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Seneca Army Depot Activity Wetlands, Fish and Wildlife Plan: A habitat based inventory and management plan including guidelines for fisheries, North American Waterfowl Plan goals and nongame birds.

December 1995

By Morgan L. McCosh
U.S. Department of the Interior
Fish and Wildlife Service

Prepared for Department of Defense, Seneca Army Depot Activity (SEDA), including a review by New York State, Department of Environmental Conservation (NYSDEC)

Administrative Report No. 96-01

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In partial fulfillment of the tripartite cooperative agreement by and between the Department of Defense functioning through the Installation Commanding Officer, Seneca Army Depot Activity, under the authority of Public Law. 86-797, the Sikes Act (16 USC 670a through o); the U.S. Department of Interior, functioning through the Regional Director of the Fish and Wildlife Service under the authority of Public Law 85-624 Fish and Wildlife Coordination Act (16 USC 661 through 667e, 1531 through 1543); the State of New York, functioning through the Director, New York State Department of Environmental Conservation, is entered into for the purpose of protecting, developing and managing the wetlands, fish and wildlife resources at Seneca Army Depot, Seneca County, New York. This agreement is within the purview of Public Law. 85-624. Public Law. 91-190, National Environmental Policy Act (42 USC 4321, 4331 through 4335, and 4341 through 4327), Public L. 93-205, The Endangered Species Act as amended (16 USC 1531-1544) and, Public Law. 96-366 and The Non-Game Act (16 USC 2901-2911) .

This cooperative plan for wetlands, fish and wildlife management pursuant to the Conservation Programs on Military Reservations (Sikes Act) is approved by the following agencies.

BY: Stephen J. Roth DATE: 30 May 96
Installation Commanding Officer:
Seneca Army Depot Activity, Department of the Army

BY: Cathy Hurst DATE: 4/8/96
ACTING
Regional Director, Region 5
U.S. Fish and Wildlife Service

BY: Gary Parsons DATE: 5/3/96
Bureau Chief of Wildlife
New York State Department of Environmental Conservation

ACKNOWLEDGEMENTS

We thank the staff from the following federal agencies for their technical support in field exercises and editorial comments, without their help this plan would not be complete; USFWS - Lower Great Lakes Fishery Resources Office, USFWS - Ecological Services (NY), USFWS - Virginia Fishery Resources Office and New York State Department of Environmental Conservation for comments and editing assistance. Special thanks are extended to Kim Claypoole, USFWS - Ecological Services (New York) for her assistance in identifying wetland types, performing bird censuses and to Steve Carlisle, US Soil Conservation Service (Ithaca) for his instruction and field assistance in identifying hydric soils.

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I. PURPOSE

The Inter-Service Support Agreement (ISSA) between the U.S. Department of Interior, Fish and Wildlife Service (Service), and the U.S. Department of Defense, Seneca Army Depot Activity (SEDA), was developed under the authority of the Fish and Wildlife Coordination Act (487 stat. 401 as amended, 16 USC 661 et. seq.), Conservation Programs on Military Reservations commonly referred to as the Sikes Act (16 USC 670 et. seq.) and other laws. The ISSA was initiated to provide assistance and technical support in the development and maintenance of natural resources at SEDA.

SEDA wishes to manage fish and wildlife resources for the benefit of natural resources, post personnel and recreational opportunities. The focus of the management objectives is on fisheries and waterfowl management. A migratory bird plan is desired because SEDA is located in the vicinity of an International Joint Venture migratory area. Specific recommendations for monitoring and managing for wood duck and eastern blue birds are developed. Habitat improvements specific to the duck pond areas are provided to improve and increase over-winter survival and recreational fishing opportunities.

This wetlands/aquatic resources plan should be considered as a part of the required comprehensive natural resources management plan to fulfill Sikes Act requirements. A tripartite agreement was signed between the Department of Defense, the Department of Interior and the New York State Department of Environmental Conservation in 1988, to develop a comprehensive fish and wildlife management plan.

II. GOALS

This report describes wetland and water habitat, fish and waterfowl and non-game migratory birds present at SEDA and management options to enhance the aquatic community to achieve common goals of the three partners, DOD, DOI, and the Department of Environmental Conservation (NYSDEC). Aquatic communities include wetlands, ponds, streams, fish, waterfowl, non-game migratory birds, amphibians, aquatic vegetation, and macro-invertebrates.

Broad goals are: 1) to maintain and improve the quality of habitats for a well-balanced community, and 2) to provide quality recreational opportunities. To accomplish these goals, evaluation of wetlands, fisheries, and North American Waterfowl Management Plan (NAWMP) recommendations will be incorporated to accomplish a habitat (wetland-complex) management approach.

Individual objectives to achieve the above goals follow:

A. The wetlands identification and classification portion of the plan allows for the development of a wetlands location map. The map will be instrumental in future land use planning and coordination of troop activity. The wetlands evaluation provides data on habitat quality and quantity for land use planning and natral resource management.

B. The fisheries evaluation includes an assessment of aquatic habitat and populations with recommended management opportunities. This assessment also documents the relative value of the existing fisheries, and identifies methods to enhance the duck ponds in order to prevent over-winter fish kills (due to anoxic conditions), and presents collected data necessary for an effective aquatic management plan. An assessment of the fishery resources on SEDA land was conducted by Service personnel during the Summer of 1994.

C. The waterfowl evaluation addresses species found on SEDA land with attention to species addressed in the North American Waterfowl Plan (NAWMP). The NAWMP's priority is to increase waterfowl populations. Primary recommendations included the conservation and enhancement/rehabilitation of wetlands as habitat for breeding and migrating waterfowl. Improving wetlands for waterfowl will benefit other species. In 1988, DOD and DOI signed an agreement to develop and implement waterfowl management plans on military lands in or near Joint Venture areas. SEDA is within the Lower Great Lakes/ St. Lawrence Basin Joint Venture Area. A preliminary assessment of waterfowl on SEDA land was conducted by Service personnel during the Spring and Summer of 1994.

D. Uplands management portion is not included in this report. Upland game management responsibilities are shared between NYSDEC and SEDA. These management activities may include whitetail deer, woodcock, and wild turkey species management.

III. LIMITATIONS

A. As of September 1995, the operating status of SEDA has been changed. SEDA is slated for closure by 2001. A minimal staff will remain for operations until lands are transferred under Base Realignment and Closure protocols. It is improbable that SEDA, due to its changed status, will receive enough funding and personnel to fully implement all proposed management activities. Those projects which are feasible according to time, funding and personnel, will be implemented by DoD; the remaining recommendations shall serve as guidelines for subsequent parties.

