighthawk ( <i>Chordeiles minor</i> )	M	G5		BC		
Cooper's Hawk ( <i>Accipiter cooperii</i> )	YR,B	G5		BT, NC		
Dickcissel ( <i>Spiza americana</i> )	YR,B	G5		X		
Eastern Kingbird ( <i>Tyrannus tyrannus</i> )	SM,B			X	H	2A
Eastern Meadowlark ( <i>Sturnella magna</i> )	YR,B	G5		BC		
Eastern Screech-owl ( <i>Megascops asio</i> )	YR,B			X		
Eastern Towhee ( <i>Pipilo erythrophthalmus</i> )	YR,B			X	H	2A
Eastern Wood-pewee ( <i>Contopus virens</i> )	SM,B			X		2A
Field Sparrow ( <i>Spizella pusilla</i> )	YR,B			X	H	1A
Golden-winged Warbler ( <i>Vermivora chrysoptera</i> )	M	G4		C	M	
Grasshopper Sparrow ( <i>Ammodramus savannarum</i> )	YR,B	G5		BT,NC	M	2C
Gray Catbird ( <i>Dumetella carolinensis</i> )	YR,B			X	M	2A
Gray-cheeked Thrush ( <i>Catharus minimus</i> )	M			NC		
Great-crested Flycatcher ( <i>Myiarchus crinitus</i> )	SM,B			X	H	
Hooded Warbler ( <i>Wilsonia citrine</i> )	SM,B	G5		X		1A
Horned Lark ( <i>Eremophila alpestris</i> )	YR,B	G5		BC		
Indigo Bunting ( <i>Passerina cyanea</i> )	SM,B			X		
Kentucky Warbler ( <i>Oporornis fromosus</i> )	SM,B	G5		C	H	1A
Least Flycatcher ( <i>Empidonax minimus</i> )	M	G5		BC		
Loggerhead Shrike ( <i>Lanius ludovicianus</i> )	WM	G5		E	M	
Long-eared Owl ( <i>Asio otus</i> )	WM	G5		T		
Louisiana Waterthrush ( <i>Seiurus motacilla</i> )	SM,B			X	H	
Marsh Wren ( <i>Cistothorus palustris</i> )	YR,B	G5		X	H	2A
Northern Bobwhite ( <i>Colinus virginianus</i> )	YR,B			G	H	2A
Northern Flicker ( <i>Colaptes auratus</i> )	YR,B			X	H	
Northern Goshawk ( <i>Accipiter gentilis</i> )	WM	G5		BE		
Northern Harrier ( <i>Circus cyaneus</i> )	YR,B	G5		BE, NC		
Northern Parula ( <i>Parula americana</i> )	M	G5		BC		

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Olive-sided Flycatcher ( <i>Contopus cooperi</i> )	M					
Osprey ( <i>Pandion haliaetus</i> )	YR,B	G5		BT		
Peregrine Falcon ( <i>Falco peregrinus</i> )	YR,B	G4		E		
Pine Warbler ( <i>Dendroica pinus</i> )	YR,B			X		2B
Prairie Warbler ( <i>Dendroica discolor</i> )	SM,B			X	HH	1A
Prothonotary Warbler ( <i>Protonotaria citrea</i> )	SM,B			X	H	1A
Purple Finch ( <i>Carpodacus purpureus</i> )	WM	G5		X		
Red-headed Woodpecker ( <i>Melanerpes erythrocephalus</i> )	WM	G5		T	M	
Red-shouldered Hawk ( <i>Buteo lineatus</i> )	YR,B	G5		BE, NT		
Rose-breasted Grosbeak ( <i>Pheucticus ludovicianus</i> )	M			X		
Rusty Blackbird ( <i>Euphagus carolinus</i> )	WM				H	
Savannah Sparrow ( <i>Passerculus sandwichensis</i> )	YR,B	G5		BT		
Scarlet Tanager ( <i>Piranga olivacea</i> )	SM,B			X	H	1A
Seaside Sparrow ( <i>Ammodramus maritimus</i> )	YR,B			X	HH	1A
Sedge Wren ( <i>Cistothorus platensis</i> )	YR,B	G5		E	M	2C
Sharp-shinned Hawk ( <i>Accipiter striatus</i> )	WM	G5		BC		
Short-eared Owl ( <i>Asis flammeus</i> )	YR,B	G5		BE, NC	M	2C
Summer Tanager ( <i>Piranga rubra</i> )	SM			X		
Swainson's Hawk ( <i>Buteo swainsoni</i> )	M					
Veery ( <i>Catharus fuscescens</i> )	M	G5		BC		
Vesper Sparrow ( <i>Pooecetes gramineus</i> )	WM	G5		BE, NT		
Whip-poor-will ( <i>Caprimulgus vociferus</i> )	SM,B	G5		X	H	1A
Willow Flycatcher ( <i>Empidonax traillii</i> )	SM,B			X	H	
Winter Wren ( <i>Troglodytes troglodytes</i> )	WM	G5		BC		
Wood Thrush ( <i>Hylocichla mustelina</i> )	SM,B			X	HH	1A
Worm-eating Warbler ( <i>Helmitheros vermivorum</i> )	M	G5		X	H	1A
Yellow-bellied Sapsucker ( <i>Sphyrapicus varius</i> )	WM			X		
Yellow-billed Cuckoo ( <i>Coccyzus americanus</i> )	SM,B			X		2A
Yellow-breasted Chat ( <i>Icteria virens</i> )	YR,B	G5		C		

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Yellow-throated Vireo ( <i>Vireo flavifrons</i> )	M			X	H	1A
<b>MAMMALS</b>						
River Otter ( <i>Lontra canadensis</i> )	YR,B			G		
<b>AMPHIBIANS</b>						
Eastern Mud Salamander ( <i>Pseudotriton m. montanus</i> )	YR,B	G5		T		
Eastern Tiger Salamander ( <i>Ambystoma t. tigrinum</i> )	YR,B	G5		E		
Fowlers Toad ( <i>Bufo woodhousii fowleri</i> )	YR,B			C		
Pine Barrens Treefrog ( <i>Hyla andersonii</i> )	YR,B	G4		T		
<b>REPTILES</b>						
Bog Turtle ( <i>Clemmys muhlengergii</i> )	YR,B	G3	T	E		
Coastal Plains Milk Snake intergrade ( <i>Lampropeltis triangulum temporalis</i> )	YR,B			C		
Eastern Box Turtle ( <i>Terrapene c. carolina</i> )	YR,B			C		
Eastern Kingsnake ( <i>Lampropeltis g. getula</i> )	YR,B	G5		C		
Northern Diamondback Terrapin ( <i>Malaclemys t. terrapin</i> )	YR,B	G4		C		
Northern Pine Snake ( <i>Pituophis m. melanoleucus</i> )	YR,B	G4		T		
Spotted Turtle ( <i>Clemmys insculpta</i> )	YR,B			C		
<b>FISH</b>						
Alewife ( <i>Alosa pseudoharengus</i> )	YR,B					
American Brook Lamprey ( <i>Lampetra appendix</i> )	YR	G4		X		
American Eel ( <i>Anguilla rostrata</i> )	YR					
American Shad ( <i>Alosa sapidissima</i> )	SM					
Atlantic Croaker ( <i>Micropogonias undulatus</i> )	YR					
Atlantic Menhaden ( <i>Brevoortia tyrannus</i> )	YR					

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Atlantic Sturgeon ( <i>Acipenser oxyrinchus</i> )	YR,B	G3		C		
Bay Anchovy ( <i>Anchoa mitchilli</i> )	YR					
Blueback Herring ( <i>Alosa aestivalis</i> )	YR,B					
Bluefish ( <i>Pomatomus saltatrix</i> )	SM					
Hickory Shad ( <i>Alosa mediocris</i> )	SM	G5		X		
Ironcolor Shiner ( <i>Notropis chalybaeus</i> )	YR	G4		X		
Rainbow Smelt ( <i>Osmerus mordax</i> )	YR	G5		X		
Shortnose Sturgeon ( <i>Acipenser brevirostrum</i> )	YR	G3	E	E		
Spot ( <i>Leiostomus xanthurus</i> )	YR					
Striped Bass ( <i>Morone saxatilis</i> )	YR					
Summer Flounder ( <i>Paralichthys dentatus</i> )	SM					
Weakfish ( <i>Cynoscion regalis</i> )	SM,B					
Winter Flounder ( <i>Pleuronectes americanus</i> )	YR					
<b>MOLLUSKS</b>						
Eastern Lampmussel ( <i>Lampsilis radiata</i> )	YR,B	G5		T		
<b>INSECTS</b>						
Bronze Copper ( <i>Lycaena hyllus</i> )	YR,B	G5		E		
Lemmer's Pinion Moth ( <i>Lithophane lemmeri</i> )	YR,B	G3G4		X		
Pink Streak ( <i>Faronta rubripennis</i> )	YR,B	G3G4		X		
Precious Underwing ( <i>Catocala pretiosa pretiosa</i> )	YR,B	G4		X		
Rare Skipper ( <i>Problema bulenta</i> )	YR,B	G2G3		X		
<i>Chytonix sensilis</i> (A Noctuid Moth)	YR,B	G4		X		
<i>Cucullia alfarata</i> (A Noctuid Moth)	YR,B	G4		X		
<i>Itame sp 1</i> (A Spanworm)	YR,B	G3		X		
<i>Macrochilo sp 1</i> (A Noctuid Moth)	YR,B	G3		X		
<i>Monoleuca semifascia</i> (A Slugmoth)	YR,B	G4G5		X		
<i>Zanclognatha sp 1</i>	YR,B	G3G4		X		

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<sup>1</sup> <b>Potential Seasons on Refuge:</b> W=Winter, S=Summer, M=Migration, YR=Year-round, B=Breeds or formerly bred in Salem County						
<sup>2</sup> <b>Global Rank</b> =G1: Critically imperiled globally because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction. G2: Imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range. G3: Either very rare and local throughout its range or found locally (even abundantly at some of the locations) in a restricted range (e.g., a single western state, a physiographic region in the East) or because of other factors making it vulnerable to extinction throughout its range; with the number of occurrences in the range of 21-100. G4: Apparently secure globally; although it may be quite rare in parts of its range, especially at the periphery. G5: Demonstrably secure globally; although it may be quite rare in parts of its range, especially at the periphery. G5: Demonstrably secure globally; although it may be quite rare in parts of its range, especially at the periphery						
<sup>3</sup> <b>Federal Rank</b> =Federal Endangered Species List: E=Endangered, T=Threatened						
<sup>4</sup> <b>NJ State Rank as of August 2005:</b> E=Endangered, T=Threatened, C=Special Concern, X=Priority Nongame Species that are not state-listed as endangered, threatened, or special concern, G=Priority Game Species, B=Breeding Population, N=Non-breeding Population						
<sup>5</sup> <b>BCR 30</b> =December 6-9, 2004, Cape May, New Jersey. Bird Conservation Region 30 Meeting: HH=Highest Priority, H=High Priority, M=Moderate Priority						
<sup>6</sup> <b>PIF Area 44</b> =Brian D. Watts. 1999. Partners in Flight Bird Conservation Plan for the Mid-Atlantic Coastal Plain (Physiographic Area 44), Version 1.0. Updated table can be found at: <a href="http://www.blm.gov/wildlife/table_44.htm">http://www.blm.gov/wildlife/table_44.htm</a> : IA=High Continental Priority and High Regional Responsibility, IB=High Continental Priority and Low Regional Responsibility, IIA=High Regional Priority and High Regional Concern, IIB= High Regional Priority and High Regional Responsibility, IIC= High Regional Priority and High Regional Threats						

## Appendix B



John Mosesso, Jr./NBI

*White-tailed Deer*

## **Findings of Appropriateness and Compatibility Determinations**



## Supawna Meadows NWR (Supawna Meadows NWR) CCP Appropriateness & Compatibility Determination Documentations

### Findings of Appropriateness

- Bicycling
- Dog Walking
- Geocaching
- Horseback Riding
- Jogging
- Non-wildlife Dependent Group Gatherings
- Organized or Facility-supported Picnicking

### Findings of Appropriateness/Compatibility Determinations

- Finns Point Rear Range Light Visitation
- Scientific Research

### Compatibility Determinations

- Release of *Rhinocomimus latipes* weevil for the biological control of mile-a-minute weed (*Polygonum perfoliatum*).
- Wildlife Observation, Photography, Environmental Education and Interpretation
- Fishing & Crabbing
- Public Hunting of Waterfowl
- White-tailed Deer Archery Hunt





**Justification for a Finding of Appropriateness of a Refuge Use**

Refuge Name: Supawna Meadows NWR

Use: Bicycling

**Narrative**

Bicycling is not identified as a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). Bicycling on unimproved roads and trails on the refuge has been found to be not appropriate for the Supawna Meadows NWR. Bicycling causes conflicts with existing uses and requires increased maintenance duties.

Biking is not allowed on the two existing refuge trails, the Forest Habitat Trail and the Grassland Trail, or any other portions of currently owned refuge lands or future lands acquired as part of the refuge. Biking on these trails and roads are not required to experience priority public uses.

Current trail and road maintenance is based on staff time availability. There is currently no assigned staff at Supawna Meadows NWR. All maintenance and law enforcement support is provided by staff located at the Cape May National Wildlife Refuge (Cape May NWR). These areas are monitored by volunteers (when available) and deficiencies are noted and reported to refuge staff. Instances of downed trees and erosion due to inclement weather occur occasionally and staff response may take days and, in some cases, weeks before repairs can be initiated.

Bicycling was not an activity in which the public expressed interest during the public scoping meetings. This use is not a historical or traditional use of the refuge.

**Finding of Appropriateness of a Refuge Use**

Refuge Name: Supawna Meadows NWR

Use: DOG WALKING

This exhibit is not required for wildlife-dependent recreational uses, forms of take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?		X
(d) Is the use consistent with public safety?		X
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		X
(g) Is the use manageable within available budget and staff?		X
(h) Will this be manageable in the future within existing resources?		X
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		X
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes \_\_\_ No X

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate X Appropriate \_\_\_

Refuge Manager: \_\_\_\_\_ Date: \_\_\_\_\_

If found to be Not Appropriate, the refuge supervisor does not need to sign concurrence if the use is a new use. If an existing use is found Not Appropriate outside the CCP process, the refuge supervisor must sign concurrence. If found to be Appropriate, the refuge supervisor must sign concurrence:

Refuge Supervisor: \_\_\_\_\_ Date: \_\_\_\_\_

**A compatibility determination is required before the use may be allowed.**

**Justification for a Finding of Appropriateness of a Refuge Use**

Refuge Name: Supawna Meadows NWR  
Use: Dog Walking

**Narrative**

Dog walking is not identified as a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). Dog walking has been found to not be appropriate for the Supawna Meadows NWR.

The two trails at Supawna Meadows NWR are unsuitable for dog walking. Walking dogs (on and off leashes) can increase disturbance to wildlife often causing reduction in abundance and diversity of migratory birds. The refuge does not provide receptacles for animal waste, which if left along refuge trails may increase the potential of disease and decrease the quality of priority public uses permitted on the refuge.



**Justification for a Finding of Appropriateness of a Refuge Use**

Refuge Name: Supawna Meadows NWR

Use: Geocaching

**Narrative**

Geocaching that involves burying or leaving a cache is not a priority public use of the National Wildlife Refuge System Improvement Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). Geocaching (with the exception of virtual geocaching) has been found to be not appropriate for the Supawna Meadows NWR. This activity involves burying items in the ground or placing objects on the refuge, both of which are actions that can disturb or damage habitat and increased instances of refuge violations.

The placement of any object on a national wildlife refuge is a violation of several Federal regulations including, but not limited to, the following:

- 16USC668dd, 50 CFR 27.93, Abandonment of Property
- 16USC668dd, 50 CFR 26.21a, Trespass
- 16USC668dd, 50 CFR 27.63, Search for and removal of other valued objects
- 16USC668dd, 50 CFR 27.97, Private Operations

This use is not a historical or traditional use of the Refuge.



**Justification for a Finding of Appropriateness of a Refuge Use**

Refuge Name: Supawna Meadows NWR

Use: Horseback Riding

**Narrative**

Horseback riding is not identified as a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). Horseback riding, used as a means to conduct priority public uses, has been found to be not appropriate for the Supawna Meadows NWR.

The refuge does not have parking space to support trailers in our designated parking areas. Trails and roads are unable to safely accommodate horses in conjunction with other public use activities. The refuge does not have the staff resources to manage the use properly. Horseback riding would add significantly to the workload of law enforcement (LE), visitor services, and maintenance staff because of the need to highly manage and monitor activities; trails would need continual maintenance.

Potential impacts of horseback travel include: soil compaction and erosion, trampling and mortality of fragile plant communities, habitat loss/deterioration, a shift in plant communities along trails, and the introduction of invasive plant species.

Current trail and road maintenance is based on staff time availability. There is currently no assigned staff at Supawna Meadows NWR. All maintenance and law enforcement support are provided from staff located at the Cape May NWR. These areas are monitored by volunteers (when available) and deficiencies are noted and reported to refuge staff. Instances of downed trees and erosion due to inclement weather occur occasionally and staff response may take days and in some cases weeks before repairs can be initiated. Trails used for public use at Supawna Meadows NWR were constructed with the intention of foot traffic only.

Horseback riding is not a wildlife-dependent public use, nor is it necessary to support a priority public use, and it may decrease the enjoyment of the refuge for other visitors. Horseback riding on the refuge was not an activity in which the public expressed interest during the public scoping meetings.



### **Justification for a Finding of Appropriateness of a Refuge Use**

Refuge Name: Supawna Meadows NWR

Use: Jogging

#### **Narrative**

Jogging is not identified as a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). Jogging has been found to be not appropriate for the Supawna Meadows NWR.

Foot travel is allowed on established trails so that visitors may experience the priority public uses of wildlife observation, photography, interpretation, and environmental education. Jogging is not required to experience these uses. Furthermore, portions of the trails are uneven and contain loose gravel. Joggers attempting to run along these portions may endanger themselves and other visitors.

Current trail and road maintenance is based on staff time availability. There is currently no assigned staff at Supawna Meadows NWR. All maintenance and law enforcement support are provided from staff located at the Cape May NWR. These areas are monitored by volunteers (when available) and deficiencies are noted and reported to refuge staff. Instances of downed trees and erosion due to inclement weather occur occasionally and staff response may take days and in some cases weeks before repairs can be initiated.

Jogging is not a wildlife-dependent public use, nor is it necessary to support a priority public use, and it may decrease the enjoyment of the refuge for other visitors. Jogging on the refuge was not an activity in which the public expressed interest during the public scoping meetings. This use is not a historical or traditional use of the refuge.



**Justification for a Finding of Appropriateness of a Refuge Use**

Refuge Name: Supawna Meadows NWR

Use: Non-wildlife Dependent Group Gatherings

**Narrative**

Non-wildlife dependent group gatherings such as, but not limited to, ceremonies, weddings, memorial services, family reunions, etc., are not priority public uses of the National Wildlife Refuge System Improvement Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57).

These types of uses do not support a refuge purpose, objective or goal and would not benefit the natural or cultural resources present within the refuge. Non-wildlife dependent group gatherings have been found to be not appropriate for the Supawna Meadows NWR.



### **Justification for a Finding of Appropriateness of a Refuge Use**

Refuge Name: Supawna Meadows NWR

Use: Organized or Facility-Supported Picnicking

#### **Narrative**

Picnicking is not identified as a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). Picnicking has been found to be not appropriate for the Supawna Meadows NWR.