B. The area outside of outer Patrol Road was not included because wetlands were not identified on either NWI or SEDA maps and time and resources were limited. This area is the runway area and the approach to Seneca Lake.

C. It is necessary to identify and achieve objectives by low intensity management due to limited personnel, budget and time.

D. The wetlands, fisheries and wildlife field study was a rapid inventory of natural resources on SEDA lands. Emphasis focused on wetlands and their associated species including fish, birds and a few amphibians and reptiles. Water chemistry variables of dissolved oxygen (mg/l), pH, and temperature (° C) were recorded. No contaminant analysis was performed. In general, upland species and systems were not inventoried. Plants were not inventoried. A comprehensive threatened and endangered inventory was beyond this scope of the study.

Knowing these limitations, the field study is considered adequate for desired goals of determining wetlands status, fish and wildlife diversity in wetlands and aquatic habitat and recreational opportunities. This plan attempts to incorporate a holistic approach by integrating human, wildlife (game and non-game) and habitat into its recommendations.

Should SEDA request that the Service implement any or all of the recommendations set forth in this report, a separate Inter-Agency Service Agreement or addendum will be drawn up on a per project basis.

IV. STUDY SITE

A. Geography

SEDA is located in Seneca County, New York, adjacent to Seneca Lake on the east. Major U.S. cities within 120 km are Syracuse, and Rochester, New York (Figure 1).

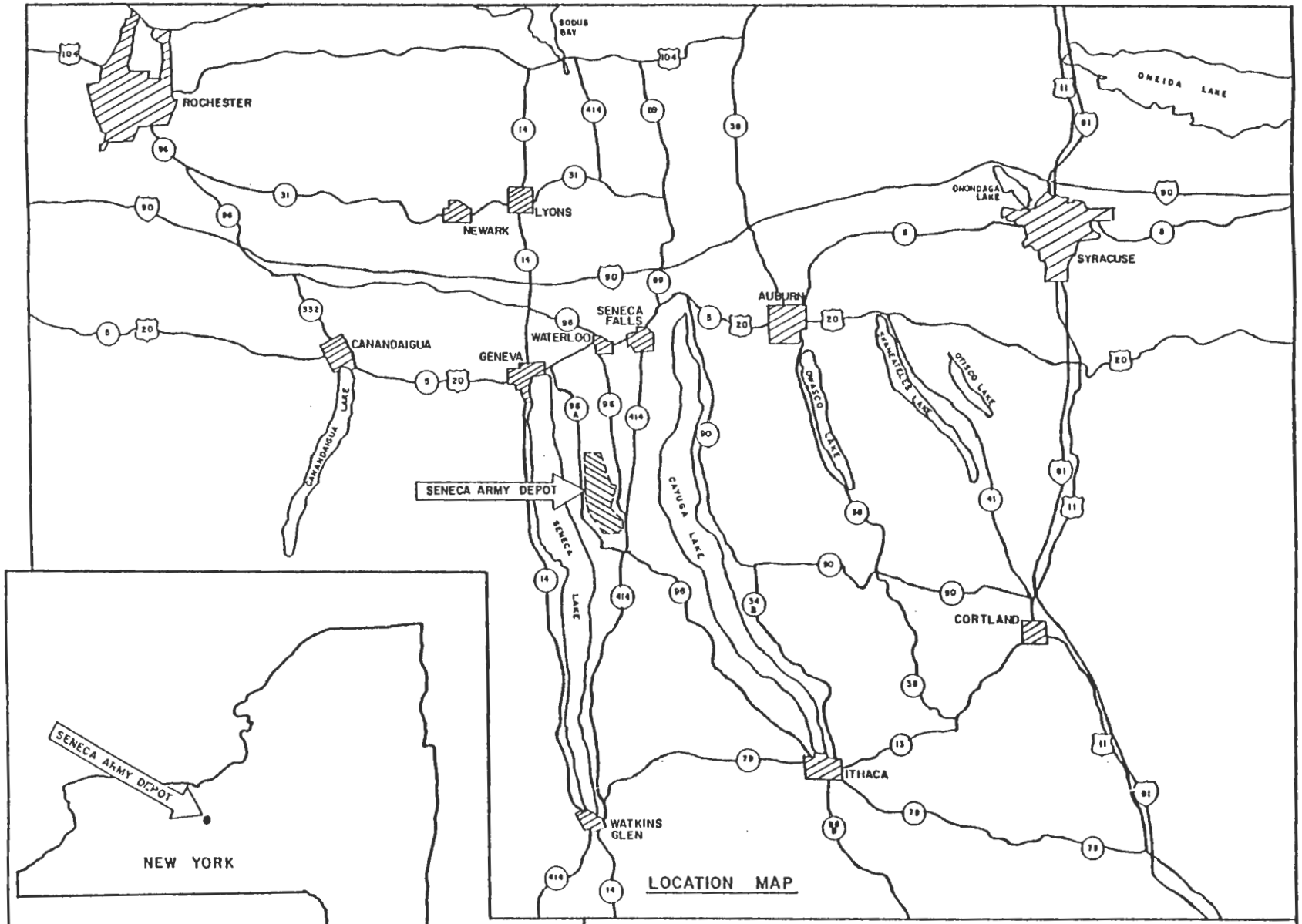
SEDA is on a plateau between Cayuga and Seneca Lakes. It is located with the glacial till plain of the Central Lowlands Physiographic Province and the Appalachian Plateau to the south. The land slopes southeast to northwest at 4.7 m/km (25 feet/mile).

Four watersheds on SEDA drain to Seneca Lake: Indian Creek, Kendaia Creek, Reeder Creek and Silver Creek. All streams which originate on the post are classified as intermittent. Drainage ditches collect and discharge stormwater from around storage igloos and buildings.

B. Land Use

The Cayuga and Seneca Indians inhabited this area prior to European settlement. There are no historic Indian villages or prehistoric archeological sites identified within the study area. SEDA consists of 10,600 acres of farmland acquired in 1941 from 105 farming families. In addition, the airstrip and lake housing area were acquired from the US Air Force and US Navy; these lands have also been historically farmed. More information may be found in the SEDA's Land and Management Plan. By 1943, the depot began its primary mission of the receipt, storage, maintenance, and supply of ammunition. In 1974, rehabilitation of industrial equipment was added to the mission. The US Coast Guard "Loran C" transmitting station was constructed in 1977. Since 1983, most of the construction has been modification and improvement on existing structures.

Transportation on the post consists of paved and un-paved roads, railroads, and airport facilities. Due to the quantity-safety distance criteria imposed by the depot's ammunition related activities, the transportation system reinforces the existing land use patterns. No major upgrading of the installation's transportation network is proposed at this time.



SENECA ARMY DEPOT

ROMULUS, NEW YORK

Figure 1. Location map of Seneca Army Depot Activity.

The present land use patterns within the study area are stable and have not been significantly changed for about twenty years. The main infrastructure consists of storage igloos, which are accessed by rail and road, two main building areas for administration and housing, a secondary sewage treatment plant, and the US Coast Guard Loran C station. Activities off the paved infrastructure are minimal. Troop training, mowing ditches and areas around the igloos and maintenance of fire lanes are the principal off-road activities. Troop training activities include obstacle courses, bivouacs, land navigation and live artillery fire at grenade and small arms ranges.

V. METHODS

HABITAT

A. Aquatic Habitat

Aquatic habitat and populations were assessed for sport fishery management and avian forage base. Habitat was measured qualitatively and quantitatively. Amount and type of cover and substrate for fish spawning and nursery areas were visually determined. Wetlands evaluations determined habitat quality and quantity for amphibians. Sites assessed were the duck ponds, Reeder, Silver, Indian and Kendaia Creeks. Summer diurnal patterns of pH, dissolved oxygen, and temperature were monitored in the duck ponds to determine if any oxygen depletion problems were present.

Kendaia, Silver and Indian Creeks were evaluated for quality and quantity of fish habitat. Water quality variables recorded at each site were water temperature, pH and oxygen. The number of sites per stream varied between 1-3. Stream sites were 40 - 50 m in length. Each site consisted of ten transects perpendicular to the stream. Transects were a stream's width to 10 m apart. Each transect consisted of 3-10 data collection points. Habitat variables of cover, substrate and depth were also recorded at these points.

B. Wetlands Habitat

The major focus on this habitat type was identification and classification of wetlands. Wetland identification and classification determined habitat quality and quantity for waterfowl, non-game migratory birds and associated mammals. Service personnel compared an early 1980's National Wetlands Inventory (NWI) map with present ground conditions during the growing season (early April - September). Wetlands were identified by standing hydrology, soil condition and wetland associated flora and fauna using Cowardin *et al.* (1979). A site was evaluated if wetlands were indicated on NWI or existing SEDA maps. The ground area was observed for 1) saturated soil for more than 15 days of the growing season, and 2) the site had obligate or facultative wetland plant and animal species present. Select sites were cored for soil identification and further validation. Actual soil mineral and organic interfaces will be delineated prior to future land use management plan chnges.

When an area marked on the NWI and/or the SEDA maps was located and identified as being a wetland, according to the above criteria, they were marked with plastic flagging for location and type of wetland. Information obtained from these field observations was used to produce a digitized map using a Geographic Information System (ARC INFO and ARC VIEW2 software) (figure 2). Although the maps were made with the best available information, they are not of 'dlg' standards.

Abbreviated descriptions of major wetland types applicable to SEDA follow:

1. Palustrine-shallow, low/no salinity wetlands (< 20 acres) usually bounded by upland and at least seasonally flooded.
   - Forested (fo) - dominated by trees
   - Scrub shrub (ss) - dominated by trees and shrubs < 20 feet in height
   - Emergent (em) - dominated by emergent macrophytes
2. Lacusterine - low/no salinity wetlands in a topographical depression with < 30 % areal cover and > 20 acres or > 2 m in depth usually bounded by upland and usually permanently flooded.
3. Riverine - all wetlands contained within a channel unless area is dominated by palustrine characteristics or salinity is >0.5%. These wetlands are bounded by upland or channels (natural or artificial). These are not represented on the NWI map because the line resolution is greater than 10 m.
   - (1) lower perennial - low grade and low velocities
   - (2) upper perennial - higher grade and faster velocities
   - (3) intermittent - part of the year flow may not exist and surface water may be in pools or absent

C. Uplands Habitat

Upland habitat was observed as it related to boundaries of aquatic or wetlands habitat, but was not evaluated for this report.

FISHERIES AND WILDLIFE

D. Ponds/Open Water Fishery Populations

Gillnet, minnow trap and creel were used to determine species composition, relative abundance, and reproduction. Sight or audio identification were used to record any reptiles, amphibians or macro-invertebrates observed. From these surveys relative abundance was determined.