The refuge does not provide the amenities for picnicking activities, such as picnic tables, shelters, trash containers, grills, etc. In addition, we do not have the resources to manage a picnic area or program. The workload for the maintenance and other staff would increase. Law enforcement duties would also increase to ensure compliance.

Although organized picnicking is prohibited, this does not preclude visitors from bringing food with them for nutrition or safety while they participate in other appropriate and compatible activities on the refuge.

Prohibiting picnicking may positively impact wildlife and wildlife habitat by, for example, reducing soil compaction and vegetation trampling, minimizing the frequency and extent of wildlife disturbance, and reducing trash and food waste which could result in wildlife conflicts, feeding of wildlife, and potential death to wildlife who ingest trash and food waste. ,

**Finding of Appropriateness of a Refuge Use**

Refuge Name: Supawna Meadows NWR

Use: FINNS POINT REAR RANGE LIGHT PUBLIC VISITATIONS

This exhibit is not required for wildlife-dependent recreational uses, forms of take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we would generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes X No    

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate     Appropriate X

Refuge Manager: \_\_\_\_\_ Date: \_\_\_\_\_

If found to be Not Appropriate, the refuge supervisor does not need to sign concurrence if the use is a new use. If an existing use is found Not Appropriate outside the CCP process, the refuge supervisor must sign concurrence. If found to be Appropriate, the refuge supervisor must sign concurrence:

Refuge Supervisor: \_\_\_\_\_ Date: \_\_\_\_\_

**A compatibility determination is required before the use may be allowed.**

### **Justification for a Finding of Appropriateness of a Refuge Use**

Refuge Name: Supawna Meadows NWR  
Use: Finns Point Rear Range Light Public Visitations

#### **Narrative**

Public visitation of the Finns Point Rear Range Light occurs almost on a daily basis by individuals stopping at the lighthouse to take photographs and read interpretative information regarding the historic importance the lighthouse served as a navigational aid to shipping in the Delaware River. The New Jersey Lighthouse Society has a strong interest in having the lighthouse open to the public during their annual Lighthouse Challenge weekend.

It is anticipated visitation to the lighthouse could be used as a means to increase public awareness of the Supawna Meadows NWR and the habitat values the refuge provides to migratory birds and other wildlife species. In this way, this use contributes to all of the habitat management and public use goals in the draft CCP/EA. Through interpretive signs located within the lighthouse and surrounding the lighthouse grounds, visitors to the lighthouse would gain a greater appreciation for the resource values of the refuge and create a greater interest to participate in the refuge's priority public use activities.

## Compatibility Determination

**Use: FINNS POINT REAR RANGE LIGHT PUBLIC VISITATIONS**

**Refuge Name:** Supawna Meadows NWR

**Establishing Authority:** Supawna Meadows NWR was originally established by Executive Order 6582 on February 3, 1934 as the Goose Pond addition to the Killcohook National Wildlife Refuge (currently termed Killcohook Coordination Area). The refuge was renamed Supawna Meadows National Wildlife Refuge and officially separated from Killcohook on April 10, 1974 by the Service. On October 30, 1998, the Service's jurisdiction over Killcohook was revoked.

**Refuge Purposes:** Supawna Meadows NWR purposes:

- "... as a refuge and breeding ground for wild birds and animals," (Executive Order 6582, dated Feb. 3, 1934),
  - "... particular value in carrying out the national migratory bird management program," (16 U.S.C. § 667b),
  - "... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds," (16 U.S.C. § 715d),
- "... suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species," (16 U.S.C. § 460k-1)

**National Wildlife Refuge System Mission:** ...to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Improvement Act of 1997, Public Law 105-57).

## Description of Use

### (a) What is this use? Is it a priority public use?

People visit the exterior of the Finns Point Rear Range Light almost on a daily basis to take photographs and read interpretative information regarding the historic importance the lighthouse as a navigational aid to shipping in the Delaware River. The interior of the lighthouse is open to the public during the annual New Jersey Lighthouse Challenge and may be open to visitors at other times pending availability of additional staffing and funding. Visitors may also have access to the catwalk after necessary repairs have been made and it is deemed safe for the public.

### (b) Where would the use be conducted?

During the Lighthouse Challenge, the Friends of Supawna Meadows NWR and the New Jersey Lighthouse Society would set up informational tables immediately adjacent to the lighthouse to discuss the lighthouse, the refuge, and refuge habitats and their importance to wildlife. Daily access would occur to the exterior of the FPRRL. Additional access pending staffing and funding increases would occur in the interior of the lighthouse and to the repaired catwalk.

### (c) When would the use be conducted?

The New Jersey Lighthouse Challenge occurs one weekend per year (Saturday – Sunday) in October. Visitation to the exterior of the FPRRL would be almost daily. Access to the interior of the lighthouse and catwalk may be seasonal or year-round pending staffing, funding, and completed repairs.

**(d) How would the use be conducted?**

Through cooperative efforts between the Friends of Supawna Meadows NWR and the New Jersey Lighthouse Society, the refuge would continue to support the Society's Lighthouse Challenge. Public access to the lighthouse would be limited to no more than six individuals at any one time. Using professional judgment, as long as there is no significant negative impact to historic resources, violation of refuge regulations, or public safety issues, a special use permit would be issued to the New Jersey Lighthouse Society and the Friends of Supawna Meadows NWR outlining the framework in which this use can be conducted. Refuge staff would ensure compliance with the permit.

Access to the interior of the FPRRL at other times of year may be conducted with additional staffing and funding. No more than six individuals would be allowed inside FPRRL at any one time. Staff would monitor the impact to the historic resources and public safety issues to determine if any minor adjustments to those numbers would be needed.

**(e) Why is this use being proposed?**

From as early as 1984 through 2005, the lighthouse had been opened to the public on the third Sunday of each month, April through October, from noon to 4pm. In addition, approximately six times a year the lighthouse would be opened by special arrangement to school groups and other organized groups, as requested and approved. In 2006 with reduced funding and staffing at Supawna Meadows NWR and for safety concerns, the lighthouse was closed to the public. In 2007, the lighthouse was again opened to the public after a safety inspection was conducted in cooperation with the Friends of Supawna Meadows NWR and the New Jersey Lighthouse Society. This non-wildlife dependent activity provides the public with an opportunity to view a large portion of the refuge's various habitats at the same time they are learning about historical resources in the area. There was an estimated 2,000 visitors at the Finns Point Rear Range Light during the 2007 Lighthouse Challenge weekend.

Daily access to the exterior and interior of FPRRL provides important opportunities for the public to learn about this historic building. This will also provide opportunities to increase awareness of the refuge's resources and build understanding and support for the refuge and the Refuge System.

**Availability of Resources**

As long as the Friends of Supawna Meadows NWR continues to actively support this activity, permitting this use does not significantly impact current refuge staffing levels and resources. The Cape May NWR law enforcement officer would provide limited support during the one-weekend annual Lighthouse Challenge. The time spent during this period would fall within the routine law enforcement patrols on the refuge. Less than one hour per year would be spent for administration costs for developing and managing the special use permit. The continuation of this program and/or proposed expansion of this activity and providing additional public access to FPRRL is dependent on the structural integrity of the lighthouse and the future development of the refuge's environmental education and outreach programs.

**Anticipated Impacts of the Use**

In addition to the Finns Point Rear Range Light, there are several improvements located on the grounds that are part of the refuge's infrastructure. In 2006, a two-story office facility was constructed between the lighthouse and a four-bay garage/storage building. The office was closed in 2007 due to the elimination of on-site staff. The gravel parking area associated with the office, garage and lighthouse is of a sufficient size to accommodate up to thirteen cars. Immediately across from the office and lighthouse parking lot is a large grass recreational field which would accommodate a significant number of vehicles. Past traffic counts along Lighthouse Road indicated approximately 800 vehicles traveled the

road in a 24-hour period. An additional 750 cars during the two-day Lighthouse Challenge would add to the vehicle traffic, but it is anticipated the use would not significantly impact local traffic patterns and parking areas. There may be minor increases in vehicle traffic and subsequent impacts associated with additional public access, but these are expected to be minimal.

**Public Review and Comment**

As part of the Supawna Meadows NWR CCP process, this compatibility determination would undergo extensive public review, including a comment period of 30 days following the release of the Draft CCP/EA.

**Determination**

Use is not compatible

Use is compatible, with the following stipulations

**Stipulations Necessary to Ensure Compatibility**

The Friends of Supawna Meadows NWR would continue to provide direct cooperative support to the New Jersey Lighthouse Society. A special use permit would be provided to the New Jersey Lighthouse Society with the following stipulations: 1) A booth and display for public enjoyment on refuge land adjacent to the Finns Point Rear Range Light would be permitted. 2) The permittee would set up the booth on the Saturday of the event weekend. The booth would be completely disassembled after the close of the event on Sunday. 3) The permittee would remove any trash left on the site as a result of the event and its participants. 4) Representatives of the New Jersey Lighthouse Society would coordinate with refuge personnel at least one week prior to the New Jersey Lighthouse Challenge to determine logistics of the event. 5) The permittee is authorized to sell items related to its organization and the New Jersey Lighthouse Challenge. 6) All donations made by event participants would be directed to the Friends of Supawna Meadows NWR, Inc. 7) Permittee would report any unusual observations requiring environmental action or law enforcement directly to the on-site law enforcement officer, if available, and/or to the refuge manager, Cape May National Wildlife Refuge.

**Justification**

We currently allow hunting, fishing, wildlife observation, photography, environmental education and interpretation. Activities that are not considered priority public uses, such as the public visitation of a historic structure, are conducted by means of a compatible use. Although this use does not directly contribute to the achievement of the refuge purposes or the National Wildlife Refuge System mission, it does provide for an interpretive, wildlife observation, and/or environmental education opportunity, thereby contributing to the public’s understanding and appreciation of the refuge’s natural resources. Therefore, this activity can be compatible as long as it is appropriate, conducted safely, and does not conflict with priority uses on the refuge.

**Project Leader**

\_\_\_\_\_  
(Name/Title/Signature)  
REFUGE MANAGER

**Review and Concurrence**

\_\_\_\_\_  
(Name/Title/Signature/Date)  
REGIONAL CHIEF

**Approved**

\_\_\_\_\_  
(Date)

**Mandatory 10-year re-evaluation date** \_\_\_\_\_ 2020 \_\_\_\_\_

Internal Review Draft



**Justification For a Finding of Appropriateness of a Refuge Use**

Refuge Name: Supawna Meadows NWR  
Use: Scientific Research

**Narrative**

The use is research conducted by non-Service personnel on the Supawna Meadows NWR. It is not a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). Research has been found to be appropriate for Supawna Meadows NWR.

The Supawna Meadows NWR does not have the resources to conduct all the necessary surveys and studies to manage all resources. Therefore, we encourage research by outside entities to assist us in collecting and providing data for our wise use. All research proposals are evaluated for their benefits to the refuge mission and are issued a special use permit if found beneficial. All research projects require the principle investigator to provide summary reports of findings and acknowledge the Supawna Meadows NWR for their participation.

## Compatibility Determination

Use: **SCIENTIFIC RESEARCH**

Refuge Name: Supawna Meadows NWR

**Establishing Authority:** Supawna Meadows NWR was originally established by Executive Order 6582 on February 3, 1934 as the Goose Pond addition to the Killcohook National Wildlife Refuge (currently termed Killcohook Coordination Area). The refuge was renamed Supawna Meadows National Wildlife Refuge and officially separated from Killcohook on April 10, 1974 by the Service. On October 30, 1998, the Service's jurisdiction over Killcohook was revoked.

**Refuge Purposes:** Supawna Meadows NWR purposes:

- "... as a refuge and breeding ground for wild birds and animals," (Executive Order 6582, dated Feb. 3, 1934),
  - "... particular value in carrying out the national migratory bird management program," (16 U.S.C. § 667b),
  - "... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds," (16 U.S.C. § 715d),
- "... suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species," (16 U.S.C. § 460k-1)

**National Wildlife Refuge System Mission:** ...to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Improvement Act of 1997, Public Law 105-57).

### Description of Use:

#### (a) What is the use? Is the use a priority public use?

The use is research conducted by non-Service personnel. Research conducted by non-Service personnel is not a priority public use of the Refuge System.

#### (b) Where would the use be conducted?

The location of the research would vary depending on the individual research project that is being conducted. An individual research project is usually limited to a particular habitat type, plant or wildlife species. On occasion, research projects would encompass an assemblage of habitat types, plants or wildlife. The research location would be limited to areas of the refuge that are absolutely necessary to conduct the research project.

#### (c) When would the use be conducted?

The timing of the research would depend entirely on the individual research project that is being conducted. Scientific research would be allowed to occur on the refuge throughout the year. An individual research project could be short-term in design, requiring one or two visits over the course of a few days. Other research projects could be multiple year studies that require daily visits to the study site. The timing of each individual research project would be limited to the minimum required to complete the

project. If a research project occurs during any refuge hunting season, special precautions would be required and enforced to ensure public health and safety.

**(d) How would the use be conducted?**

The mechanics of the research will depend entirely on the individual research project that is conducted. The methods of each research project would be scrutinized well before it would be allowed to occur on the refuge. No research project would be allowed to occur if it does not have an approved scientific method or if it compromises public health and safety.

**(e) Why is this use being proposed?**

Research by non-Service personnel is conducted by colleges, universities, Federal, State, and local agencies, non-governmental organizations, and qualified members of the general public to further the understanding of the natural environment and to improve the management of the refuge's natural resources. Much of the information generated by the research is applicable to management on and near the refuge.

The Service would encourage and support research and management studies on refuge lands that will improve and strengthen natural resource management decisions. The refuge manager would encourage and seek research relative to approved refuge objectives that clearly improves land management and promotes adaptive management. Priority research addresses information that will better manage the Nation's biological resources and are generally considered important to: Agencies of the Department of the Interior; the U.S. Fish and Wildlife Service; the National Wildlife Refuge System; and State Fish and Game Agencies; and that address important management issues or demonstrate techniques for management of species and/or habitats. The refuge would also consider research for other purposes which may not be directly related to refuge-specific objectives, but contribute to the broader enhancement, protection, use, preservation and management of native populations of fish, wildlife and plants, and their natural diversity within the region or flyway. These proposals must comply with the Service's compatibility policy.

Refuge support of research directly related to refuge objectives may take the form of funding, in-kind services such as vehicles, housing or use of other facilities, direct staff assistance with the project in the form of data collection, provision of historical records, conducting of management treatments, or other assistance as appropriate.

**Availability of Resources:**

The bulk of the cost for research is incurred in staff time to review research proposals, coordinate with researchers and write special use permits. In some cases, a research project may only require one day of staff time to write a special use permit. In other cases, a research project may take an accumulation of weeks, as the refuge biologist must coordinate with students and advisors and accompany researchers on site visits. The refuge biologist spends an average of one week a year working full time on research projects conducted by outside researchers.

**Anticipated Impacts of the Use:**

The Service encourages approved research to further the understanding of natural resources. Research by non-Service personnel adds greatly to the information base for refuge managers to make proper decisions.

Disturbance to wildlife and vegetation by researchers could occur when researchers are accessing project locations. Research activities may disturb fish and wildlife through observation, a variety of wildlife capture techniques, banding, and accessing the study area by foot or vehicle. For example, the presence of researchers may cause disruption of birds on nests or breeding territories, or increase predation on nests. Efforts to capture birds may cause disturbance, injury, or death to groups or to individual birds.

The energy cost of disturbance may be appreciable in terms of disruption of feeding, displacement from preferred habitat, and the added energy expended to avoid disturbance. It is possible that direct or indirect mortality could result as a by-product of research activities. Mist-netting or other wildlife capture techniques, for example, may cause mortality directly through the capture method or in-trap predation, and indirectly through capture injury or stress caused to the organism. Even if such mortalities to individual birds do occur, there would be no impact to the overall population. To minimize disturbance, all research must be approved through the refuge’s special use permit process.

Allowing research to be conducted by non-Service personnel would have very little impact on Service interests. If the research project is conducted with professionalism and integrity, potential adverse impacts far outweigh the knowledge gained about an entire species.

**Public Review and Comment:**

As part of the Supawna Meadows NWR CCP process, this compatibility determination would undergo extensive public review, including a comment period of 30 days following the release of the Draft CCP/EA.

**Determination:**

Use is not compatible

Use is compatible, with the following stipulations

**The Following Stipulations are required to Ensure Compatibility:**

All researchers would be required to submit a detailed research proposal following Service Policy (Fish and Wildlife Service Refuge Manual Chapter 4 Section 6). The proposal would be reviewed and, if necessary, conditions and/or restrictions would be placed in the special use permit, the Cooperative Agreement, or Memorandum of Understanding which would ensure that any identified negative impacts towards the Service’s interest would be addressed and minimized. Refuge staff must be given at least 45 days to review proposals before initiation of research. If collection of wildlife is involved, refuge staff must be given 60 days to review the proposal. Proposals would be prioritized and approved based on need, benefit, compatibility, and funding required. Regional Biologists, other Service Divisions, and/or State agencies may be asked to review and comment on proposals. All researchers would be required to obtain appropriate State and Federal permits.

**Justification:**

The Service encourages approved research to further explore the complex nature and understanding of refuge natural resources. Research by non-Service personnel adds greatly to the information base for refuge managers to make proper decisions. Research conducted by non-Service personnel would not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established.

**Project Leader**

\_\_\_\_\_  
(Name/Title/Signature)

REFUGE MANAGER

**Review and Concurrence**

\_\_\_\_\_  
(Name/Title/Signature/Date)

REGIONAL CHIEF

**Approved**

\_\_\_\_\_  
(Date)

**Mandatory 10-year re-evaluation date** \_\_\_\_\_ 2020 \_\_\_\_\_

**References:**

Department of the Interior. Departmental Manual. Washington, D.C.: U.S. Government Printing Office

U.S. Fish and Wildlife Service. 1985. Refuge Manual. Washington, D.C.: U.S. Government Printing Office.

Internal Review Draft

## Compatibility Determination

**Use:** Release of *Rhinoncomimus latipes* weevil for the biological control of mile-a-minute weed (*Polygonum perfoliatum*).

**Refuge Name:** Supawna Meadows NWR

**Establishing and Acquisition Authority(ies):** The Migratory Bird Conservation Act (16 U.S.C. §715d); The Fish and Wildlife Act of 1956 (16 U.S.C. §742f(a)(4)); The Emergency Wetlands Resources Act of 1986 (16 U.S.C. §3901(b), 100 Stat. 3583).

### Refuge Purpose(s):

“...as a refuge and breeding ground for wild birds and animals”;

“...for particular value in carrying out the national migratory bird management program”;

“...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds... The Migratory Bird Conservation Act (16 U.S.C. §715d);

“...suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species...”.

### National Wildlife Refuge System Mission:

The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

### Management Goals

**Fish and Wildlife Populations.** Maintain viable, historically diverse populations of native fish and wildlife species consistent with sound biological principles.

**Habitat.** Conserve, restore, and manage the functions and values associated with a diverse bottomland hardwood system in order to achieve refuge purposes and wildlife population objectives.

**Land Protection and Conservation.** Conserve natural and cultural resources through partnerships, protection, and land acquisition from willing sellers.

**Education and Visitor Services.** Develop and implement a quality wildlife-dependent recreation and environmental education program that leads to a greater understanding and appreciation of fish and wildlife resources and enjoyable recreation experiences.

**Refuge Administration.** Provide administrative support to ensure that the goals and objectives for refuge habitats, fish and wildlife populations, land conservation, and visitor services are achieved.