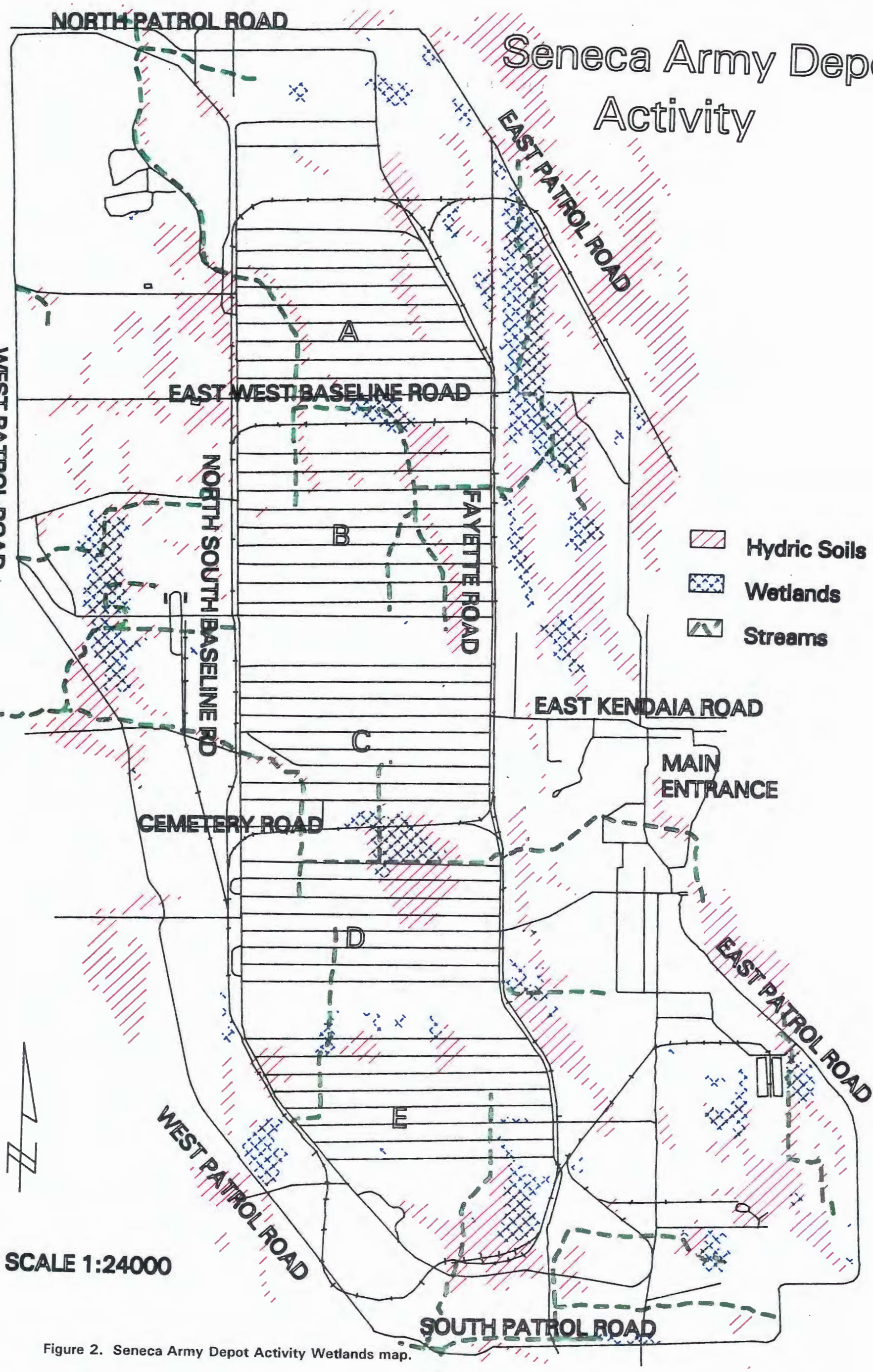


Figure 2. Seneca Army Depot Activity Wetlands map.

This information has been developed for the purpose of identifying wetlands as part of a wildlife management plan. Exact coordinate locations have not been verified through the use of GPS or other ground truthing methods.

E. Stream Fishery Populations

Alternate current (AC) backpack electro-fishers were used to determine species composition and relative abundance. Sight or audio identification were used to record any reptiles, amphibians or macro-invertebrates observed.

F. Waterfowl and Non-game Migratory Bird Populations

Dawn and dusk bird counts were performed. Sight and audio identification were used to determine species and relative abundance. Also, a continuous species list was kept during all field work. Wood duck boxes were located and assessed for use and condition.

G. Other Fish and Wildlife Populations

Mammals were identified on the continuous species list, when sighted. Significant wildlife sightings were also recorded, such as active red-tail hawk and killdeer nests. Bluebird boxes were located and checked for inhabitants and condition.

VI. RESOURCE FINDINGS

As mentioned earlier, the field work to assess SEDA's aquatic natural resources was limited because complete chemical analysis for contaminants and primary production was not performed. Aquatic resources including wetlands, associated species identification, and water quality parameters (DO, pH, ° C) were the main focus.

HABITAT

A. Wetlands Habitat

A total of eighty-seven wetlands are identified on SEDA land. These wetlands cover approximately 496 acres. This is an increase from the 1985 NWI estimates of 420 acres (Figure 3). This may be due to the cessation of previous farming practices on the poorly drained soil types. Many of these wetlands form combinations of different habitat types. Wetland systems represented are palustrine and lacustrine. Classes include open water, scrub/shrub, emergent, forested and some wet grasslands. For both frequency and area, the main wetland types are palustrine forested (47%) and emergent (Figure 4 & 5).

Palustrine (non-tidal emergent and forested) can be used as nutrient stores. Primary production is usually limited by nitrogen levels. The post's sewage treatment plant's success relies on the capacity of the wetlands to absorb nutrients as its' wastewater is filtered through the marsh. Beavers at the duck ponds have increased the wetland acreage and diversity of existing wetlands. Another large source of wetlands is the saturated area marked on the post maps in quadrant DF.

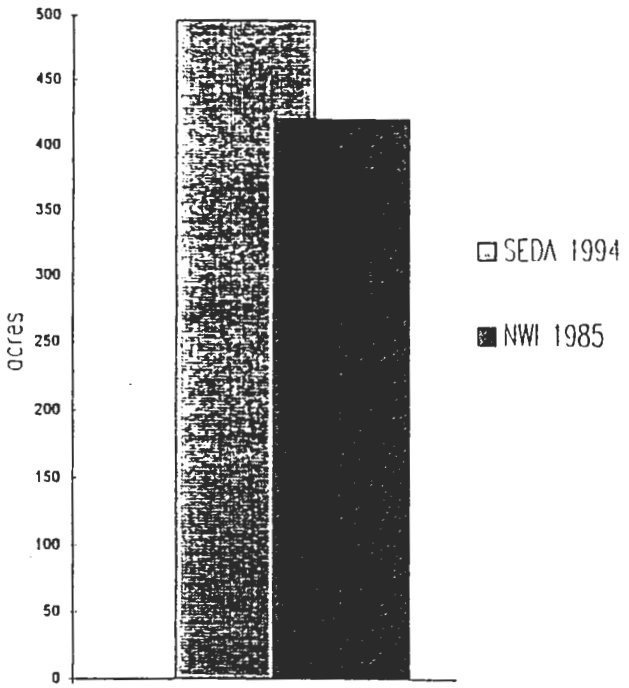


Figure 3. Total area of wetlands located on SEDA during the 1994 growing season compared with the 1985 National Wetlands Inventory maps (NWI).

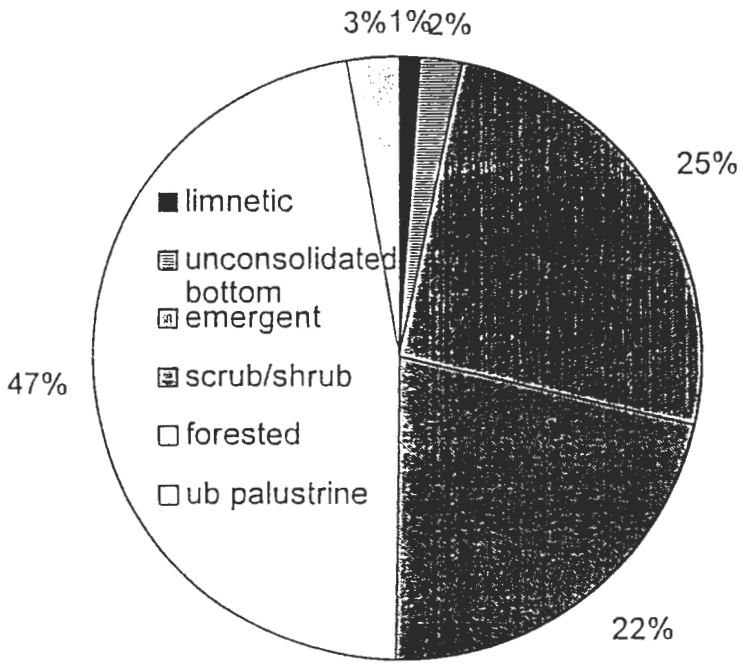


Figure 4. Area percentage of wetland types on SEDA. Pies are proportional. Class types are forested, scrub/shrub, unconsolidated, emergent, and limnetic.

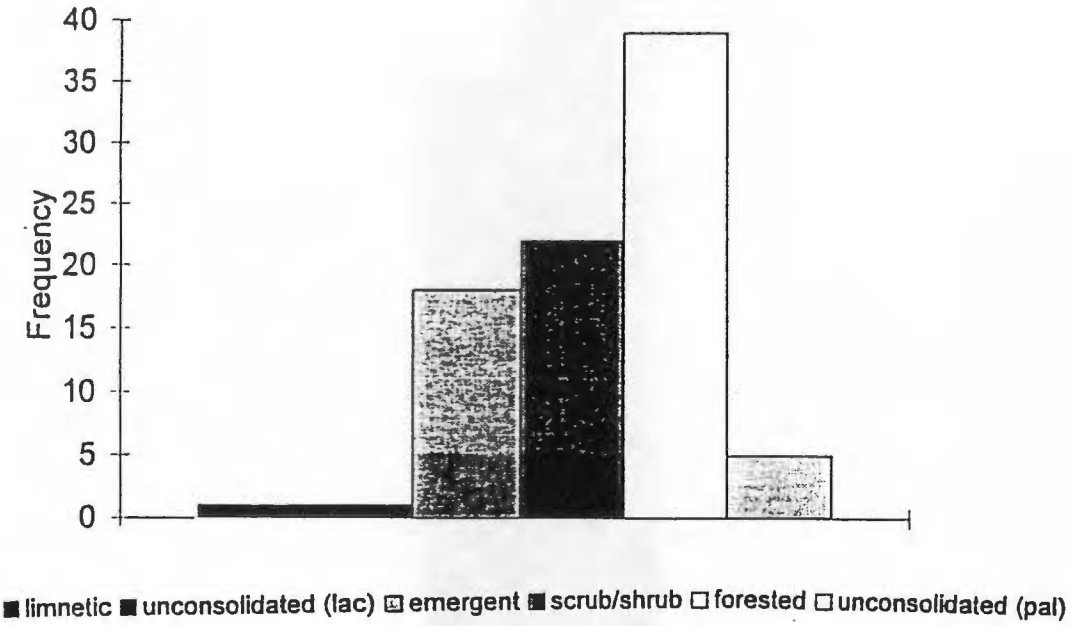


Figure 5. Percent frequency of wetland types on SEDA. Unconsolidated, scrub/shrub, emergent and forested wetland classes are represented.

1. Existing wetlands

Forty-nine wetlands equaling a total of 297 acres did not deviate from original NWI or SEDA maps. Wetlands of special note which were found to be consistent with NWI or SEDA maps were:

North of Ovid Road railroad yard. A palustrine forested area is perched within and south of the epsilon igloos. Soils are Romulus silty (hydric). This is an extensive varied wetland with interspersed upland habitat.

West of the North/South Baseline Road and the north side of east/west Gate Two road. This is exceptional open-water habitat, where two species of amphibians, american toad and spotted newt, were observed using it for breeding. The State of New York (NYS) is concerned with declining populations of amphibians due to the loss of habitat. Because of the scarcity of this habitat type, it should not be disturbed. Primary loss of these breeding areas occur when the ponds are connected to flowing water, or when fish are stocked.

Railroad between Charlie(C) and Delta(D) igloos. The forested palustrine wetland is Romulus silty clay loam and extends south to D-4(a hydric soil). If beaver dams continue to raise water levels, the wetland will increase. Presently, beaver tubes in place prevent flooding of roads.

The water treatment marsh. This is the largest mono-specific emergent wetland on SEDA. Cattails with increasing phragmites are the emergent species. No waterfowl broods were observed, possibly due to the stem density and lack of open-water. Because of the possible harmful effects from the effluent, this area should be monitored for sedimentation and soil and water quality. The northern end appears to be filling, the cause may be from decomposing vegetation sediment loading from the sewage treatment plant.

2. Reclassified wetlands

Thirty-nine wetlands equaling a total of 199 acres were classified differently than original NWI or SEDA maps indicated. Most of the differences in wetland type appear to be due to the low intensity Army use of many of these areas. This has allowed some to begin reverting to the hydrology present prior to farming and other ditching activities. A few appear to have been miss-classified when the original maps were created. Wetlands of special note, which were found to be different from NWI and SEDA maps, were:

The duck ponds - This is a man-made wetlands complex with a water control structure. Eleven acres of open water are present out of twenty-three acres total. This area is one of the most important on the post, due to its recreational use and habitat diversity. Many freshwater wetland habitat types are present. Among them are emergent, forested and shrub-scrub palustrine. The complex supports waterfowl, song and wading birds and mammals. In 1995, a pair of osprey built a platform at the complex and two young were hatched. Osprey are a NYS threatened species.

The northern end is filling in. Whether this is due to sedimentation or other causes is unknown and should be investigated. Management practices should protect and enhance these duck ponds.

The area along East Patrol Road and south of the duck ponds - This area is larger than indicated on the 1985 NWI map. Beaver activity is increasing this wetland to the south along the telephone line. While this area is becoming more inundated with water, the area north and south of Igloo Road #10 has less water. This could be in conjunction with the treatment plant activities.

East of buildings 608-612 and southwest of the USCG station - This palustrine wetland is the largest contiguous piece of the shrub/scrub type of habitat on post. The predominant soil type is Ilion (hydric) and Darien (inclusions). The surrounding open meadow habitat type plays an important role for northern harrier. This raptor is a NYS species of concern.

Numerous fire lanes disrupt the shrub/scrub vegetation in this area. The necessity of so many firelanes through the wetland should be reviewed. If these 'edges' were mowed

less frequently, they could provide wet herbaceous habitats for species such as woodcock, white-tail deer and song-bird. Timing of the mowing is crucial to not disturb any breeding birds. Further development and disturbance may warrant a specific soil delineation.