## **Description of Use:**

### **A. What is the Use? Is the use a priority use?**

The use is the release of *Rhinoncomimus latipes* weevil for the biological control of mile-a-minute weed. Release of *Rhinoncomimus latipes* weevil for the biological control is not a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57).

### **B. Where would the use be conducted?**

The release would occur on Supawna Meadows NWR. The initial release is being coordinated with the New Jersey Field Office and the State of New Jersey Department of Agriculture as part of a Partners for Fish and Wildlife restoration project on a newly acquired 130-acre tract of land on the refuge. Release sites would be close to LeHigh Road along the refuge boundary where mile-a-minute weed is most pervasive. If the release is successful, in that the weevils have a significant impact on growth and expansion of mile-a-minute stands, the weevil may be released in other areas of the refuge infested with the weed.

### **C. When would the use be conducted?**

The release of the weevil initially occurred in spring 2006. However, future releases of the weevil may occur if the initial release is deemed successful. Primary areas targeted for future releases would include refuge lands in the Xmas Tree Lane area (along the Forest Habitat Trail) and near the Tract 11 impoundment in the vicinity of the PSE&G right-of-way.

### **D. How would the use be conducted?**

The release would occur with the assistance of the Biological Pest Control Program in the Division of Plant Industry of the New Jersey Department of Agriculture. They would provide the weevils and conduct the releases. Approximately 3,000 to 5,000 weevils would be released. The release takes a matter of minutes.

### **E. Why is the use being proposed?**

New Jersey Department of Agriculture and the Service's Partners for Fish and Wildlife Program requested permission to release weevils as a biological control agent for mile-a-minute weed. Supawna Meadows NWR has a severe invasive species problem. Mile-a-minute weed is an herbaceous trailing vine that is native to India and Eastern Asia. It was introduced to the United States at York, Pennsylvania on nursery stock in the late 1930s and is now established throughout the northeastern part of the country. It is an aggressive plant that grows over and blocks sunlight to native vegetation. This reduced photosynthesis capability may kill native plants (Okay 2005).

The *Rhinoncomimus latipes* weevil is from China and has been studied since 2000 at the University of Delaware for its specificity to mile-a-minute and for its value as a biological control agent. Based on results of host-range tests, a limited amount of native foliage was consumed by weevils (between 0.1 and 2.3 centimeter<sup>2</sup> over 30 days). However, none of the non-target plant species were consumed when the weevils were given a choice between them and mile-a-minute weed. Additionally, no eggs were laid on non-target plant species (Colpetzer 2003).

Subsequent field work done at release sites in the Northeast has resulted in additional information. Small-scale releases in New Jersey and Delaware in summer 2004 indicated the weevils could survive

the winter. More than 10,000 weevils were released in two New Jersey sites in 2005. All plants were killed due to adult feeding at one of the sites. About 450 weevils released at a Chester County, Pennsylvania site in June 2005 were studied. Weevils reproduced and dispersed up to 200 meters from the release site, but most stayed within 25 meters. Weevils increased due to reproduction throughout the summer (Hough-Goldstein 2006).

The conclusions from field studies indicate the weevil establishes easily, produces multiple generations per year, and that adults can kill mile-a-minute plants through foraging. Work continues to determine the level of impact the weevils may have in the future to help control mile-a-minute weed. The intention of the release is that the weevils would consume mile-a-minute weed stems and leaves, which would result in reducing the spread of and, eventually, killing the plants.

**Availability of Resources:** The release of the weevil is a Partners for Fish and Wildlife project. The restoration plan was prepared by U.S. Fish and Wildlife biologists at the New Jersey Field Office (about \$1,200 of staff time). The Biological Pest Control Program in the Division of Plant Industry of the New Jersey Department of Agriculture reproduced and would release the weevils (\$5,000). Preparation of a special use permit, a Finding of No Significant Impact, and the Compatibility Determination would require about 10 hours of Service staff time (\$350). Outreach to adjacent landowners would require about 8 hours of Service staff time (\$280).

The annual costs associated with the administration of release of *Rhinoncomimus latipes* on the Supawna Meadows NWR are estimated below:

Planning and supervising staff to monitor the use and its effects on environment and other visitors. Also, coordination, budgeting, issuance of special use permit [SUP], public relations.

GS-12 Deputy Refuge Manager for 2 work days/year = \$560

Monitoring impacts of release on environment, review proposals, coordinate with researchers, public outreach, monitoring.

GS-9 Wildlife Biologist for 5 work days/year = \$460

Total annual projected weevil release program cost = \$1,020

#### **Anticipated Impacts of the Use:**

**Habitat:** Based on results of both laboratory and field study to date, spread of the non-native, invasive mile-a-minute weed would be halted. At best, the existence of the plant on the refuge would be eliminated. Regardless, reduction of this plant would allow native habitat to rebound and provide wildlife habitat values to refuge wildlife. As stated above, in laboratory tests minor consumption of native plant species occurred when no mile-a-minute was present. It is anticipated that the weevil damage to native plants would be minimal.

**Wildlife:** The primary wildlife species of concern at the refuge are migratory birds and resident wildlife. Improvement of habitat through reduction of the mile-a-minute weed would benefit refuge wildlife. The weevil is not known to compete with native insect life. As noted in the July 2004 Environmental Assessment, there is not total assurance that the release of *Rhinoncomimus latipes* would be reversible. However, there is no evidence that the weevil would cause any adverse environmental effects (Firko 2004). Additionally, no negative interaction with native fauna is anticipated.

**Public Review and Comment:**

A public notice was printed in the Today's Sunbeam newspaper on April 10, 2006 to announce the review period for the draft Compatibility Determination (CD) and FONSI. Letters announcing the proposed project and review period were mailed to 16 adjacent landowners. Additionally, a copy of the draft CD and FONSI were posted at the refuge office. The public review and comment period ended on May 9, 2006. No public comments were received.

**Determination (check one below):**

- Use is Not Compatible  
 Use is Compatible with the Following Stipulations

**Stipulations Necessary to Ensure Compatibility:** The release of *Rhinoncomimus latipes* weevil for biocontrol would occur in areas of the refuge with uncontrollable mile-a-minute weed populations that threaten the survival of native wildlife habitat.

The following stipulations would help ensure the release is compatible with refuge purposes:

- Refuge staff would monitor progress of weevil release and impact on mile-a-minute population.
- Refuge staff would continually coordinate with the New Jersey State Beneficial Insect Laboratory

**Justification:** Mile-a-minute weed is a non-native, invasive plant that has infested portions of Supawna Meadows NWR. The *Rhinoncomimus latipes* weevil has been studied for six years by the University of Delaware both in the laboratory and the field. The weevils have had a significant impact on reduction of the advancement of the mile-a-minute weed. Based on that research and an Environmental Assessment prepared by the United States Department of Agriculture, it has been determined that introduction of the *Rhinoncomimus latipes* weevil would not have an adverse impact on refuge lands and wildlife, and that the use is compatible with refuge purposes. The release of *Rhinoncomimus latipes* weevil for the biological control of mile-a-minute weed would not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established.

**Signature:** Refuge Manager \_\_\_\_\_  
(Signature and Date)

**Concurrence:** Regional Chief \_\_\_\_\_  
(Signature and Date)

**Mandatory 10-year Re-Evaluation Date:** \_\_\_\_\_ 2020 \_\_\_\_\_

**Literature Cited:**

- Colpetzer, K. 2003. An evaluation of the Asian weevil, *Homorosoma chinense* Wagner (Coleoptera: Curculionidae), a potential biological control agent of mile-a-minute weed, *Polygonum perfoliatum* L. (Polygonales: Polygonaceae). MS. Thesis, University of Delaware, Newark.
- Firko, Michael. 2004. Field Release of *Rhinoncomimus latipes* (Coleoptera: Curculionidea), a Weevil for Biological Control of Mile-a-minute Weed (*Polygonum perfoliatum*), in the Continental United States - Final Environmental Assessment. U.S. Department of Agriculture.
- Hough-Goldstein, Judy. 2006. "Biological Control of Mile-a-minute." College of Agriculture and Natural Resources, University of Delaware. URL: <http://ag.udel.edu/enwc/research/biocontrol/mileminute.htm>. Date: April 4, 2006.
- Okay, J.A. Gerlach. 2006. "Mile-A-Minute Weed." Plant Conservation Alliance. URL: <http://www.nps.gov/plants/alien/fact/pope1.htm>. Date: April 5, 2006.

## Compatibility Determination

### Use: WILDLIFE OBSERVATION, PHOTOGRAPHY, ENVIRONMENTAL EDUCATION AND INTERPRETATION

**Refuge Name:** Supawna Meadows NWR

**Establishing Authority:** Supawna Meadows NWR was originally established by Executive Order 6582 on February 3, 1934 as the Goose Pond addition to the Killcohook National Wildlife Refuge (currently termed Killcohook Coordination Area). The refuge was renamed Supawna Meadows National Wildlife Refuge and officially separated from Killcohook on April 10, 1974 by the Service. On October 30, 1998, the Service's jurisdiction over Killcohook was revoked.

**Refuge Purposes:** Supawna Meadows NWR purposes:

- "... as a refuge and breeding ground for wild birds and animals," (Executive Order 6582, dated Feb. 3, 1934),
  - "... particular value in carrying out the national migratory bird management program," (16 U.S.C. § 667b),
  - "... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds," (16 U.S.C. § 715d),
- "... suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species," (16 U.S.C. § 460k-1)

**National Wildlife Refuge System Mission:** ...to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Improvement Act of 1997, Public Law 105-57).

### Description of Proposed Use:

#### (a) What is this use? Is it a priority public use?

The uses are wildlife-oriented recreational activities including: wildlife observation, photography, environmental education and interpretation, including special self-led groups participating in these activities. These are priority public uses of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57).

#### (b) Where would the use be conducted?

Except for closed areas and where legal access is inadequate or absent, wildlife observation, photography, environmental education and interpretive activities would be permitted on all currently owned refuge tracts, as well as on newly acquired properties as they are acquired by the Service and made part of the refuge ownership. Currently there are two maintained walking trails on the refuge, one located along Lighthouse Road (Grassland Trail) and the other located off of Xmas Tree Lane (Forest Habitat Trail).

**(c) When would the use be conducted?**

The uses would be conducted year round during the hours when the refuge is open to the public, which is dawn to dusk.

**(d) How would the use be conducted?**

Currently the refuge is open to the public for wildlife observation, photography, environmental education and interpretation. Wildlife observation and photography occur on individual or group bases on refuge lands open to the public. Horseback riding, bicycling, jogging, and motorized vehicles are prohibited on the refuge. Interpretive signs are located along the two existing trails providing limited environmental education and interpretive information. The refuge has no facilities or staffing for conducting specific environmental education programs.

The Draft Comprehensive Conservation Plan and Environmental Assessment (draft CCP/EA) for Supawna Meadows NWR proposes to expand or enhance these four public uses using a variety of strategies including, but not limited to:

A. Wildlife Observation, Photography, and Interpretation

- Extend trail system on newly acquired lands to include new observation platforms where deemed appropriate.
- Work with the Friends Group to improve or install additional observation platforms on the refuge to include: installing an observation platform at the Tract 11 impoundment; and converting one or more old deer hunting platforms for use as an observation and photography blind.
- Expand refuge signage on newly acquired lands.
- Develop a brochure specific to trails.
- Develop a new website.
- Construct a wheelchair accessible photography blind or other amenities to improve facilities for wildlife photographers.
- Evaluate the use of the Finns Point Rear Range Light (FPRRL) as a locus of refuge interpretation with panels and brochures on ground-level and in the interior of FPRRL. Take advantage of landscape view from FPRRL to interpret refuge marshlands, invasive plants, and mosaic of other cover types as well as viewing birds in flight on the refuge.

B. Environmental Education

- Provide on-site nature walks arranged and sponsored by the Friends of Supawna Meadows NWR. Staff would fill occasional requests to lead tours on the refuge.
- The majority of off-site outreach activities would be conducted by the Friends of Supawna Meadows NWR. These include 2 or 3 events the Friends Group use as an opportunity to educate the public about the refuge. When refuge staff is available, they would actively participate in off-site outreach activities as well.
- Implementation of the above strategies would depend on staffing and funding levels.

**(e) Why is the use being proposed?**

Wildlife observation and photography, and environmental education and interpretation are four of the six priority public uses of the National Wildlife Refuge System. If compatible, they are to receive enhanced consideration over other secondary public uses.

**Availability of Resources**

In 2004, the Supawna Meadows NWR was made part of the administrative operations of the Cape May NWR. With substantial reductions in staffing and funding, the Supawna Meadows NWR was identified in the 2006 Regional Strategy Plan as an unstaffed satellite refuge of the Cape May NWR. Funding and staffing support for the current level of these non-consumptive public use activities is administered from the Cape May NWR. Supplemental support for specific activities is provided by the Friends of Supawna Meadows NWR and volunteers. At current levels the annual operating cost is expected to be approximately \$11,000. A breakdown of estimated expenses follows:

<u>Annual Costs</u>	
Document Preparation and Review	\$ 700
Road, Parking Lot, Equip., Maintenance	\$ 500
Supplies	\$ 700
Law Enforcement and Responding to Public	\$9,400
<u>Miscellaneous Expenses</u>	<u>\$ 500</u>
Total	\$10,600

Expanded public use activities, as outlined in the proposed draft Comprehensive Conservation Plan (refer to paragraph (d) above), would be best met by adding a full-time public use/outreach professional to the Cape May NWR staff.

**Anticipated Impacts on Service Lands, Waters or Interest:**

Wildlife observation, photography, environmental education, and interpretation can affect wildlife resources positively or negatively. Public involvement in these priority public uses would positively result in a better appreciation and more complete understanding of refuge wildlife and habitats, which in turn, translates into more widespread, stronger support for the Supawna Meadows NWR, the Refuge System, and the Service. Wildlife observation and photography have the potential of impacting waterfowl, marshbirds and other migratory bird populations feeding and resting near the trails, utilized access roads, and on other refuge lands. Use of upland trails is more likely to impact songbirds than other migratory birds. The disturbance of migratory birds by humans is documented in many studies in different locations.

On-site activities by teachers and students using trails and environmental education sites may impose low-level impacts such as trampling of vegetation, removing vegetation, littering and temporary disturbance to wildlife. In the event of persistent disturbance to habitat or wildlife, the activity would be restricted or discontinued.

Placement of kiosks may affect small areas of vegetation. Kiosks would be placed where minimal disturbance would occur.

Providing additional interpretive and educational brochures as well as increasing involvement with local groups in the area may result in increased knowledge of the refuge and its resources. This awareness and knowledge may improve the willingness of the public to support refuge programs, resources, and compliance with regulations.

We predict the impacts of wildlife observation and photography uses will be minimal. Possible impacts include disturbing wildlife, removing or trampling of plants, littering, vandalism and entrance into closed

areas. There would be some removal of vegetation to place the observation platforms and photo blinds. In the event of persistent disturbance to habitat or wildlife, the activity would be restricted or discontinued.

Human disturbance to migratory birds has been documented in many studies in different locations. Conflicts arise when migratory birds and humans are present in the same areas (Boyle and Samson 1985). The responses of wildlife to human activities include departure from the site (Burger 1981), the use of sub-optimal habitat (Erwin 1980), altered behavior (Burger 1981), and an increase in energy expenditure (Belanger and Bedard 1990).

Disturbance can cause shifts in habitat use, abandonment of habitat, and increase energy demands on affected wildlife since wildlife would expend energy leaving areas of disturbance (Knight and Cole, 1991). Flight in response to disturbance can lower nesting productivity and cause disease and death. Hammitt and Cole (1998) conclude that the frequent presence of humans in “wild land” areas can dramatically change the normal behavior of wildlife mostly through “unintentional harassment.”

**Public Review and Comment:**

As part of the Supawna Meadows NWR CCP process, this compatibility determination would undergo extensive public review, including a comment period of 30 days following the release of the Draft CCP/EA.

**Determination:**

Use is not compatible

Use is compatible, with the following stipulations

**Stipulations Necessary to Ensure Compatibility:**

All-terrain vehicles, bicycles, jogging and horseback riding would be prohibited on all refuge lands. Refuge brochures and the refuge’s internet site would provide information regarding the refuge and maintained trails. A law enforcement program would ensure public use activity compliance and would protect refuge resources.

**Justification:**

These four priority public uses would provide compatible educational and recreational opportunities for visitors to enjoy the refuge resources, and improve their understanding and appreciation of fish and wildlife, ecology, refuge management practices, and the relationship of plant and animal populations in the ecosystem. Visitors would better understand the Service role in conservation, and opportunities, issues, and concerns faced in management of our natural resources. Further, they would understand the impact that human presence, disturbance, and/or consumption can cause to these resources. Likewise, these four priority uses would provide opportunities for visitors to observe wildlife habitats firsthand, and learn about wildlife and wild lands at their own pace in an unstructured environment. Authorization of these uses would result in a greater constituency for achieving individual refuge goals, and, ultimately, the Service mission. These activities would not materially interfere with or detract from the mission of the National Wildlife Refuge System or purposes for which the Supawna Meadows NWR was established.

**Project Leader**

\_\_\_\_\_  
(Name/Title/Signature)

REFUGE MANAGER

**Review and Concurrence**

\_\_\_\_\_  
(Name/Title/Signature/Date)

REGIONAL CHIEF

**Approved**

\_\_\_\_\_  
(Date)

**Mandatory 15-year re-evaluation date** \_\_\_\_\_ 2024 \_\_\_\_\_

**Literature Cited:**

Belanger, L., and J. Bedard. 1990. Energetic cost of man-induced disturbance to staging snow geese. *Journal of Wildlife Management*. 54:36.

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Burger, J. 1981. The effect of human activity on birds at a coastal bay. *Biological Conservation*. 21:231-241.

Erwin, R.M. 1980. Breeding habitat by colonially nesting water birds in 2 mid-Atlantic U.S. regions under different regimes of human disturbance. *Biological Conservation*. 18:39-51.

Hammit, W.E., D.N. Cole. 1998. *Wildland Recreation: Ecology and Management*. 2<sup>nd</sup> ed. New York: John Wiley and Sons. 361 pp.

Knight, R.L., D.N. Cole, 1991. Effects of recreational activity on wildlife in wildlands. *Transactions, 56th North American Wildlife and Natural Resources Conference*, 1991, p. 238-247. Washington, D.C. : Wildlife Management Institute.

## Compatibility Determination

### Use: FISHING AND CRABBING

#### Refuge Name: Supawna Meadows NWR

**Establishing Authority:** Supawna Meadows NWR was originally established by Executive Order 6582 on February 3, 1934 as the Goose Pond addition to the Killcohook National Wildlife Refuge (currently termed Killcohook Coordination Area). The refuge was renamed Supawna Meadows National Wildlife Refuge and officially separated from Killcohook on April 10, 1974 by the Service. On October 30, 1998, the Service's jurisdiction over Killcohook was revoked.

#### Refuge Purposes: Supawna Meadows NWR purposes:

- "... as a refuge and breeding ground for wild birds and animals," (Executive Order 6582, dated Feb. 3, 1934),
  - "... particular value in carrying out the national migratory bird management program," (16 U.S.C. § 667b),
  - "... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds," (16 U.S.C. § 715d),
- "... suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species," (16 U.S.C. § 460k-1)

**National Wildlife Refuge System Mission:** ...to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Improvement Act of 1997, Public Law 105-57).

#### Description of the Use:

##### (a) What is the use? Is the use a priority public use?

The use is fishing and crabbing within designated areas of the refuge. Fishing is a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997.