Indian Creek - The wetlands have been altered by beaver dams. This area is unique because it is the only one with Sloan silt loam soils (hydric) on post. The area is degraded by the overabundance of *phragmites* spp., a non-native which displaces many native wetland vegetation including *scirpus spp.* (bulrush) and *typhus* (cattails). The area has increased 50% in one summer season due to raised water levels from beaver dams. Increased water levels may limit the *phragmites,* however, it may be necessary to install a beaver tube to prevent road flooding and wash outs. This creek is the only one sizable enough to support warm-water sport fishes if the channel was open. SEDA goals will determine management option implemented.

North of epsilon igloos - This area is a complex of questionable forested wetlands. Principle anthropogenic changes of these wetlands are due to the ditching systems. Predominant soils are inclusion classes with some non-hydric and some hydric present. These wetlands are inaccessible, for the most part, due to brush and their juxtaposition between the delta igloos. Soil type is marginally hydric, and the water table is low except for areas which border a north south ditch and an intermittent stream bed. As it is, this area provides some upland habitat with a open under-story.

Swamp area north and south of West Romulus Road, and quadrant DF - An extensive palustrine forest south of Romulus Road and saturated soils north of Romulus Road are interspersed with upland. NWI maps did not identify this site. Post maps indicated the wetland location to be north of Romulus Road. Both Romulus (hydric) and Darien (inclusions) soils are abundant.

Beaver dam at Charlie(C)/Delta(D) railroad - Due to beaver activity, this forested palustrine has increased. The wetland is east and west of the straightened creek. Romulus silty clay loam (hydric) is east of the creek. The border is unclear. An intensive soil validation would help in deciding how much has been converted to wetlands. The beaver tubes are working to keep road flooding to a minimum.

North end of the post, and east of the housing quarters - This palustrine forested area has a few older facultative trees (maple and ash). Soils are Darien which can have inclusions if not well drained. Soil identification in combination with the above marginal conditions identified an existant wetland. It is smaller than indicated on the NWI map as a small elongated piece crosses the road.

Surrounding areas of Buildings 356 and 357 - Forested palustrine wetland follows the Ilion silty/clay loam soil(hydric) outlines and the palustrine shrub/scrub is in transition towards forest. Due to marginal drainage this wetland is increasing in area.

3. Unidentified wetlands

Some wetlands were not located as original NWI or SEDA maps indicated. Most of the 'unlocated' wetlands were smaller in size ($\leq$ 1 acre). Also, in place drainage systems do not retain the hydraulic qualities needed to support hydrophytes. Wetlands of special note which were found to be different from NWI and SEDA maps were:

Silver Creek, North of South Patrol Road - A shrub/scrub is mapped on the NWI map which would have indicated a unique suspended wetland at the southern end of the post. Hydric soil was not identified. Plants were mostly facultative in nature, not obligate. Soil maps show non-hydric conditions (Darien-Danby-Cazanova). The areas are circular in shape and mono-specific in grass species present, which would lend to misidentification from aerial vegetative maps.

North of Brady Road and South Patrol intersection - Forested palustrine, also indicated on NWI maps at the southern end of the post, has remnant red maples. It may still function as a water absorption area, though the road ditches divert any standing water outside of the immediate drainage area (straightened streambed). Soil maps show small amounts of Ilion soils present. The remaining soils are Darien which have inclusions and Darien-Danby-Cazanova.

B. Aquatic Habitat

The four streams selected for stream habitat assessments were Indian, Kendaia, Reeder and Silver Creeks. All of these streams are headwater streams and flows vary from perennial to intermittent. The average width for all streams was 4.5 m. The average depth for all streams was 13 cm; depths greater than 2 m occasionally occurred in culvert and beaver pools. Substrate habitat ranged from organic and silt/clay bottoms to bedrock. Gravel and silt/clay were the most predominant substrate type. Most of the substrate classified as bedrock was artificial, because it was cement under bridges.

A winter-kill was evident from spring shoreline observations of dead channel catfish, carp and largemouth bass fish carcasses at the duck ponds. This kill followed an extremely cold winter. Mortality could have been caused by freezing, or lack of oxygen. Temperature and dissolved oxygen were recorded throughout the day for three different days during the summer, in order to examine any temporal changes which could create undesirable conditions.

1. Water quality

Only water temperature was recorded for the streams, mechanical problems prevented stream pH and dissolved oxygen from being recorded. Summer temperatures for all streams had a mean of around 21° C. Table 1 shows the ranges in water temperature, dissolved oxygen and depth during the summer for the duck pond.

Table 1. Summary of the duck ponds summer water quality. Variables recorded were water temperature (wat°c), dissolved oxygen (mg_l) and depth(cm).

Variable n	Mean	Std dev	Minimum	Maximum
WAT°C 9	24.5	1.32	22.5	26.5
MG_L 9	6.3	0.66	4.7	7.0
DEPTH 9	43	4	40	50

During July, water variables were as expected; dissolved oxygen was inversely related to depth and water temperature. In August, dissolved oxygen increased as daytime temperature rose up to levels of 7 mg/l, then declined to around 4 mg/l during the early morning hours when temperatures were lowest. These conditions may indicate that because of the eutrophic conditions of these ponds, algae and macrophytes may be driving the oxygen levels, not temperature. Oxygen would be released during the days from photosynthesis and used through respiration of plants during the night. In the winter, with an ice cover light for photosynthesis and wind to mix air, these conditions are intensified. Unless action is taken, these problems will continue to progress as the pond is gradually filled in with more organic material. The long-term solution is to stop the input of excess nutrients. An immediate, albeit temporary cure, would be to remove organic materials which use oxygen when decomposing. The removal of organic material would also increase the depth which could provide temperature refuges for fish in the summer and spatial refuges during the winter.

2. Stream habitat

Indian Creek was the widest and deepest, as a result of beaver activity causing flooding of the flood plain. Silver Creek is the narrowest with a minimal floodplain and cliffs bordering it. Reeder had the shallowest depths and flow due to at least two active beaver dams which minimized flow through its straightened ditch channel.

Indian Creek substrates are predominantly sand (50%) and clay/silt (15%) which settled out from the low flows of the beaver pools. Rubble and cobble make up most of the remaining substrate (15%). Kendaia Creek substrates are predominantly gravel (60%) and rubble (27%), with sand and bedrock making up the remainder (10%). Reeder Creek substrates are rubble (60%) and cobble (23%) with the remainder comprising of silt/clay (19%) and gravel (19%). Silver Creek substrates are natural bedrock (37%), gravel (30%) and boulders (30%) derived from the parent material.