##### (b) Where would the use be conducted?

Areas currently open for saltwater fishing and crabbing would continue to be open. The 1-day refuge youth fishing event at the Tract 18 impoundment would continue to be held. Boats would be prohibited on the freshwater ponds. All other freshwater ponds and impoundments would be closed to these activities. See map B-1 for an illustration of where fishing and crabbing would be conducted on the refuge.

##### (c) When would the use be conducted?

All fishing would follow applicable state fishing seasons, except where the refuge administers further restrictions to ensure compatibility. Fishing would be prohibited in the portions of tidal creeks and marshes that are closed to the public during the State migratory waterfowl seasons (generally, September

through the first week of January) (Figure 1). Night fishing would be permitted in tidal areas, but prohibited on all other areas of the refuge.

The marshland area surrounding a known bald eagle nesting site, located at the southern portion of the refuge along the Salem River is closed to the public during the nesting season (December 15 – July 31). Anglers and boaters are prohibited from anchoring, landing, and/or accessing the marshlands during this period.

**(d) How would the use be conducted?**

Tidal creeks and streams would be accessed by boat. There are no boat launching sites on the refuge. Boat access is available from various public and private boat ramps located in the Pennsville and Salem areas. Access to the pond along the Forest Habitat Trail is available by foot from a parking area off of Xmas Tree lane.

A step-down fishing plan describes the details of the fishing program. Each year the plan would be reviewed and any changes would be incorporated into an annual fishing program. All fishing would be planned and operated with the refuge's primary objectives, habitat management requirements and goals as the guiding principles. All fishing activities would follow applicable State laws, except where refuge-specific regulations are needed to ensure compatibility with the refuge's primary mission. Changes to the refuge-specific regulations would be published in the Federal Register. Fishing activities would only occur in designated areas. Fishing activities are intended to meet goals of the National Wildlife Refuge System Improvement Act and some of the refuge objectives and management goals without adversely affecting the primary objectives and mission of the refuge. Completing this activity under a fishing plan allows the refuge to accomplish its management goals and provide needed safety levels for citizens of the area without adversely affecting refuge habitats and wildlife populations. Refuge staff would coordinate with the New Jersey Division of Fish and Wildlife on matters of law enforcement and fishing regulations.

The refuge law enforcement officer would conduct patrols during the fishing season. Assistance would also be provided by the State Conservation Officers.

**(e) Why is the use being proposed?**

This traditional support has been recognized in statutory authority for the National Wildlife Refuge System, including most recently the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act) amendment to the Wildlife Refuge System Administration Act (Administration Act) of 1966. This law, which also provides the Refuge System its mission, clearly states that six wildlife-dependent recreational uses, including both hunting and fishing as well as wildlife observation and photography and environmental education and interpretation, when compatible, are the priority general public uses of the Refuge System. Furthermore, these uses are to receive "enhanced consideration over other general public uses in planning and management within the Refuge System . . . ." The Improvement Act also directs the Service to provide "increased opportunities for families to experience compatible wildlife-dependent recreation, particularly opportunities for parents and their children to safely engage in traditional outdoor activities, such as fishing . . . ." From this statutory language, Congress' intent is clear that the Service provide opportunities for compatible fishing on the Refuge System.

**Availability of Resources:**

In 2004 the Supawna Meadows NWR was made part of the administrative operations of the Cape May NWR. With substantial reductions in staffing and funding, the Supawna Meadows NWR was identified in the 2006 Regional Strategy Plan as an unstaffed satellite refuge of the Cape May NWR. Funding and staffing support for the current level of this activity is administered from the Cape May NWR. At

Current levels, the annual operating cost for accommodating all priority public uses combined is expected to be approximately \$6,000. A breakdown of estimated expenses follows:

Annual Costs

Document Preparation and Review	\$ 700
Road, Parking Lot, Equip., Maintenance	\$ 500
Supplies	\$ 700
Law Enforcement and Responding to Public	\$3,500
<u>Miscellaneous Expenses</u>	<u>\$ 500</u>
Total	\$5,900

There are sufficient funds within the regular Operations and Maintenance budget of Cape May NWR to support the public waterfowl hunt at Supawna Meadows NWR.

**Anticipated Impacts of the Use**

Recreational fishing should not have any adverse impacts on the fisheries resources at the refuge. Adverse impacts to the federally-listed, endangered shortnose sturgeon are not anticipated. Problems associated with site compaction and denuding of vegetation can be addressed by area closures as necessary to protect sensitive areas. Problems associated with littering can be countered through an effective law enforcement program and through public education.

The areas open to fishing and crabbing would be open to water-based wildlife observation as well. Fishermen and crabbers do not actively approach wildlife and generally anchor for short periods of time. Conflicts between fishermen or crabbers and individuals engaged in wildlife observation are expected to be minor and infrequent.

Some of the areas open to fishing and crabbing would be open to waterfowl hunting. Waterfowl hunting seasons extend from September through the first week in January. Fishing and crabbing activities occur year-round. While conflicts are expected to be infrequent, refuge maps and guidelines provided to the public would identify the areas open to hunting. No hunting is permitted on Sundays in New Jersey, which would reduce the potential for conflict.

Waterfowl, wading birds, shorebirds and other wildlife may be disturbed by human activities. Klein (1993), in a study conducted at J. N. "Ding" Darling National Wildlife Refuge, observed that individuals fishing and crabbing showed the lowest disturbance of wildlife compared to other refuge visitors presumably because they did not attempt to approach wildlife.

Morton et al. (1989) suggested that human disturbance of wintering black ducks impairs their physiological conditions, thereby reducing winter survival and nutrient reserves carried to the breeding grounds. Because of the cold climate, little fishing activity occurs on the refuge from the middle of November through the middle of March. Additionally, about 60% of the refuge would be closed during waterfowl season during the majority of the time black ducks are wintering there.

Several species of frogs and turtles that use the refuge are experiencing population declines. Conserving these species achieves refuge purposes, addresses the general concern about these population declines, and also increases the likelihood that more wildlife would be available for viewing at Watchable Wildlife sites. By closing most of the freshwater ponds to fishing, amphibians and turtles would not be impacted by fishing activity. The upland areas of the refuge would be closed to all uses between dusk and dawn. Prohibiting night fishing in freshwater areas would decrease illegal and unauthorized activities on the refuge.

The federally listed, endangered shortnose sturgeon is found in larger rivers, estuaries, and nearshore sea environments (Dadswell et al. 1984). Individuals from the Delaware River population spawn in the freshwater section of the Delaware River from mid-winter to early spring and spend the summer near the mouth of Delaware Bay (Hastings and O'Herron 1987, NMFS 1998). Because this species prefers larger rivers, sturgeons are not expected to occur in waters passing through the refuge. Individuals may be present in the Delaware River bordering the refuge. Fishing and crabbing within the Delaware River is controlled by the states of New Jersey and Pennsylvania, both of which prohibit sturgeon fishing (NJDFW 2009b, PFBC 2010), and is not under the Service's jurisdiction. Adult sturgeon may forage in shallow water areas near the refuge (Dadswell et al. 1984). However, accidental hook and line catches of shortnose sturgeon in the proposed refuge fishing areas are unlikely because sturgeon are bottom feeders, feeding on small clams, amphipods and juvenile crabs in the bottom sediment (Dadswell et al. 1984). Prey is not considered to be a limiting resource (NMFS 1998), therefore it is unlikely that the limited, localized crabbing in refuge waters would affect the sturgeon's prey base. Lastly, fishing and crabbing on the refuge are conducted in accordance with applicable state regulations to help protect sensitive species, including the shortnose sturgeon.

Recreational fishermen on the refuge are a potential audience for refuge outreach and information efforts. The minor impacts to vegetation and wildlife which may occur are a worthwhile trade-off for informing visitors about refuge natural and cultural resources.

Fishermen may impact wildlife and the habitat by leaving their trash, old bait, and fishing line behind. This refuse may negatively impact wildlife if they ingest the trash or get tangled in the fishing line.

#### **Public Review and Comment**

As part of the Supawna Meadows NWR CCP process, this compatibility determination would undergo extensive public review, including a comment period of 30 days following the release of the Draft CCP/EA.

#### **Determination (check one below):**

**Use is Not Compatible**

**Use is Compatible With the Following Stipulations**

#### **Stipulations Necessary to Ensure Compatibility**

All anglers must comply with State regulations regarding possession of fishing licenses. Seasons and creel limits would conform to State regulations. Night fishing would only be permitted on tidal marshes within the refuge boundary. Fishing would be prohibited in the tidal marshes closed to waterfowl hunting during the State migratory waterfowl seasons (September through the first week of January)

The marshland area surrounding a known bald eagle nesting site, located at the southern portion of the refuge along the Salem River (Figure 3) is closed to the public during the nesting season (December 15 – July 31). Users are prohibited from accessing the marshlands around the nesting site during this period.

Access to the fishing pond along the Forest Habitat Trail at Xmas Tree Lane would be by foot only. Boats are prohibited in all the refuge ponds and impoundments.

Fishermen would be required to clean up all garbage and bait prior to leaving an area.

#### **Justification**

The National Wildlife Refuge System Improvement Act of 1997 (P.L. 105-57) identifies six priority public uses of wildlife refuges: hunting, environmental education, interpretation, fishing, wildlife

observation and wildlife photography. These priority public uses are dependent upon healthy wildlife populations. Where these uses are determined to be compatible, they are to receive enhanced consideration over other uses in planning and management.

Fishing is recognized by the Fish and Wildlife Service as a traditional form of outdoor recreation and is not expected to adversely impact the target species. Fishing is a traditional form of outdoor recreation on the refuge and in the region. Permitting fishing on the refuge would provide substantial recreational opportunities to the public.

This activity would not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established.

**Project Leader**

\_\_\_\_\_  
(Name/Title/Signature)

REFUGE MANAGER

**Review and Concurrence**

\_\_\_\_\_  
(Name/Title/Signature/Date)

REGIONAL CHIEF

**Approved**

\_\_\_\_\_  
(Date)

**Mandatory 15-year re-evaluation date** \_\_\_\_\_ 2024

**Literature Cited:**

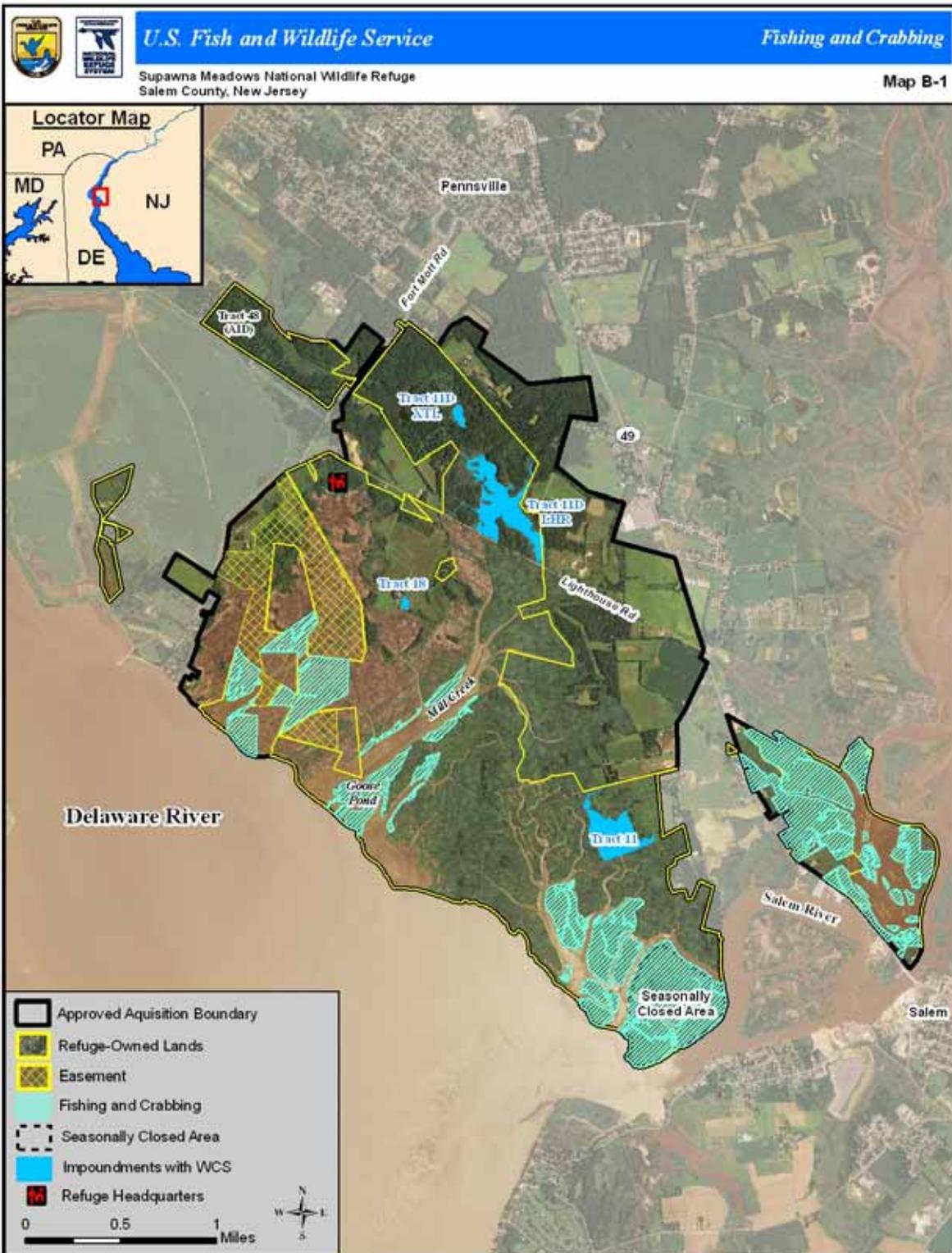
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Map B-1. Public fishing and crabbing areas within Supawna Meadows National Wildlife Refuge



## Compatibility Determination

**Use: PUBLIC HUNTING OF WATERFOWL**

**Refuge Name:** Supawna Meadows NWR

**Establishing Authority:** Supawna Meadows NWR was originally established by Executive Order 6582 on February 3, 1934 as the Goose Pond addition to the Killcohook National Wildlife Refuge (currently termed Killcohook Coordination Area). The refuge was renamed Supawna Meadows National Wildlife Refuge and officially separated from Killcohook on April 10, 1974 by the Service. On October 30, 1998, the Service's jurisdiction over Killcohook was revoked.

**Refuge Purposes:** Supawna Meadows NWR purposes:

- "... as a refuge and breeding ground for wild birds and animals," (Executive Order 6582, dated Feb. 3, 1934),
  - "... particular value in carrying out the national migratory bird management program," (16 U.S.C. § 667b),
  - "... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds," (16 U.S.C. § 715d),
- "... suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species," (16 U.S.C. § 460k-1)

**National Wildlife Refuge System Mission:** ...to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Improvement Act of 1997, Public Law 105-57).

### Description of the Use:

#### (a) What is the use? Is the use a priority public use?

The use is public hunting of waterfowl (ducks, coots, geese and swans) at designated times on designated areas within the refuge boundary within the framework of State and Federal regulations. This use is a public priority use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57).

#### (b) Where would the use be conducted?

As specified in the Refuge Purposes, the Supawna Meadows NWR has been specified as set apart as an inviolate sanctuary and therefore is subject to permitting waterfowl hunting on up to forty percent of the refuge in accordance with (16 U.S.C. 668dd(d)(1)(A), National Wildlife Refuge System Administration Act, (16 U.S.C. 703-712), Migratory Bird Treaty Act and (16 U.S.C. 715a-715r), Migratory Bird Conservation Act. Figure (1) below represents that portion of the refuge which public hunting of waterfowl would be allowed. All other areas of the refuge would be closed to waterfowl hunting. See map B-1 for an illustration of where waterfowl hunting would be conducted on the refuge.

#### (c) When would the use be conducted?

The proposed use is to provide public hunting of waterfowl (ducks, coots, geese and swans) by foot or by boat in designated areas within the refuge in accordance with State and Federal regulations. Hunting

would take place within the open waterfowl seasons established by the New Jersey Division of Fish and Wildlife.

**(d) How would the use be conducted?**

State game laws and regulations including season dates, bag limits, and weapon restrictions would follow the New Jersey Division of Fish and Wildlife (NJDFW) guidelines to the greatest extent possible, and would be coordinated with them annually. In addition to state regulations, hunters must follow Federal regulations. More restrictive regulations may be implemented, as necessary, to conserve wildlife populations and to provide for safe, quality wildlife-dependent recreation.

Hunting seasons on the refuge would be the same as those set by the state. Refuge staff would coordinate with the New Jersey Division of Fish and Wildlife on matters of law enforcement and hunting seasons.

The refuge law enforcement officer would conduct patrols during the hunting season. Assistance would also be provided by the State Conservation Officers, and the area special agent currently located in Pleasantville, New Jersey.

**(e) Why is the use being proposed?**

Hunting is one of the six priority public uses of the National Wildlife Refuge System and, as such, is to receive enhanced consideration over other secondary public uses.

**Availability of Resources:**

In 2004, the Supawna Meadows NWR was made part of the administrative operations of the Cape May NWR. With substantial reductions in staffing and funding, Supawna Meadows NWR was identified in the 2006 Regional Strategy Plan as an unstaffed satellite refuge of the Cape May NWR. Funding and staffing support for the current level of this activity is administered from the Cape May NWR. The annual operating cost for accommodating all priority public uses combined is expected to be approximately \$6,000. A breakdown of estimated expenses follows:

Annual Costs

Document Preparation and Review	\$ 700
Road, Parking Lot, Equip., Maintenance	\$ 500
Supplies	\$ 700
Law Enforcement and Responding to Public	\$3,500
Miscellaneous Expenses	\$ 500
Total	\$5,900

There are sufficient funds within the regular Operations and Maintenance budget of Cape May NWR to support the public waterfowl hunt at Supawna Meadows NWR.

**Anticipated Impacts of the Use**

The Supplemental Environmental Impact Statement (SEIS) for Waterfowl Hunting in the United States (1988) concluded that waterfowl hunting was an acceptable use of a renewable natural resource and established guidelines for establishment of seasons and bag limits. Waterfowl seasons and bag limits are revised each year based on winter and breeding ground surveys to ensure the maintenance of viable waterfowl populations. Waterfowl hunting is recognized by the Service as a traditional form of wildlife related outdoor recreation (a primary purpose for which the refuge was established).

The refuge is located within the Atlantic Flyway Black Duck Joint Venture area which has a goal of increasing the black duck population. The primary species harvested are mallard, American black duck, green-winged teal, and Canada goose.

Heusmann (1974) concluded that "During the past 100 years, the status of the mallard (*Anas platyrhynchos*) in the Northeast has changed from that of rare migrant to major game bird..... The close relationship between mallards and black ducks (*Anas rubripes*) is leading to increasing hybridization as the species come in contact, particularly in inland park situations. The black duck possesses few traits to prevent hybridization, and its continued existence as a distinct species is threatened." Ankney, et al. (1987) suggest that increased mallards in an area cause a decline in black ducks through introgressive hybridization and, or competitive exclusion. Removal of drake mallards during hunting season in areas where black ducks and mallards interact may decrease hybridization.

Wood duck nesting and roosting areas on the non-tidal waters of the refuge are not open to waterfowl hunting. Many of the refuge's breeding and juvenile wood ducks have dispersed or migrated by the opening of the waterfowl season in mid-October. The hunting of waterfowl in the designated areas within the federally and state prescribed seasons and bag limits should have little or no affect on the refuge's wood duck breeding population or national populations.

New Jersey, northern Delaware, and southeastern Pennsylvania are currently experiencing a population explosion of non-migratory Canada geese. City parks, industrial parks, water supply reservoirs and private landowners are experiencing problems resulting from these birds. Rexstad (1992) found a high intrinsic survival rate of the Canada goose in Utah in the absence of hunting. Current regulations, focused on harvesting non-migratory Canada geese, allow hunting during the month of September. Hunting during late winter has the potential to disturb wintering ducks, particularly black ducks, and decrease the value of the refuge as wintering habitat. Hunting of Canada geese on designated areas of the refuge may be permitted after the close of the duck season for the southern zone of New Jersey when necessary to achieve population and damage control goals for non-migratory Canada geese.

The greater snow goose population in the Atlantic flyway has increased significantly over the past decade and continues to increase. Damage to winter grain and salt hay fields and marsh areas in New Jersey is increasing. The refuge marshes are currently used by greater snow geese. Refuge marshes and impoundments provide valuable late winter habitat for black ducks and pintails. Hunting during late winter has the potential to disturb wintering ducks, particularly black ducks, and decrease the value of the refuge as wintering habitat. As snow goose use of the refuge increases, hunting of greater snow geese on designated areas of the refuge may be permitted after the close of the duck season for the southern zone of New Jersey to achieve population goals for greater snow geese or reduce damage to refuge habitats and surrounding marsh and agricultural areas.

Other species which share refuge habitat with waterfowl include shorebirds, wading birds, osprey and bald eagle. Most shorebirds and wading birds have commenced or completed migration by the opening of the waterfowl hunting season.

Bald eagles feed in the tidal and non-tidal areas of the refuge. Since 1998, an eagle nest has been located on the refuge in an area outside the designated waterfowl hunting areas. This area is closed to all public entry between December 15 and July 31.

Hunters benefit from the harvesting of game for personal consumption. Hunters who come from outside the local area also contribute to the local economy by staying at local hotels and eating in local restaurants.

### **Public Review and Comment**

As part of the Supawna Meadows NWR CCP process, this compatibility determination would undergo extensive public review, including a comment period of 30 days following the release of the Draft CCP/EA.

**Determination (check one below):**

Use is Not Compatible

Use is Compatible With the Following Stipulations

**Stipulations Necessary to Ensure Compatibility**

All hunters must obtain all necessary State and Federal permits. Hunters must abide by all applicable refuge, State and Federal regulations. Refuge brochures and publication of hunt information in the New Jersey Fish and Wildlife Digest will inform hunters of State and refuge regulations.

The hunting program would be reviewed annually to ensure compatibility with Service and refuge purposes and compliance with Federal and State waterfowl hunting regulations. Disturbance of other wildlife, especially migratory birds, would be monitored and changes would be made in the hunt program as necessary to minimize disturbance. A law enforcement program would ensure hunt regulation compliance and would protect refuge resources.

**Justification**

The National Wildlife Refuge System Improvement Act of 1997 (P.L. 105-57) identifies six priority public uses of wildlife refuges: hunting, environmental education, interpretation, fishing, wildlife observation and wildlife photography. These priority public uses are dependent upon healthy wildlife populations. Where these uses are determined to be compatible, they are to receive enhanced consideration over other uses in planning and management.

Hunting of waterfowl on Supawna Meadows NWR is justified within refuge objectives by providing wildlife-oriented recreation and promoting appreciation of wildlife and the outdoors. Recreational hunting is also a valid means of population control and can serve to keep wildlife populations in check.

These activities would not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established.

**Project Leader**

\_\_\_\_\_  
(Name/Title/Signature)

REFUGE MANAGER

**Review and Concurrence**

\_\_\_\_\_  
(Name/Title/Signature/Date)

REGIONAL CHIEF

**Approved**

\_\_\_\_\_  
(Date)

**Mandatory 15-year re-evaluation date** 2024

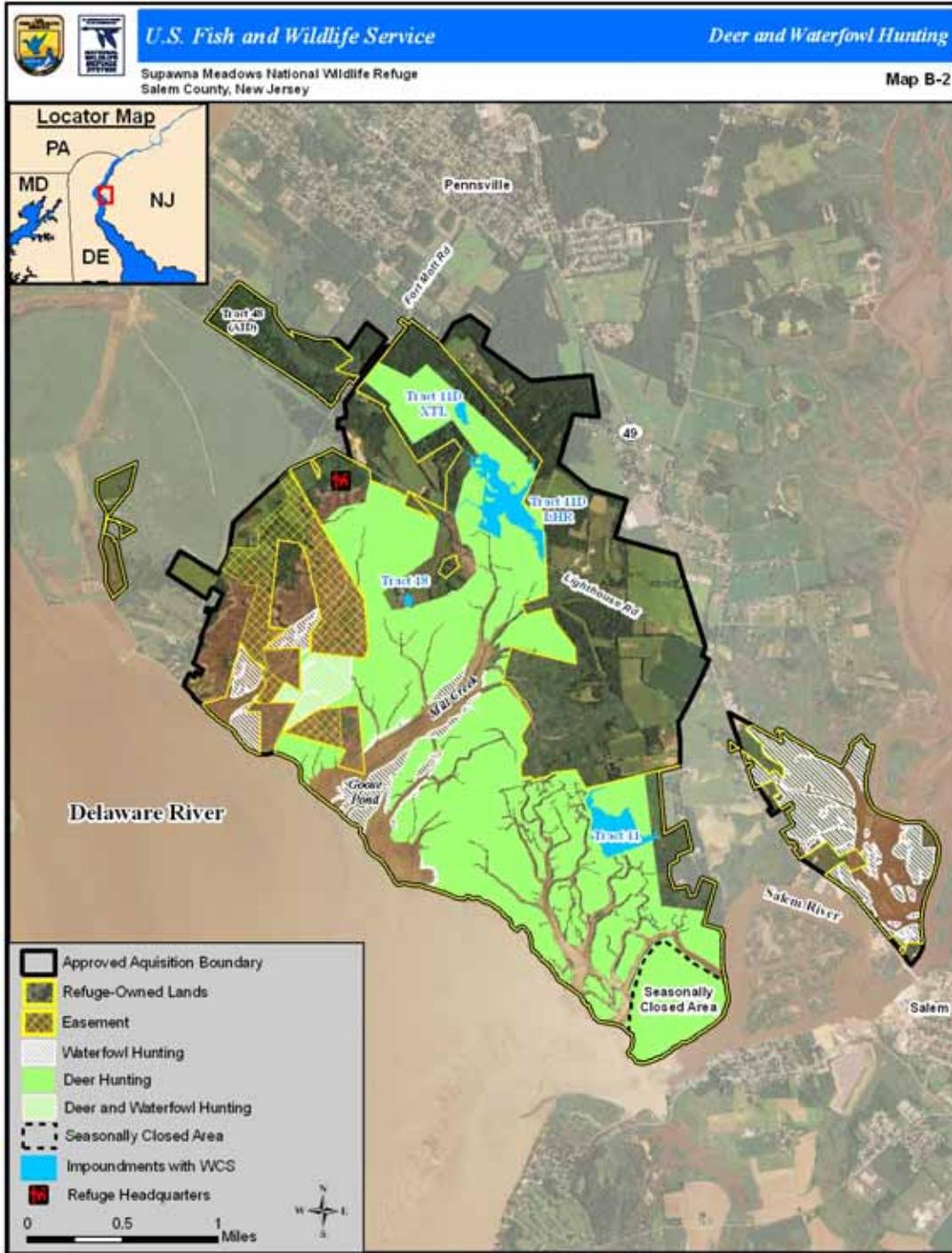
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Map B-2. Public hunting areas within Supawna Meadows National Wildlife Refuge



## **Compatibility Determination**

**Use:** White-tailed Deer Archery Hunt

**Refuge Name:** Supawna Meadows National Wildlife Refuge

**Establishing Authority:** Supawna Meadows National Wildlife Refuge (Refuge) was originally established as the Goose Pond addition to the Killcohook National Wildlife Refuge (currently termed Killcohook Dredge Spoil Disposal Area) that was established by Executive Order 6582 on February 3, 1934. The Refuge was renamed Supawna Meadows National Wildlife Refuge and officially separated from Killcohook on April 10, 1974 by the Service. On October 30, 1998, the Service's jurisdiction over Killcohook was revoked.

Refuge Purposes: Supawna Meadows NWR purposes:

- "... as a refuge and breeding ground for wild birds and animals," (Executive Order 6582, dated Feb. 3, 1934),
- "... particular value in carrying out the national migratory bird management program," (16 U.S.C. § 667b),
- "... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds," (16 U.S.C. § 715d),  
  
"... suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species," (16 U.S.C. § 460k-1)

**National Wildlife Refuge System Mission:** ...to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans. (National Wildlife Refuge System Improvement Act of 1997, Public Law 105-57)

### **Description of Use:**

**(a) What is the use? Is the use a priority public use?** The use is an archery hunt for white-tailed deer. Hunting is a priority public use. Archery would be the only acceptable means of taking deer on Supawna Meadows Refuge. Only portable stands are allowed and no tree spiking is allowed. Open seasons will adhere to New Jersey State deer hunting regulations for bow hunting only. Access to the Refuge for this activity is achieved through walking.

**(b) Where would the use be conducted?** Except for safety zones and where legal access is inadequate or absent, deer hunting will be permitted on all Refuge tracts with the exception of Tract 11c, which is the location of the old Refuge headquarters and residence. Optimum deer habitat is found on Tracts 11, 11b, and 11d, which contain the majority of Refuge uplands. Marsh tracts are included in the hunting area because deer often seek shelter in Phragmites-dominated marshes during hunting seasons. Upland islands in the marsh also support deer, primarily Tracts 11e, 11g, and 11r.

**(c) When would the use be conducted?** Refuge deer hunting will follow the bow seasons set by the State of New Jersey, Division of Fish and Wildlife in Zone 63. Bow hunting will be maximized to include fall bow, permit bow, youth bow, and winter bow seasons.

**(d) How would the use be conducted?** State game laws and regulations including season dates, bag limits, and weapon restrictions will follow the New Jersey Division of Fish and Wildlife (NJDFW) guidelines to the greatest extent possible, and will be coordinated with them annually. In addition to state regulations, hunters must follow Federal regulations including no baiting, use of a spotlight, or use of nails, wire, screws or bolts to attach a tree stand. Refuge regulations also must be followed, including the prohibition of motorized vehicles. More restrictive regulations may be implemented, as necessary, to conserve wildlife populations and to provide for safe, quality wildlife-dependent recreation.

Consultations with the New Jersey Division of Fish and Wildlife were conducted during development of the proposed changes to the hunting program and during the development of the plan. Copies of the plan and the supporting environmental documents were provided to the NJDFW during the public review and comment period.

Changes to the deer hunting program on Supawna Meadows Refuge as outlined in the White-tailed Deer Hunt Management Plan will be implemented beginning with the 2007-2008 hunting season. Guidelines set by this hunt plan will apply to areas acquired by the Refuge in the future.

A Refuge-specific permit will be required to hunt on the Refuge along with a hunter orientation training until this change is codified. All required State permits must be in possession of the hunter while hunting on the Refuge. Possession of any firearm is prohibited on the Refuge at all times.

The number of bow hunters will not be limited and there will not be a lottery. Hunters will be allowed to select their own sites within the posted deer hunting areas, on a first-come basis. There are four elevated stands located in Tracts 18 and 18a where the vegetation is not sufficient to support portable tree stands. These stands will be available to hunters on a first-come, first-serve basis. The Refuge will remain open to the general public during the hunting season because of the lack of firearms.

Except for safety zones and where legal access is inadequate or absent, deer hunting will be permitted on all Refuge tracts with the exception of Tract 11c, which is the location of the old Refuge headquarters and residence. Optimum deer habitat is found on Tracts 11, 11b, and 11d, which contain the majority of Refuge uplands. Marsh tracts are included in the hunting area because deer often seek shelter in Phragmites-dominated marshes during hunting seasons. Upland islands in the marsh also support deer, primarily Tracts 11e, 11g, and 11r. Refuge lands and tract numbers can be found on the Refuge hunting map, Figure 1.

Hunting seasons on the Refuge will be the same as those set by the State. Refuge staff will coordinate with the New Jersey Division of Fish and Wildlife on matters of law enforcement and hunting seasons.

The Refuge law enforcement officer will conduct patrols during the hunting season. Assistance will also be provided by the State Conservation Officers, and the area Special Agent currently located in Pleasantville, New Jersey. Harvested deer will be checked at the State check stations. These are identified in the New Jersey Fish and Wildlife Hunting Digest.

**(e) Why is this use being proposed?** In 2004, the Refuge was administratively complexed to Cape May National Wildlife Refuge in Cape May County, New Jersey. Significant staffing changes occurred in 2006, as shown in the Regional Strategic Workforce Plan due to expected future budget reductions. Supawna Meadows Refuge was designated an unstaffed satellite of the Cape May Refuge complex, and has no permanent staffing and drastically reduced funding assigned for direct management, including that of the hunt program. Additionally, the office is closed to the public and all activities are currently managed through the Cape May Refuge office, which is 1 ½ hours away. The proposed changes to the hunt program continue to provide quality deer hunting opportunities on the Refuge, while reducing the

administrative burden on Refuge personnel.

**Availability of Resources:** The annual operating cost is expected to be approximately \$6,000. A breakdown of estimated expenses follows:

Annual Costs

Document Preparation and Review	\$ 700
Road, Parking Lot, Equip., Maintenance	500
Supplies	700
Law Enforcement and Responding to Public	3,500
<u>Miscellaneous Expenses</u>	<u>500</u>
Total	\$5,900

There are sufficient funds within the regular Operations and Maintenance budget of Cape May National Wildlife Refuge to conduct an annual deer hunt at Supawna Meadows Refuge.

**Anticipated Impacts of the Use:** The impacts of allowing hunting may include disturbance of non-target species in the course of tracking deer, trampling of vegetation, possible creation of unauthorized trails by hunters, littering and possible vandalism and subsequent erosion.

Under the proposed action, only bow hunting seasons would be permitted on the Refuge under Zone 63 in Salem County. Twenty-two hunting days using firearms would be eliminated. The length of the bow season would be increased from 25 to 124 days. The number of bow hunters would not be limited.

According to the NJ Division of Fish and Wildlife, in the 2005/2006 hunting season, approximately half of the total deer harvested were harvested during permit bow. By increasing the number of possible bow hunting days and not limiting the number of bow hunters, the same amount of deer should be harvested each year and will continue to help manage the deer herd at Supawna Meadows Refuge. There may continue to be complaints of crop damage and there would likely continue to be deer/vehicle collisions.

This proposal would result in less disturbances to wildlife. Wildlife species may be alarmed by firearm hunters because of the noise from firearms and that they may drive deer in groups. Since bow hunting is generally a solitary sport and hunters will be scattered throughout the Refuge hunting areas, animals would not be disturbed as much.

By eliminating Zone 59, demands on Refuge operational resources would be significantly lowered. The NJ Division of Fish and Wildlife would also benefit from this option by reducing the time and expense needed to conduct a lottery. Refuge law enforcement patrols, however, would increase. Patrols may not be performed as intensely, but a law enforcement presence would be needed for a longer period of time since the length of the hunting season would be increased.

The Refuge would remain open to all users during the hunting season, thereby concurrently allowing priority public uses. Non-hunting visitors may be in the hunt area at the same time as recreational hunters. Conflicts may arise if non-hunting visitors disturb deer or hunters or if a hunter disturbs deer or other wildlife that a non-hunting visitor was watching or photographing.

The safety of Refuge visitors and adjacent landowners would be increased due to the elimination of firearms. However, non-hunting visitors may still have safety concerns and may be uncomfortable using areas of the Refuge in which bow hunters are present. State law prohibiting hunting on Sunday provides an opportunity for non-consumptive users to visit the Refuge on a non-hunting day during the hunting

season.

The proposed action would not likely affect any cultural resources that may be located on the Refuge.

All or part of the Refuge may be closed to hunting at any time, if necessary, for public safety, to provide wildlife sanctuary, or for other urgent reasons. All seasons would be coordinated with and within the framework of the New Jersey Division of Fish and Wildlife. Some hunting regulations may be more restrictive than State regulations to meet Refuge objectives. If necessary, modifications may be made to Refuge-specific regulations and/or the hunt program based on harvest data and/or public use issues.

The hunt program, along with all other management programs, relates directly to the overall mission of the Service. Additionally, the National Wildlife Refuge Improvement Act of 1997 identifies six priority public uses that are appropriate on national wildlife refuges, including hunting, fishing, wildlife observation, wildlife photography, and environmental interpretation and education. Development and enhancement of a quality and biologically sound hunt program that 1) leads to enjoyable recreation experiences and 2) maintains the deer population to promote a healthy environment is the overall goal for the hunt program at Supawna Meadows Refuge.

**Public Review and Comment:** A Draft Environmental Assessment was prepared for this use and made available for public comment from December 5, 2006 to January 3, 2007. Comments were received from local residents and hunters and addressed in that format. A public notice was printed in the Today's Sunbeam newspaper on August 31, 2007 to announce the review period for the draft Compatibility Determination (CD). Additionally, a copy of the draft CD was posted at the refuge office and Grassland Trail kiosk. The public review and comment period ended on September 14, 2007. No public comments were received.

**Determination:**

- Use is not compatible
- Use is compatible, with the following stipulations

**Stipulations Necessary to Ensure Compatibility:**

- All hunters must obtain all necessary State, Federal, and refuge permits.
- Hunters must abide by all applicable refuge, State, and Federal regulations.
- Deer hunting will be allowed on the upland and marshland areas of the Refuge, except within posted closed areas. Concurrently, the public will have access to the Refuge for non-consumptive public uses.
- All-terrain vehicles will be prohibited on all Refuge lands.
- Refuge brochures and publication of hunt information in local newspapers and the New Jersey Fish and Wildlife Digest will inform hunters of refuge regulations.
- A law enforcement program will ensure hunt regulation compliance and will protect Refuge

resources.

- A Refuge-specific permit will be required to hunt on the Refuge along with a hunter orientation training until this change is codified.

**Justification:** The National Wildlife Refuge System Improvement Act of 1997 (P.L. 105-57) identifies six legitimate and appropriate uses of wildlife refuges: hunting, environmental education, interpretation, fishing, wildlife observation and wildlife photography. These priority public uses are dependent upon healthy wildlife populations. Where these uses are determined to be compatible, they are to receive enhanced consideration over other uses in planning and management.

Hunting of white-tailed deer and waterfowl on Supawna Meadows Refuge is justified within Refuge objectives by providing wildlife-oriented recreation and promoting appreciation of wildlife and the outdoors. Recreational hunting is also a valid means of population control and can serve to keep wildlife populations in check.

These activities will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the Refuge was established.