Other instream habitat consisted of vegetation, hard cover and overhead shade. All streams but Reeder Creek had some amount of overhead shade. Reeder Creek runs

through the igloo area where mowing keeps the area open and free of taller shrubs and trees. Indian and Reeder Creeks had the most vegetative cover of emergent and submergent varieties. Flooding of shores by beaver dams support this type of cover. Slower water flows allow an increase in organic sediments. Hard cover provided by large boulders, fallen logs, root wads and undercut banks was present in Indian and Silver Creeks, and minimally in Kendaia. Table 2 gives percentages of these substrate and cover types (Figures 6 and 7).

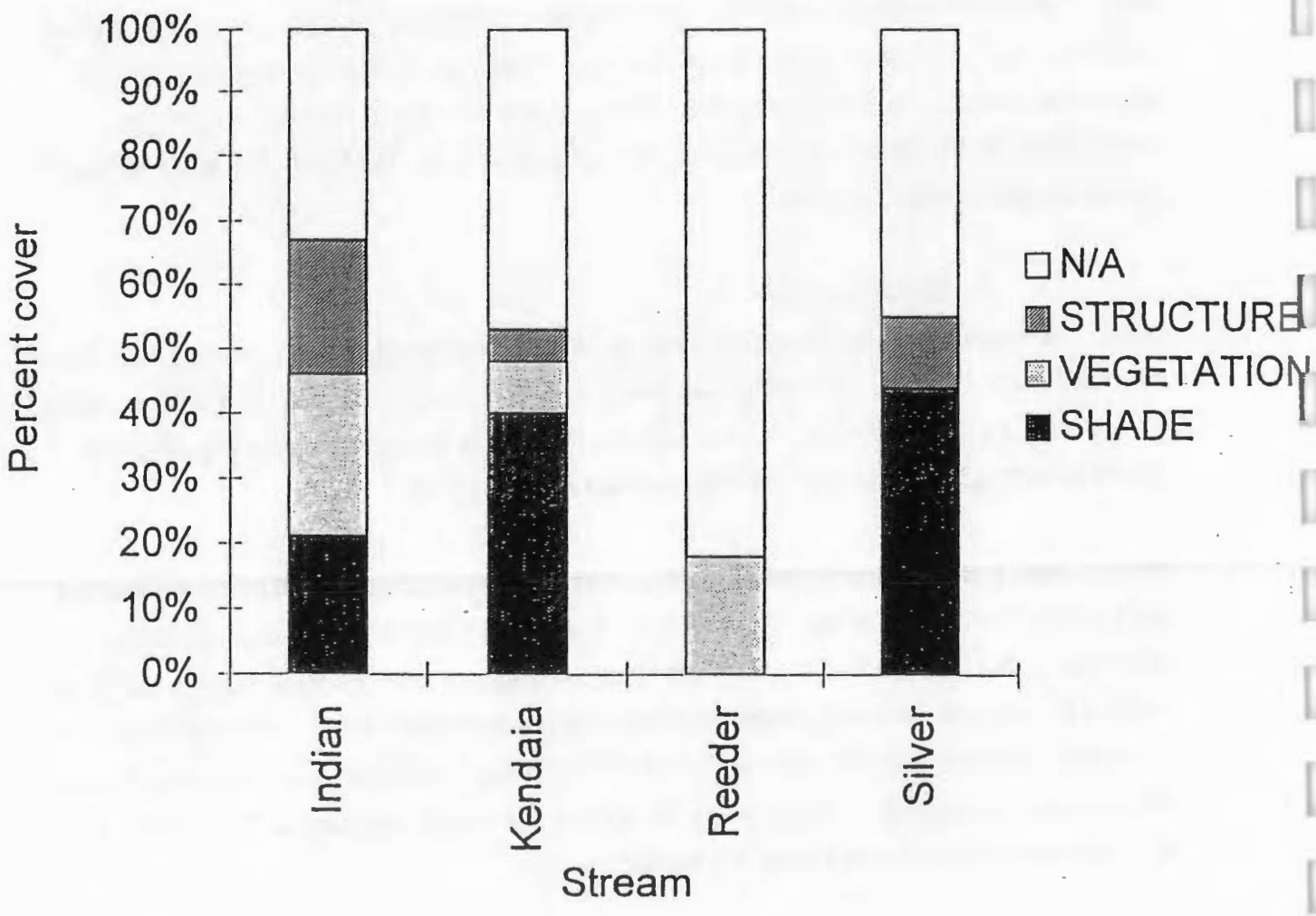


Figure 6. Comparison of percent cover of four SEDA streams. Shade, vegetation and hard cover for refugia are represented.

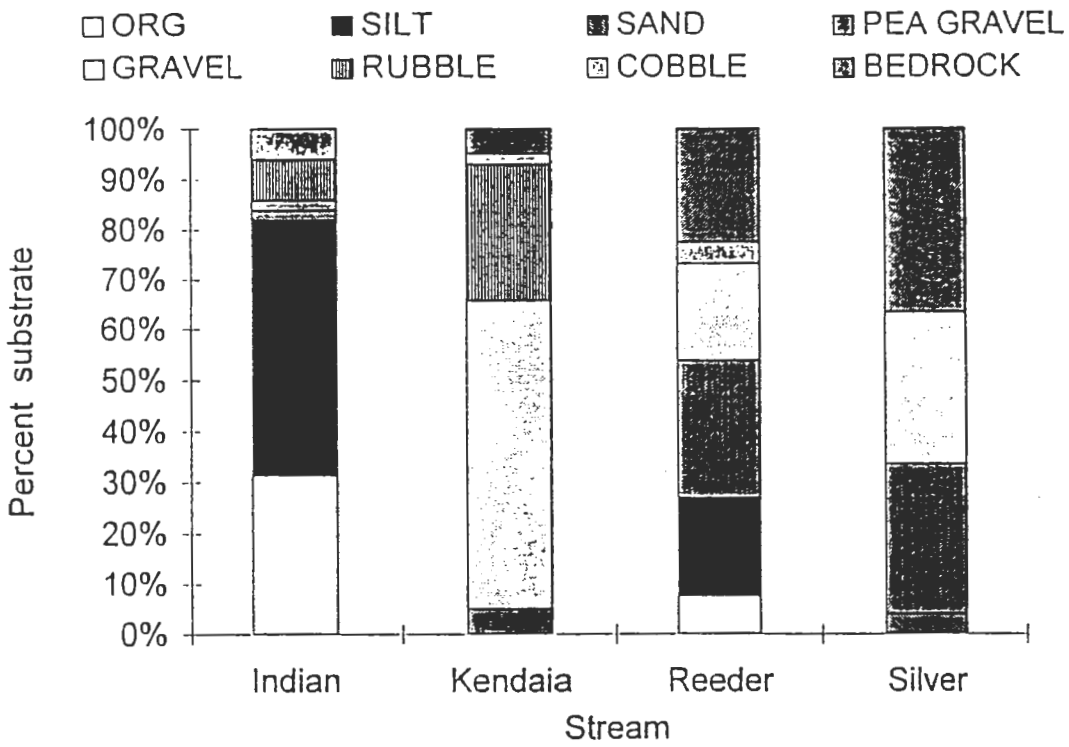


Figure 7. Comparison of percent substrate of four SEDA streams. Organic (org), silt/clay (sil), peagravel (peagrav), gravel (grav), rubble, cobble, bedrock and sand are represented.