Signature - Refuge Manager: Howard K. Sibley 9/20/07  
(Signature and Date)

Concurrence - Regional Chief: Anthony D. Lege 9/26/07  
(Signature and Date)

Mandatory ~~10~~ or 15-year Reevaluation Date: Sept. 26, 2022

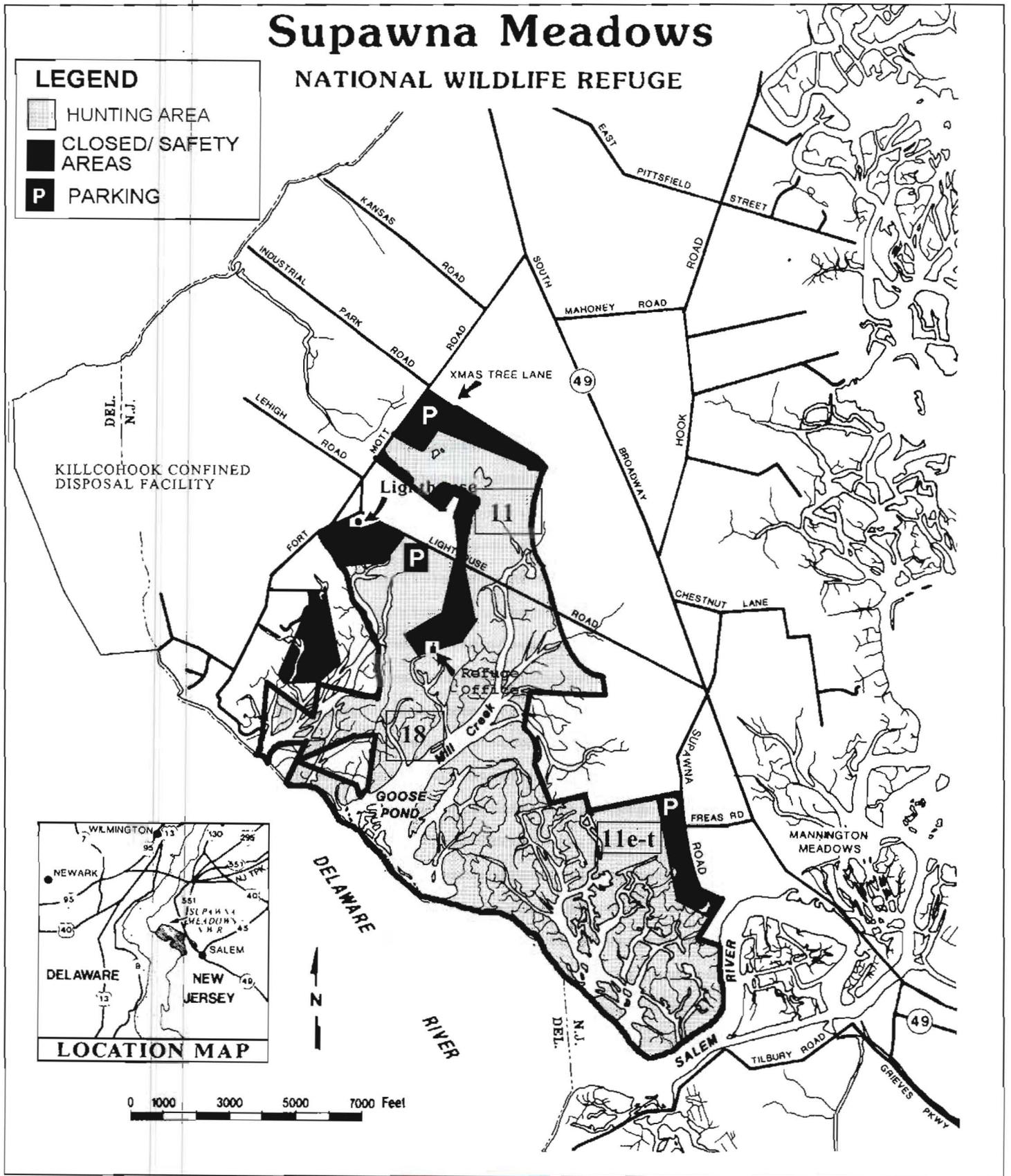


Figure 1. Map of no hunting zones and tract numbers on Supawna Meadows National Wildlife Refuge.

## Appendix C



John Mossesso, Jr./NBII

*Eastern Box Turtle*  
John Mossesso, Jr./NBII

## **Refuge Operations Needs System (RONS) and Service Asset Maintenance Management System (SAMMS)**



Table C.1. Refuge Operations and Needs System (RONS) table.

Project #	Project Title	Regional Rank	Station Rank	Budget Category	Year 1 Cost	Recurring Cost	FTE's	Alternatives		
								A	B	C
	Improve refuge operations (Assistant Refuge Manager stationed at Supawna Meadows)			People			1		X	
	Improve inventories and monitoring of refuge biological program (Wildlife Biologist stationed at Supawna Meadows)			People			1		X	
	Improve visitor services and volunteer coordination (Outdoor Recreation Planner stationed at Cape May)			People			.4		X	
	Improve and maintain refuge facilities and equipment (Maintenance Worker stationed at Supawna Meadows)			People			1		X	
	Improve refuge resource protection, facility security and public safety Park Ranger-Law Enforcement Officer stationed at Supawna Meadows)			People			1		X	
	Conduct surveys and develop comprehensive inventories of all flora and fauna on refuge									
	Conduct long-term marsh monitoring and restoration									
	Conduct secretive marshbird and seaside sparrow surveys to evaluate impacts of <i>Phragmites</i> control									
	Conduct pilot studies of <i>Phragmites</i> control measures									
	Conduct surveys to establish baseline population of coastal									

Project #	Project Title	Regional Rank	Station Rank	Budget Category	Year 1 Cost	Recurring Cost	FTE's	Alternatives		
								A	B	C
	plain swamp sparrow and research use of habitat RONS and SAMMS									
	Conduct comprehensive surveys for bat species of conservation concern									
	Conduct survey of pond use by birds, fish, reptiles, amphibians, and insects.									
	Hire contractor to conduct paleo-environmental review of refuge									

**Table C.2. Service Asset Management Maintenance System (SAMMS) table.**

Project #	Project Title	Regional Rank	Station Rank	Budget Category	Year 1 Cost	Recurring Cost	Alternatives		
							A	B	C
	Construct signage on newly acquired lands							X	
	Construct spur trail off Grassland Trail							X	
	Install (or upgrade) observation blind on impoundment 11 off Grassland Trail							X	
	Upgrade grass parking area nearby the observation blind on impoundment 11 to accommodate 10 vehicles							X	
	Construct a wheelchair-accessible photo-blind and other amenities to improve facilities for wildlife photography at the Grassland trail							X	
	Repair Finn's Point Rear Range Light catwalk to allow for public access							X	
	Install and upgrade signage along Highway 49 to direct motorists to refuge						X		
	Construct trail linking the Finn's Point Rear Range Light site to the Grasslands Trail							X	
	Demolish old headquarters, Yerkes House, staff quarters behind new office, and small outbuildings								
	Expand new maintenance shop								
	Remove hunting closure signage								
	Repair/restore Finn's Point Rear Range Light								



## Appendix D



USFWS

*Forest on Supawna Meadows NWR*

## Wilderness Review



## Documentation of Wilderness Inventory

The wilderness review process consists of three phases: inventory, study, and recommendation. The purposes of the wilderness inventory phase are

- to identify areas of System lands and waters with wilderness character and establish those areas as Wilderness Study Areas (WSAs);
- to identify areas of Refuge System lands and waters that do not qualify as WSAs; and
- to document the inventory findings for the planning record.

## INVENTORY CRITERIA

WSAs are areas that meet the criteria in the Wilderness Act. Section 2(c) provides the following definition.

A wilderness, in contrast with those areas where man and his works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural condition, and which generally

- 1) appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;
- 2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation;
- 3) has at least 5,000 acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and
- 4) may also contain ecological, geological or other features of scientific, educational, scenic, or historical value.

Section 4(c) of the act prohibits permanent roads in wilderness, so WSAs also must be roadless. For the purposes of the wilderness inventory, a "roadless area" is defined as "A reasonably compact area of undeveloped Federal land that possesses the general characteristics of a wilderness and within which there is no improved road that is suitable for public travel by means of four-wheeled, motorized vehicles intended primarily for highway use. A route maintained solely by the passage of vehicles does not constitute a road."

In summary, the inventory to identify WSAs is based on an assessment of the following criteria: absence of roads (roadless); size; naturalness; and either outstanding opportunities for solitude or primitive and unconfined recreation.

We initially assessed Supawna Meadows National Wildlife Refuge based on the size criteria. The size criterion is satisfied for areas under Service jurisdiction in the following situations:

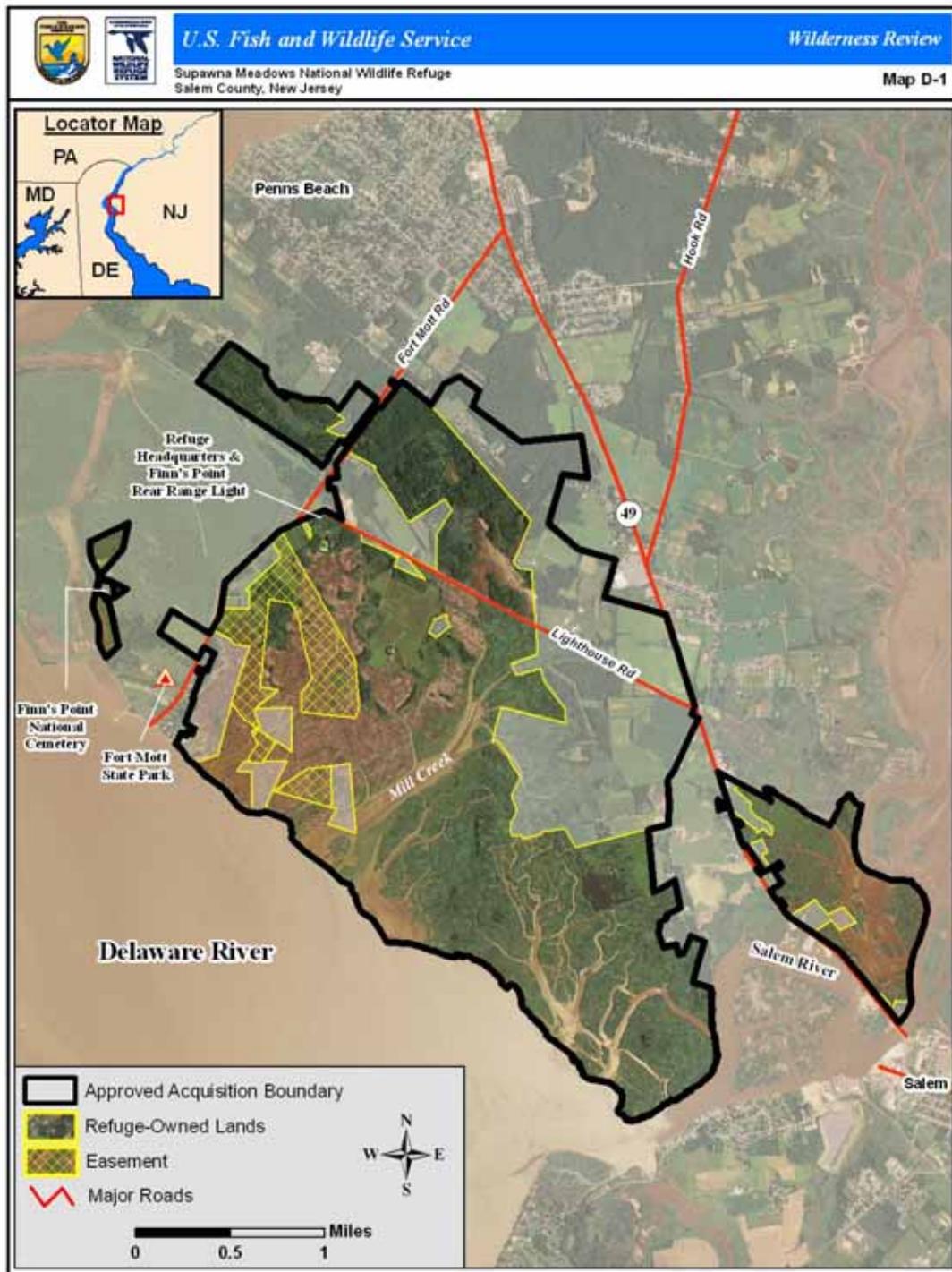
- An area with over 5,000 contiguous acres (2,000 hectares). State and private land inholdings

are not included in calculating acreage.

- A roadless island of any size. A roadless island is defined as a roadless area that is surrounded by permanent waters or that is markedly distinguished from surrounding lands by topographical or ecological features such as precipices, canyons, thickets, or swamps.
- An area of less than 5,000 contiguous acres that is of sufficient size as to make practicable its preservation and use in an unimpaired condition, and of a size suitable for wilderness management.
- An area of less than 5,000 contiguous acres that is contiguous with a designated wilderness, recommended wilderness, or area of other Federal lands under wilderness review by the United States Department of Agriculture Forest Service (USDA-FS), Bureau of Land Management (BLM), or National Park Service (NPS).

## **INVENTORY CONCLUSIONS**

The 3,016-acre Supawna Meadows National Wildlife Refuge does not meet the size criteria for a WSA. It is less than 5,000 acres and its size is not sufficient to preserve natural ecological processes. Map D-1 shows the current refuge-owned lands, easements and proposed acquisition boundaries. We will reevaluate this determination in 15 years with the revision of this CCP, or sooner if significant new information warrants a reevaluation. In summary, at this time additional study is not warranted.





## Appendix E

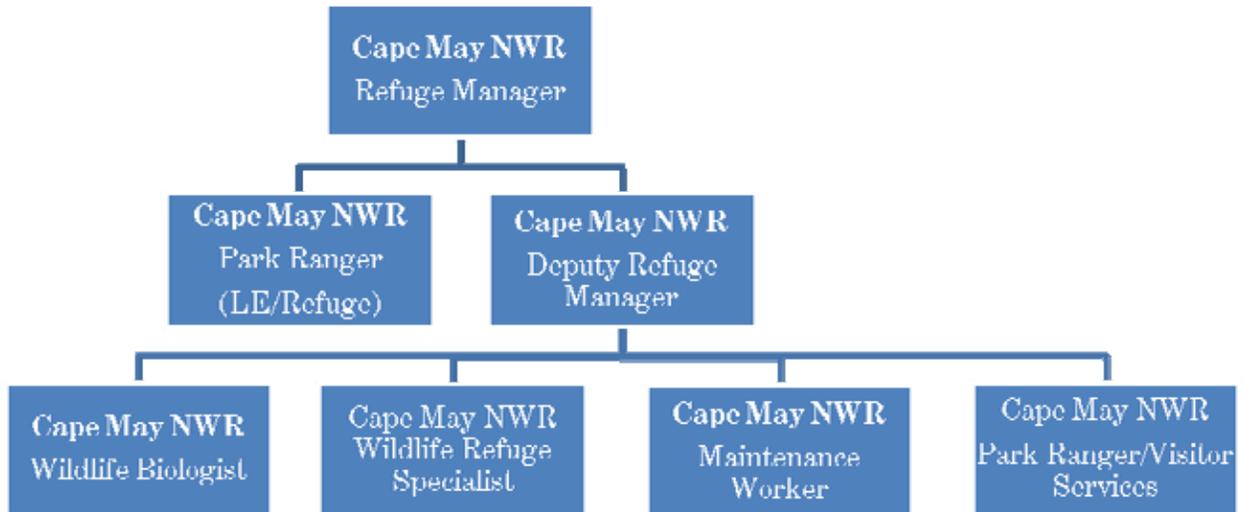


Phil Sezerenie/Mangi Environmental Group, Inc.

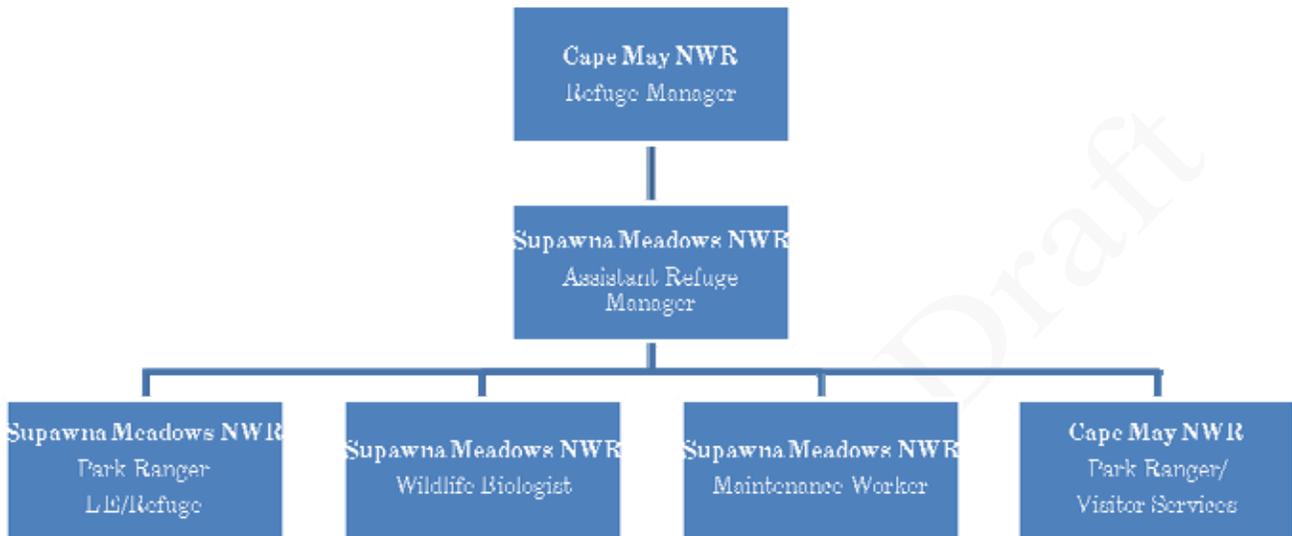
*Service Staff on the Refuge*

## Refuge Staffing Charts for Alternatives





**Figure E-1.** Supawna Meadows National Wildlife Refuge Current Approved Staff (Alternative A & Alternative C) (All staff located at Cape May National Wildlife Refuge).



**Figure E-2.** Supawna Meadows National Wildlife Refuge Proposed Staff (Alternative B)

## Appendix F



USFWS

*Prescribed Burn on Service Lands*

## Fire Management Program Guidance



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## Introduction

The mission of the National Wildlife Refuge System is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" as stated in the National Wildlife Refuge Improvement Act (October 9, 1997).

## The Role of Fire

Historically, natural fire and ignitions by Native American people played an important disturbance role in many ecosystems by removing fuel accumulations, decreasing the impacts of insects and diseases, stimulating regeneration, cycling nutrients, and providing a diversity of habitats for plants and wildlife.

In the heavily manipulated areas of the northeast U.S. that role has been modified significantly. However, when fire is used properly it can:

- reduce hazardous fuels build-up in both wildland-urban interface (WUI) and in non-WUI areas;
- improve wildlife habitats by reducing the density of vegetation, and/or changing plant species composition;
- sustain and increase biodiversity;
- improve woodlands and shrublands by reducing plant density;
- reduce the susceptibility of plants to insect and disease outbreaks;
- assist in the control of invasive and noxious species.

## Wildland Fire Management Policy and Guidance

In 2001, the Secretaries of the Interior and Agriculture approved an update of the 1995 "Federal Fire Policy". The 2001 "Federal Wildland Fire Management Policy" directs federal agencies to achieve a balance between fire suppression to protect life, property and resources, and fire use to regulate fuels and maintain healthy ecosystems. It also directs agencies to provide a management response to all wildfires, commensurate with values at risk, safety, and costs for suppression.

This policy provides nine guiding principles that are fundamental to the success of the fire management program. Firefighter and public safety is the first priority in every fire management activity. The role of wildland fires as an ecological process and natural change agent will be incorporated into the planning process.

Fire management plans (FMPs), programs and activities support land and resource management plans and their implementation. Sound risk management is the foundation for all fire management activities. Fire management programs and activities are economically viable, on the basis of values to be protected, costs, and land and resource management objectives. FMPs and activities are based on the best available science. FMPs and activities incorporate public health and environmental quality considerations. Federal, state, tribal, local, interagency and international coordination and cooperation are essential. Standardization of policies and procedures among federal agencies is an ongoing objective.

The fire management considerations, guidance, and direction should be addressed in the land use resource management plans (for example, the CCP). The FMP is a step-down plan derived from the land use plans and habitat plans, with more detail on fire suppression, prescribed fire, and fuels management activities.

## Management Direction

Supawna Meadows National Wildlife Refuge would protect life, property, and other resources from wildland fire by suppressing all wildfires. Prescribed fire in conjunction with chemical, manual and mechanical fuel treatments would be used in an ecosystem context to protect federal and private property, for habitat management purposes. Fuel reduction activities would be applied in collaboration with federal, state and nongovernmental organizations partners.

Prescribed fire would be used as a management tool to promote and accomplish the goals set forward in the Comprehensive Conservation Plan:

- Protect and enhance Service Trust Resources and Species and Habitats of Special Concern.
- Maintain a healthy and diverse complex of natural community types comprised of native plants and animals to pass on to future generations of Americans.
- Conduct effective outreach activities to promote quality, wildlife dependent public use programs, with the emphasis on wildlife observation, and photography, to raise public awareness of the refuge and the Refuge System, and to promote enjoyment and stewardship of natural resources in the Delaware Bay region.

All aspects of the fire management program would be conducted in a manner consistent with applicable laws, policies, and regulations. Supawna Meadows NWR would maintain a FMP to accomplish the fire management goals described below in Fire Management Goals. Prescribed fire, chemical, manual and mechanical fuel treatments would be applied in a scientific way, under selected weather and environmental conditions.

## Fire Management Goals

The goals and strategies of the National Wildlife Refuge System Wildland Fire Management Program Strategic Plan are consistent with Department of Interior (DOI) and the United States Department of Agriculture Forest Service policies, National Fire Plan direction, the President's Healthy Forest Initiative, the 10-year Comprehensive Strategy and Implementation Plan, National Wildfire Coordinating Group (NWCG) Guidelines, initiatives of the Wildland Fire Leadership Council, and Interagency Standards for Fire and Fire Aviation Operations.

The fire management goals for the refuge are to use prescribed fire, chemical, and manual and mechanical treatments to:

1. reduce the threat to life and property through hazardous fuels reduction treatments; and
2. meet the habitat goals and objectives identified in this CCP.

## Fire Management Objective

The purpose of the fire management program is to:

- Ensure public and firefighter safety while protecting property and natural resource values from wildfire.
- Reduce the wildfire impacts to all resource management activities. Reduce the threats associated with accumulations of hazardous fuel loads in marsh and woodland habitats.
- Provide and enhance and protect habitats for State and Federal endangered and threatened species and species of special concern.
- Provide, maintain, enhance, and protect feeding, resting, nesting and brood habitat that meet the requirements of migratory waterfowl, other migratory birds, and resident wildlife.
- Maintain health and vigor of marsh vegetation.
- Facilitate the control of invasive and exotic species.
- Increase habitat diversity in refuge woodland habitats.
- Demonstrate and educate the public about the role and benefits of wildland fire protection and prescribed fire use in natural resource management.
- Maintain current ecosystem diversity within the landscape context, and contribute to the recovery and restoration of the Delaware Bay ecosystem.
- Comply with State Air Quality Implementation Plans to protect public health and the environment.

## **Strategies**

The refuge would use strategies and tactics that consider public and firefighter safety as well as resource values at risk. Wildfire suppression, prescribed fire, chemical, manual and mechanical treatment methods, along with, timing, and monitoring are described in more detail within the step-down FMP.

Prescribed fire burn plans would be developed for specific sites, following the interagency Prescribed Fire Planning and Implementation Procedures Reference Guide (2008) template.

Prescribed fire temporarily reduces air quality by diminishing visibility and releasing components through combustion. The refuge would meet the Clean Air Act emission standards by adhering to the New Jersey Air Quality requirements during all prescribed fire activities.

## **Fire Management Organization, Contacts, and Cooperation**

Fire management technical oversight for the refuge has been established in Region 5 of the Service, using the fire management zone approach. Under this approach, fire management staff has been determined by established modeling systems based on fire management workload of a group of refuges, and possibly interagency partners. The fire management workload consists of historical wildfire suppression activities, as well as past hazard fuels treatments. At this time, Supawna Meadows NWR is within a fire management zone, which includes all the national wildlife refuges in New York, Pennsylvania, and New Jersey. The primary fire management staffing and support equipment are located at Wallkill River National Wildlife Refuge. Depending upon budgets and the qualifications of personnel assigned to Supawna Meadows NWR, fire qualified individuals may be available at the refuge in the future. All fire management activities are conducted in a coordinated and collaborative manner with the refuge and other federal and nonfederal partners. The fire management zone has also developed a close working relationship with the New Jersey Forest Fire Service and regularly works jointly on fire projects. Initial attack of any wildfire is carried out by the New Jersey Forest Service and Salem County Fire Companies under cooperative agreements in place among the agencies.

## Appendix G



Beth Goldstein/USFWS

*Marsh Habitat on Supawna Meadows NWR*

## **Application of Sea-Level Affecting Marshes Model (SLAMM 5.1) to Supawna Meadows NWR**



# Application of the Sea-Level Affecting Marshes Model (SLAMM 5.1) to Supawna Meadows NWR

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# Application of the Sea-Level Affecting Marshes Model (SLAMM 5.1) to Supawna Meadows NWR

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## INTRODUCTION

Tidal marshes are among the most susceptible ecosystems to climate change, especially accelerated sea level rise (SLR). The International Panel on Climate Change (IPCC) Special Report on Emissions Scenarios (SRES) suggested that global sea level will increase by approximately 30 cm to 100 cm by 2100 (IPCC 2001). Rahmstorf (2007) suggests that this range may be too conservative and that the feasible range by 2100 could be 50 to 140 cm. Pfeffer et al. (2008) suggests that 200 cm by 2100 is at the upper end of plausible scenarios due to physical limitations on glaciological conditions. Rising sea level may result in tidal marsh submergence (Moorhead and Brinson 1995) and habitat migration as salt marshes transgress landward and replace tidal freshwater and Irregularly Flooded marsh (Park et al. 1991).

In an effort to address the potential effects of sea level rise on United States national wildlife refuges, the U. S. Fish and Wildlife Service contracted the application of the SLAMM model for most Region 5 refuges. This analysis is designed to assist in the production of comprehensive conservation plans (CCPs) for each refuge along with other long-term management plans.

## MODEL SUMMARY

Changes in tidal marsh area and habitat type in response to sea-level rise were modeled using the Sea Level Affecting Marshes Model (SLAMM 5.0) that accounts for the dominant processes involved in wetland conversion and shoreline modifications during long-term sea level rise (Park et al. 1989; [www.warrenpinnacle.com/prof/SLAMM](http://www.warrenpinnacle.com/prof/SLAMM)).

Successive versions of the model have been used to estimate the impacts of sea level rise on the coasts of the U.S. (Titus et al., 1991; Lee, J.K., R.A. Park, and P.W. Mause. 1992; Park, R.A., J.K. Lee, and D. Canning 1993; Galbraith, H., R. Jones, R.A. Park, J.S. Clough, S. Herrod-Julius, B. Harrington, and G. Page. 2002; National Wildlife Federation et al., 2006; Glick, Clough, et al. 2007; Craft et al., 2009).

Within SLAMM, there are five primary processes that affect wetland fate under different scenarios of sea-level rise:

- **Inundation:** The rise of water levels and the salt boundary are tracked by reducing elevations of each cell as sea levels rise, thus keeping mean tide level (MTL) constant at zero. The effects on each cell are calculated based on the minimum elevation and slope of that cell.
- **Erosion:** Erosion is triggered based on a threshold of maximum fetch and the proximity of the marsh to estuarine water or open ocean. When these conditions are met, horizontal erosion occurs at a rate based on site-specific data.
- **Overwash:** Barrier islands of under 500 meters width are assumed to undergo overwash during each 25-year time-step due to storms. Beach migration and transport of sediments are calculated.

- **Saturation:** Coastal swamps and fresh marshes can migrate onto adjacent uplands as a response of the fresh water table to rising sea level close to the coast.
- **Accretion:** Sea level rise is offset by sedimentation and vertical accretion using average or site-specific values for each wetland category. Accretion rates may be spatially variable within a given model domain.

SLAMM Version 5.0 was developed in 2006 and 2007 and based on SLAMM 4.0. SLAMM 5.0 provides the following refinements:

- The capability to simulate fixed levels of sea-level rise by 2100 in case IPCC estimates of sea-level rise prove to be too conservative;
- Additional model categories such as “Inland Shore,” “Irregularly Flooded (Irregularly Flooded) Marsh,” and “Tidal Swamp.”
- *Optional.* In a defined estuary, salt marsh, Irregularly Flooded marsh, and tidal fresh marsh can migrate based on changes in salinity, using a simple though geographically-realistic salt wedge model. This optional model was not used in this model application.

Model results presented in this report were produced using SLAMM version 5.0.1 which was released in early 2008 based on only minor refinements to the original SLAMM 5.0 model. Specifically, the accretion rates for swamps were modified based on additional literature review. For a thorough accounting of SLAMM model processes and the underlying assumptions and equations, please see the SLAMM 5.0.1 technical documentation (Clough and Park, 2008). This document is available at <http://warrenpinnacle.com/prof/SLAMM>

All model results are subject to uncertainty due to limitations in input data, incomplete knowledge about factors that control the behavior of the system being modeled, and simplifications of the system (CREM 2008).

## SEA LEVEL RISE SCENARIOS

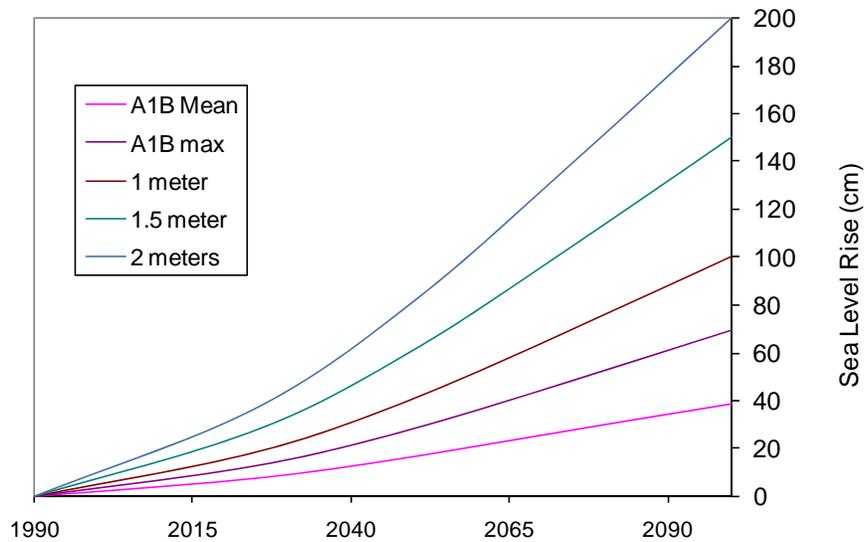
SLAMM 5 was run using scenario A1B from the Special Report on Emissions Scenarios (SRES) – mean and maximum estimates. The A1 scenario assumes that the future world includes very rapid economic growth, global population that peaks in mid-century and declines thereafter, and the rapid introduction of new and more efficient technologies. In particular, the A1B scenario assumes that energy sources will be balanced across all sources. Under the A1B scenario, the IPCC WGI Fourth Assessment Report (IPCC, 2007) suggests a likely range of 0.21 to 0.48 meters of sea level rise by 2090-2099 “excluding future rapid dynamical changes in ice flow.” The A1B-mean scenario that was run as a part of this project falls near the middle of this estimated range, predicting 0.40 meters of global sea level rise by 2100.

The latest literature (Chen et al., 2006, Monaghan et al., 2006) indicates that the eustatic rise in sea levels is progressing more rapidly than was previously assumed, perhaps due to the dynamic changes in ice flow omitted within the IPCC report’s calculations. A recent paper in the journal *Science* (Rahmstorf, 2007) suggests that, taking into account possible model error, a feasible range by 2100 might be 50 to 140 cm. This work was recently updated and the ranges were increased to 75 to 190 cm (Vermeer and Rahmstorf, 2009). Pfeffer et al. (2008) suggests that 2 meters by 2100 is at the upper end of plausible scenarios due to physical limitations on

glaciological conditions. A recent US intergovernmental report states "Although no ice-sheet model is currently capable of capturing the glacier speedups in Antarctica or Greenland that have been observed over the last decade, including these processes in models will very likely show that IPCC AR4 projected sea level rises for the end of the 21st century are too low." (US Climate Change Science Program, 2008) A recent paper by Grinsted et. al. (2009) states that "sea level 2090-2099 is projected to be 0.9 to 1.3 m for the A1B scenario, with low probability of the rise being within Intergovernmental Panel on Climate Change (IPCC) confidence limits."

To allow for flexibility when interpreting the results, SLAMM was also run assuming 1 meter, 1½ meters, and 2 meters of eustatic sea-level rise by the year 2100. The A1B- maximum scenario was scaled up to produce these bounding scenarios (Figure 1).

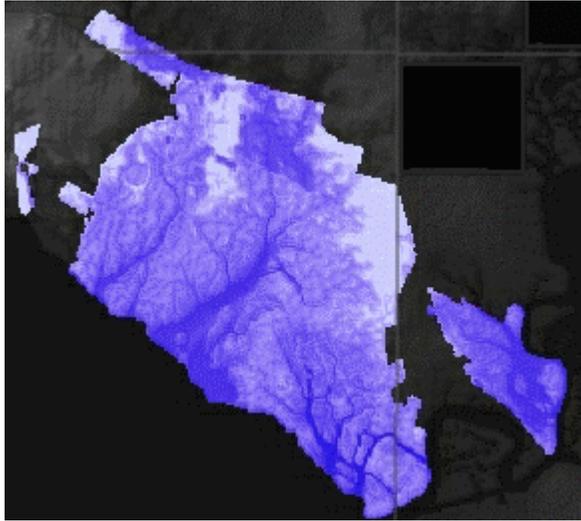
**Figure 1: Summary of SLR Scenarios Utilized**



Additional information on the development of the SLAMM model is available in the technical documentation, which may be downloaded from [the SLAMM website](#) (Clough and Park, 2008).

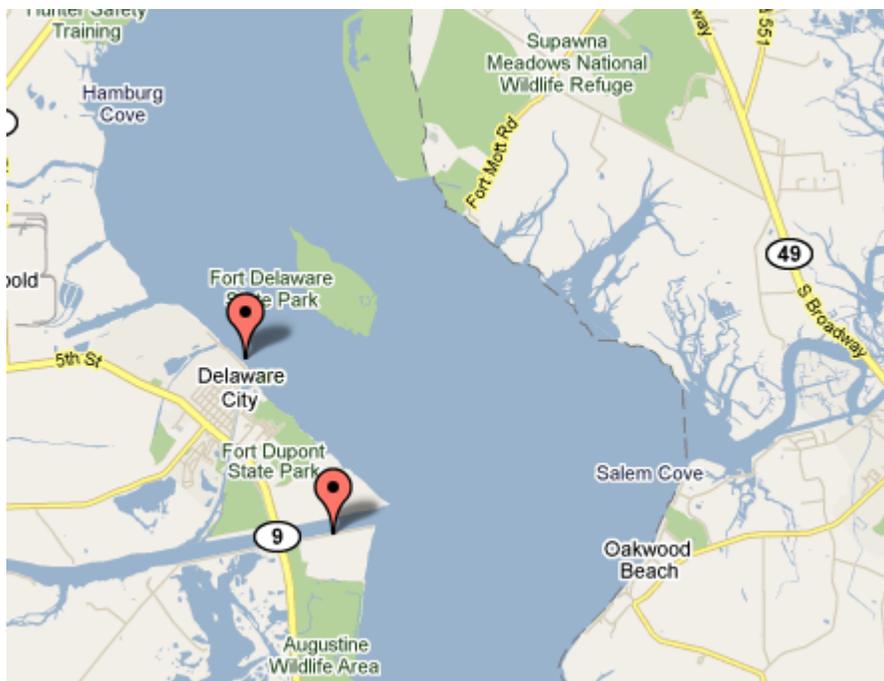
## METHODS AND DATA SOURCES

The digital elevation map (DEM) used in this model simulation was derived from a 2007 LiDAR coverage produced by the USGS and New Jersey Department of Environmental Protection (Figure 3). The LiDAR DEM was provided to us exclusively within the NWR boundaries, with contextual results based on 10 foot contour USGS topographical DEMs.



**Figure 3:** LiDAR coverage map (blue) of Supawna Meadows NWR.

The diurnal range of tide (GT) for the Supawna Meadows NWR was estimated at 1.78 m based on two NOAA gages (8551910, Reedy Point, DE; 8551762, Delaware City, DE) (**Error! Reference source not found.**). These gages were in close agreement measuring ranges of 1.779 meters and 1.786 meters.



**Figure 4:** NOAA Gage Relevant to the Study Area.

The historic trend for sea level rise was estimated 3.46 mm/year using the nearest NOAA gage (Reedy Point, Delaware, 8551910). The estimated rate of sea level rise for this refuge is roughly 1.7 mm/year greater than the global average for the last 100 years (approximately 1.7 mm/year). This difference in relative sea level rise is maintained throughout all model projections.

The National Wetlands Inventory for Supawna Meadows is based on photo dates of 1999. Comparing this polygon coverage to current satellite photos, there appears to be a slight but pervasive shift throughout the NWI coverage of around 30 meters due to either horizontal uncertainty or shoreline change (Figure 5).

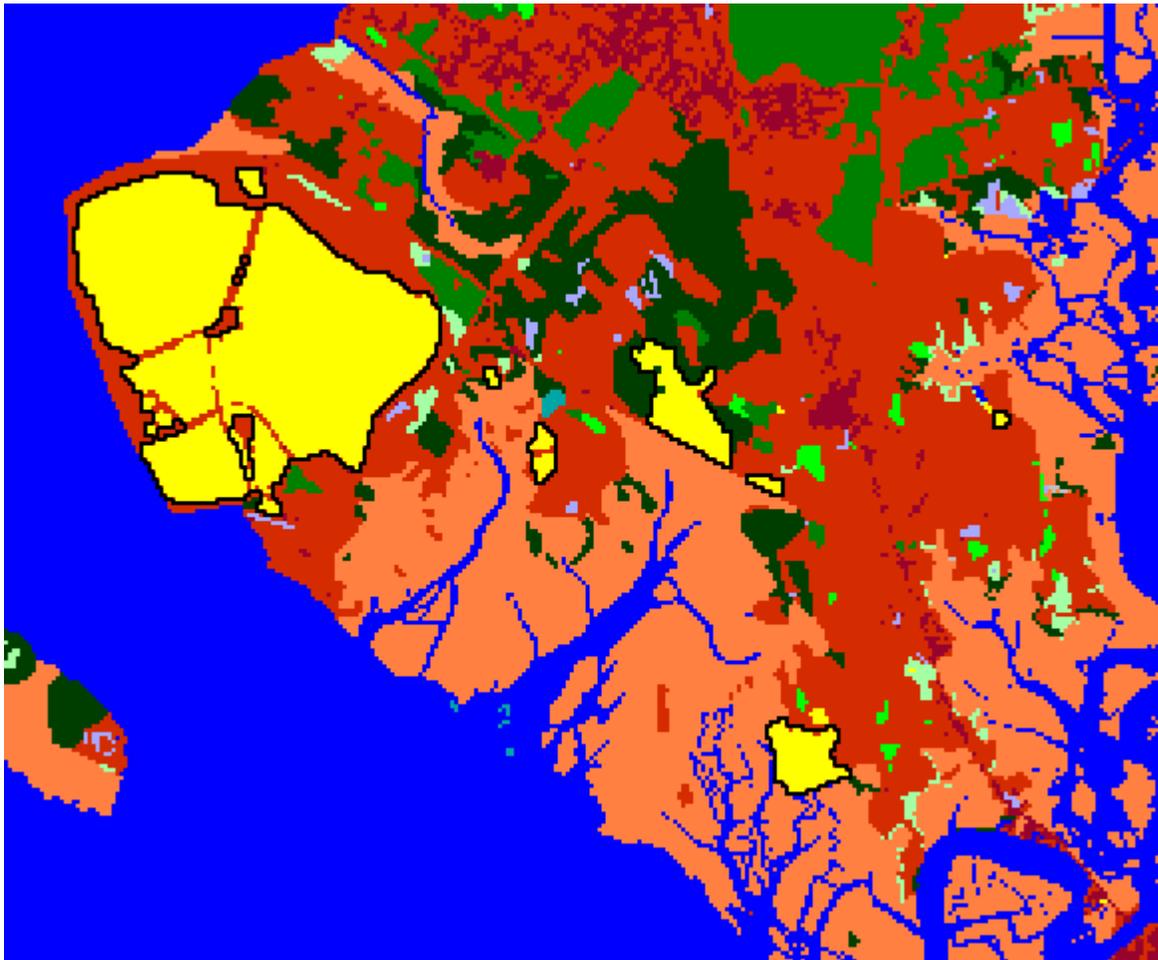


**Figure 5:** NWI layer over current satellite imagery.

Converting the NWI survey into 30 meter cells indicates that the approximately four thousand five hundred acre refuge (approved acquisition boundary including water) is composed of the categories as shown below:

Irreg. Flooded Marsh	46.4%
Dry Land	22.2%
Estuarine Open Water	15.5%
Tidal Swamp	10.7%
Tidal Fresh Marsh	1.5%
Inland Open Water	1.2%

There are several diked or impounded wetlands in the Supawna Meadows NWR according to the National Wetlands Inventory classifications.



**Figure 6:** Diked areas in yellow, bordered by black.

No site-specific marsh accretion data were located for this refuge. The marsh accretion values used were based on a rough average of three different calculations:

- The marsh accretion study located nearest to this study area (Port Mahon DE, Kraft, 1992) measured accretion rates as 4.05 mm/year;
- Based on a large analysis of accretion studies within the mid-Atlantic region (Reed 2008), the average Delaware salt marsh accretion value was calculated at 3.88 mm/yr (n=9);
- Based on data in this same paper (Reed 2008), the average Delaware *estuary* accretion value was calculated at 4.28 mm/yr (n=15)

As these three different estimates are quite similar, accretion rates in regularly flooded marshes were set to 4 mm/year, irregularly flooded marshes to 4 mm/year and tidal fresh were also set to 4 mm/year.

The MTL to NAVD88 correction was derived using the NOAA VDATUM modeling product. The correction was estimated at -0.036 meters which closely matches data available at a nearby NOAA gage (8551910, Reedy Point).

Modeled U.S. Fish and Wildlife Service refuge boundaries for New Jersey are based on Approved Acquisition Boundaries as published on the FWS National Wildlife Refuge Data and Metadata website. The cell-size used for this analysis was 30 meter by 30 meter cells. Additionally, the SLAMM model will track partial conversion of cells based on elevation and slope.

Heidi Hanlon of Supawna Meadows National Wildlife Refuge located the LiDAR DEM that was utilized in simulation modeling.

Marsh erosion rates for this refuge were set to 2 horizontal meters per year based on long-term measurements of coastal erosion rates in Delaware as presented in Kraft 1992.

Based on site-specific LiDAR elevation data (and also LiDAR elevation data from other sites) the allowed elevation ranges for tidal swamp and tidal fresh marsh were altered slightly. The SLAMM 5 conceptual model has traditionally assumed that these categories are all located above the salt boundary due to their “fresh” designation. Recent experience with the model in several sites with LiDAR data indicates that the presence of fresh water allows these categories to extend well below mean high higher water. Based on the LiDAR at this location, the minimum elevation for tidal swamp was set to 0.32 and the minimum elevation for tidal fresh marsh was set to 0.42 half-tide units. (One half-tide unit is half of the diurnal range of tide or ½ GT.)

**SUMMARY OF SLAMM INPUT PARAMETERS FOR SUPAWNA NWR**

Parameter	Global	SubSite 1	SubSite 2	SubSite 3
Description	NJ	Supawna Meadows	Supawna North	Supawna West
NWI Photo Date (YYYY)	1995	1999	1999	1999
DEM Date (YYYY)	1989	2008	2008	2008
Direction Offshore [n,s,e,w]	East	South	North	West
Historic Trend (mm/yr)	3	3.46	3.46	3.46
MTL-NAVD88 (m)	0	-0.036	-0.036	-0.036
GT Great Diurnal Tide Range (m)	1.65	1.78	1.78	1.78
Salt Elev. (m above MTL)	1.45	1.84	1.84	1.84
Marsh Erosion (horz. M /yr)	2	2	2	2
Swamp Erosion (horz. M /yr)	2	2	2	2
T.Flat Erosion (horz. M /yr)	2	2	2	2
Reg. Flood Marsh Accr (mm/yr)	4	4	4	4
Irreg. Flood Marsh Accr (mm/yr)	4	4	4	4
Tidal Fresh Marsh Accr (mm/yr)	4	4	4	4
Beach Sed. Rate (mm/yr)	0.5	0.5	0.5	0.5
Freq. Overwash (years)	25	25	25	25
Use Elev Pre-processor [True,False]	TRUE	FALSE	FALSE	FALSE

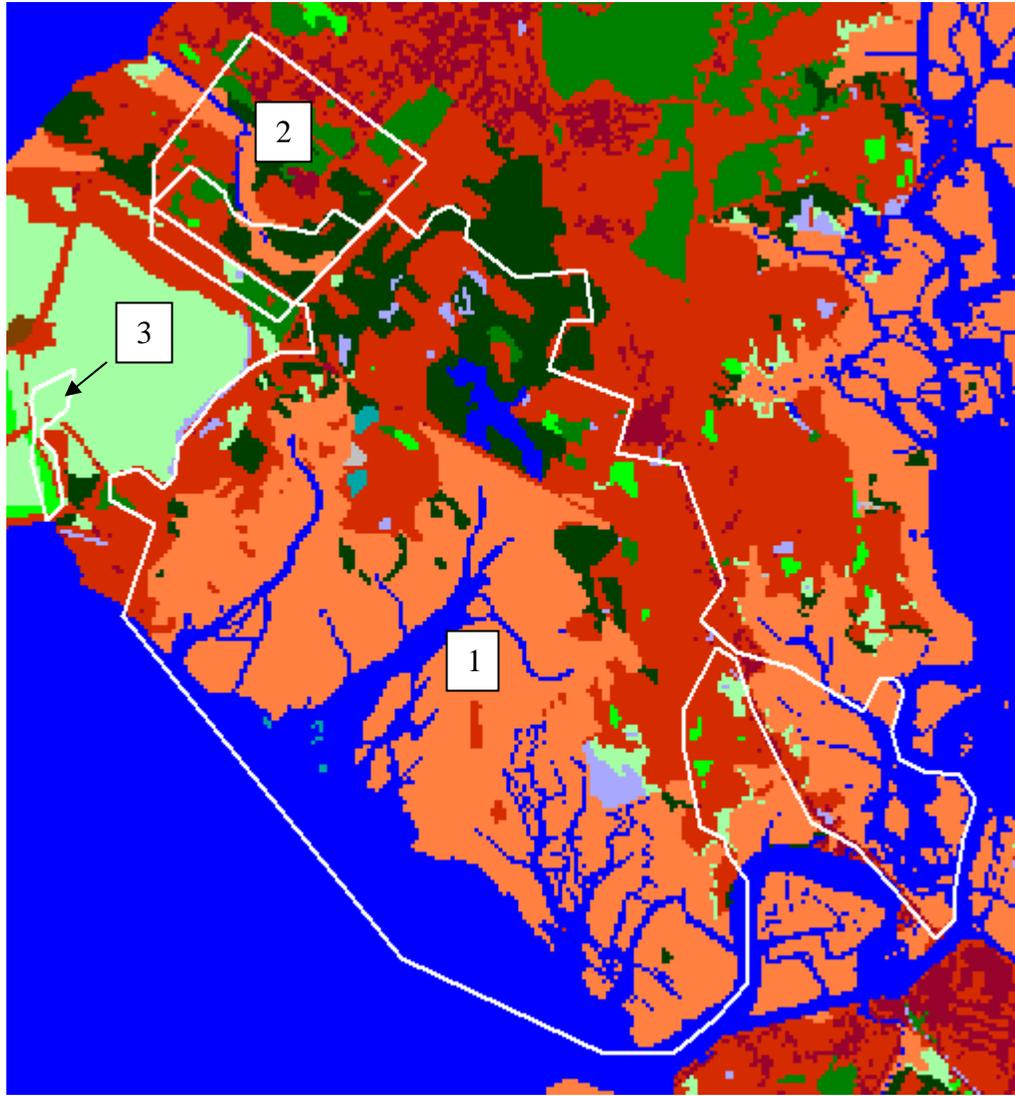


Figure 7: Input sub-sites correspond with above table.

## Results

The predicted effects of global sea level rise on Supawna Meadows NWR are fairly severe. For example, roughly half of the refuge’s dry land is predicted to be lost even in the lowest SLR scenario examined. The refuge is predicted to lose between 49% and 88% of its dry land across all scenarios.

The model results also show a predicted loss of between 18% and 93% of irregularly flooded marsh, which currently makes up roughly half of the refuge. Tidal swamps, about 10% of the refuge, are predicted to be lost at a rate of 19% to 82% across all SLR scenarios. Maps presented below illustrate the spatial extent of these predictions.

SLR by 2100 (m)	0.39	0.69	1	1.5	2
Irreg. Flooded Marsh	18%	28%	48%	89%	93%
Dry Land	49%	59%	69%	80%	88%
Tidal Swamp	19%	25%	38%	65%	82%

**Predicted Loss Rates of Land Categories by 2100 Given Simulated Scenarios of Eustatic Sea Level Rise**

### Supawna Meadows NWR

IPCC Scenario A1B-Mean, 0.39 M SLR Eustatic by 2100

#### Results in Acres

	Initial	2025	2050	2075	2100
Irreg. Flooded Marsh	2104.7	1805.6	1804.7	1764.4	1718.6
Dry Land	1004.3	665.6	614.1	563.7	517.1
Estuarine Open Water	704.1	858.1	895.5	926.1	951.0
Tidal Swamp	486.2	451.0	425.7	405.5	393.8
Tidal Fresh Marsh	68.7	80.4	81.3	81.9	82.2
Inland Open Water	56.0	36.3	36.0	35.4	35.4
Swamp	41.8	30.2	27.5	24.3	21.3
Inland Fresh Marsh	32.2	24.4	23.9	23.5	23.1
Saltmarsh	15.3	234.7	241.8	277.2	311.0
Dev. Dry Land	13.3	4.4	3.7	3.0	3.0
Tidal Flat	4.4	22.3	6.5	6.6	11.2
Trans. Salt Marsh	0.0	318.4	370.5	419.7	463.7
<b>Total (incl. water)</b>	<b>4531.3</b>	<b>4531.3</b>	<b>4531.3</b>	<b>4531.3</b>	<b>4531.3</b>

Supawna Meadows NWR  
 IPCC Scenario A1B-Max, 0.69 M SLR Eustatic by 2100

Results in Acres

	Initial	2025	2050	2075	2100
Irreg. Flooded Marsh	2104.7	1796.6	1748.3	1634.3	1505.3
Dry Land	1004.3	652.3	579.8	503.7	406.8
Estuarine Open Water	704.1	869.7	940.7	1009.8	1102.4
Tidal Swamp	486.2	441.3	408.4	387.8	365.7
Tidal Fresh Marsh	68.7	79.1	80.4	80.8	81.0
Inland Open Water	56.0	36.0	35.4	35.4	33.1
Swamp	41.8	29.2	25.2	20.1	13.8
Inland Fresh Marsh	32.2	24.1	23.3	21.9	20.2
Saltmarsh	15.3	243.9	274.9	357.5	442.3
Dev. Dry Land	13.3	4.2	3.1	2.9	2.7
Tidal Flat	4.4	23.0	12.9	18.1	37.0
Trans. Salt Marsh	0.0	331.9	399.0	459.0	520.9
<b>Total (incl. water)</b>	<b>4531.3</b>	<b>4531.3</b>	<b>4531.3</b>	<b>4531.3</b>	<b>4531.3</b>

Supawna Meadows NWR  
1 Meter Eustatic SLR by 2100

Results in Acres

	Initial	2025	2050	2075	2100
Irreg. Flooded Marsh	2104.7	1781.3	1677.1	1466.1	1098.3
Dry Land	1004.3	635.8	546.1	428.8	313.8
Estuarine Open Water	704.1	884.0	984.8	1106.1	1289.2
Tidal Swamp	486.2	431.0	396.8	368.8	302.1
Tidal Fresh Marsh	68.7	78.7	80.1	80.2	79.0
Inland Open Water	56.0	36.0	35.4	33.6	30.7
Swamp	41.8	28.1	22.8	14.8	7.9
Inland Fresh Marsh	32.2	23.8	22.1	19.8	16.7
Saltmarsh	15.3	256.5	323.6	493.5	821.2
Dev. Dry Land	13.3	3.9	3.0	2.8	1.8
Tidal Flat	4.4	25.4	19.2	34.6	65.1
Trans. Salt Marsh	0.0	346.7	420.4	482.3	505.5
<b>Total (incl. water)</b>	<b>4531.3</b>	<b>4531.3</b>	<b>4531.3</b>	<b>4531.3</b>	<b>4531.3</b>

Supawna Meadows NWR  
1.5 Meters Eustatic SLR by 2100

Results in Acres

	Initial	2025	2050	2075	2100
Irreg. Flooded Marsh	2104.7	1750.8	1531.0	925.4	236.1
Dry Land	1004.3	612.4	487.5	319.5	198.4
Estuarine Open Water	704.1	904.3	1050.9	1296.2	1777.2
Tidal Swamp	486.2	418.5	381.2	300.4	169.9
Tidal Fresh Marsh	68.7	76.8	77.2	73.5	63.8
Inland Open Water	56.0	36.0	34.7	32.7	30.5
Swamp	41.8	26.6	18.5	8.1	3.8
Inland Fresh Marsh	32.2	23.3	20.4	15.6	10.5
Saltmarsh	15.3	283.1	457.5	989.0	1347.7
Dev. Dry Land	13.3	3.6	2.9	1.8	1.6
Tidal Flat	4.4	29.1	28.6	96.4	299.1
Trans. Salt Marsh	0.0	366.8	440.8	472.5	392.9
<b>Total (incl. water)</b>	<b>4531.3</b>	<b>4531.3</b>	<b>4531.3</b>	<b>4531.3</b>	<b>4531.3</b>

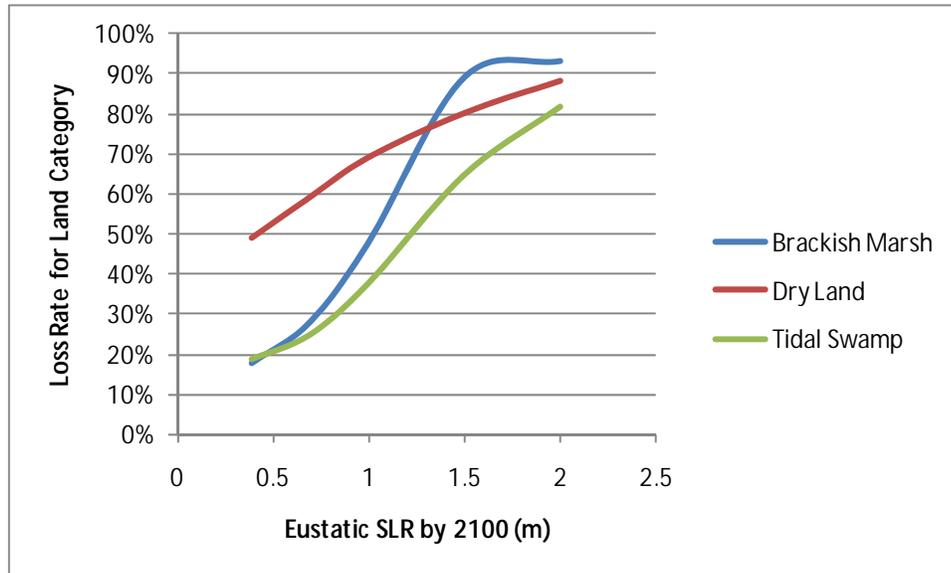
Supawna Meadows NWR  
2 Meters Eustatic SLR by 2100

Results in Acres

	Initial	2025	2050	2075	2100
Irreg. Flooded Marsh	2104.7	1717.0	1304.7	318.7	140.1
Dry Land	1004.3	588.6	417.0	236.2	117.1
Estuarine Open Water	704.1	924.1	1134.9	1544.3	2250.6
Tidal Swamp	486.2	407.6	361.9	209.1	86.3
Tidal Fresh Marsh	68.7	76.1	76.2	64.6	55.0
Inland Open Water	56.0	35.6	33.6	30.5	30.2
Swamp	41.8	25.2	14.0	4.6	1.2
Inland Fresh Marsh	32.2	22.5	18.1	10.9	9.6
Saltmarsh	15.3	315.1	665.2	1525.9	761.3
Dev. Dry Land	13.3	3.2	2.8	1.7	0.8
Tidal Flat	4.4	32.6	59.9	189.8	829.7
Trans. Salt Marsh	0.0	383.8	442.9	395.1	249.3
<b>Total (incl. water)</b>	<b>4531.3</b>	<b>4531.3</b>	<b>4531.3</b>	<b>4531.3</b>	<b>4531.3</b>

## Discussion

Supawna Meadows NWR is predicted to show effects of SLR under even the most conservative SLR scenarios utilized. However, as shown in the chart below, loss rates become increasingly severe as predicted SLR increases.



**Figure 8** Loss rates of Primary NWR land-cover categories as a function of SLR

When marsh accretion rates are unable to keep up with predicted local SLR, Irregularly Flooded marsh is predicted to first convert to regularly flooded marsh (saltmarsh). If this regularly flooded marsh falls to too low of an elevation to maintain itself, it is then predicted to convert to tidal flats and eventually to open water. Dry land, when it falls to an elevation range that suggests regular inundation, is predicted to convert to “transitional marsh.” Although significant irregularly flooded marsh conversion is predicted in eustatic scenarios of under 1 meter, total refuge marsh acreage (including salt marsh, and transitional marsh), is predicted to increase due primarily to the conversion of dry lands. However, under the highest SLR scenario utilized, 50% of total marsh acreage is predicted to be lost.

As shown above, there are some shifts visible between the latest National Wetland Inventory data and current satellite photos. This likely means that some of the change predicted under lower scenarios is a result of change that has already occurred, or horizontal data uncertainty.

This site was entirely covered with high-vertical-resolution LiDAR data which reduces model uncertainty considerably. However, how refuge marshes will respond to SLR and their potential to vertically accrete at a higher rate is uncertain. These model results assume that historically measured accretion rates will continue for the next 100 years. Additionally, no site-specific accretion data were available, further exacerbating the uncertainty caused by the accretion assumptions within the model.

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