Table 2. Summary of habitat and cover percentages by stream. Substrate types were Organic (ORG), silt/clay (SILT), sand (SAN), pea gravel (PEA), gravel (GRV), rubble (RUB), cobble (COB), and bedrock (BRK). Cover types recorded were overhead shade (SHD), submergent and emergent vegetation (VEG), and hard (HRD) cover in the form of large boulders, undercut banks, etc. n = number of sites measured.

NAME	n	% STREAM SUBSTRATE TYPE								% COVER		
		ORG	SILT	SAN	PEA	GRV	RUB	COB	BRK	SHD	VEG	HRD
Indian	48	0.31	0.50	0.02	0.02	0.00	0.08	0.06	0.00	0.21	0.25	0.21
Kendaia	60	0.00	0.00	0.00	0.05	0.60	0.27	0.02	0.05	0.40	0.08	0.05
Reeder	28	0.07	0.18	0.00	0.25	0.18	0.00	0.04	0.21	0.00	0.18	0.00
Silver	27	0.00	0.00	0.04	0.30	0.30	0.00	0.00	0.37	0.44	0.00	0.11

These streams have minimal potential to be managed for increased fishing opportunities due to limited spawning habitat (Figure 8) and free flowing water. Though Indian Creek has the most water and cover, its substrate of organic and silt is not supportive of the spawning needs of many game species. Kendaia Creek has all three types of cover and suitable substrates, but beaver dams have decreased flows. Both Reeder and Silver Creeks are prohibitive of self-sustaining sport fish populations because of poor cover and low flow or flash floods respectively. The primary value and function to these streams is to provide abundant riparian areas for forage fishes for avian and mammal predators, amphibians and other wildlife. Without supplemental fish and flow management a recreational fishery can not exist.

Fishery habitat in the duck ponds exists for largemouth bass, pumpkinseed, bluegill, common carp and others, and reproduction. The shoreline and bottom is silt/clay or sand, macrophytes are abundant and a submerged road provides a gravel substrate. Management activities for the duck ponds to create better cover, water temperature and dissolved oxygen levels would improve over-winter survival of desirable sport fish species.

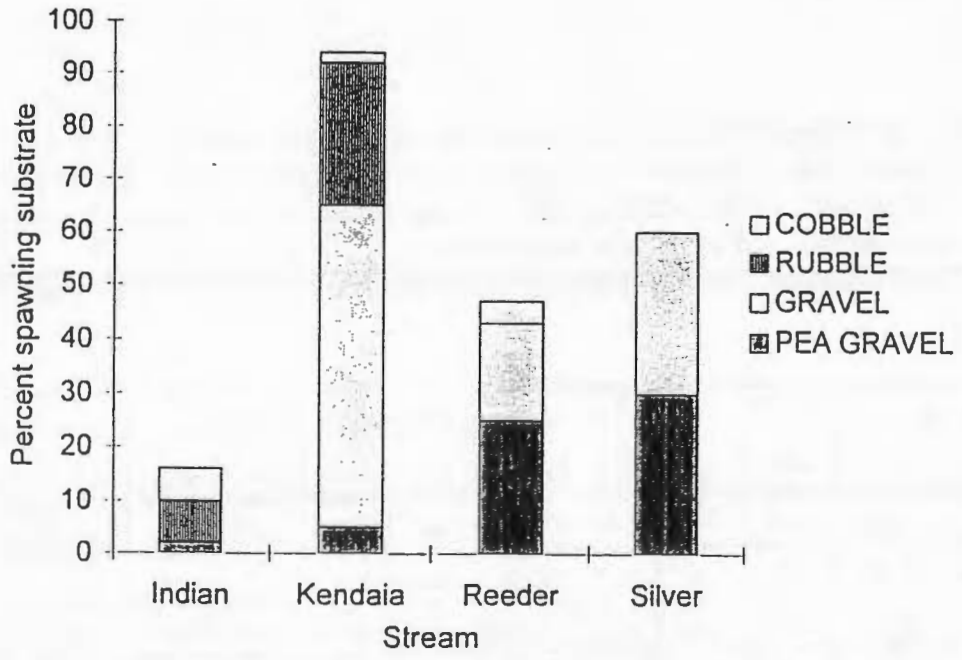


Figure 8. Relative spawning substrate for instream game fishes. Brook trout and smallmouth bass both require peagravel to cobble for redd and nest construction.

FISH AND WILDLIFE SPECIES

C. Wetland Associated Species

During surveys and field work conducted on SEDA land, 33 wetland associated species were observed; 6 amphibian species, 12 fish species, 1 reptile, 3 mammals and 11 bird species (Table 3). Of special interest are the amphibians which NYS has indentified as being of concern due to habitat loss. Osprey and northern harrier are listed as threatened for New York State. And the least bittern is a species of concern for the state.

Wood duck boxes were checked for wood duck occupancy, condition of box and location. Raccoon and opossum were inhabiting three of the boxes. Though historic records showed the boxes were used at high occupancy rates, they are all in a state of disrepair and no ducks were observed to be using the boxes. The boxes need to be relocated at further distances away from each other and have predator guards installed to reduce raccoon predation.

D. Duck Pond Gamefish Species

Fish species identified in the duck ponds included bluegill, common carp, golden shiner, largemouth bass and pumpkinseed. Common carp and largemouth bass were the most abundant and largest in size and weight. Common carp were in better condition than the largemouth bass. Common carp average weight to length ratios were almost three times that of largemouth bass. Largemouth bass were noticeably absent at larger sizes. This may be due to their higher oxygen requirements (Figure 9).

The quality and abundance of common carp versus largemouth bass may be explained by the habitat and water quality previously discussed. Largemouth bass need gravel for reproduction and this is present. Unfortunately, most of the duck pond bottom is unconsolidated. And, too many macrophytes prevent largemouth bass from feeding on smaller prey. Common carp need less oxygen and can withstand higher temperatures than largemouth bass. Their feeding and spawning habits may also perpetuate lower water quality by uprooting plants and disturbing sediments.

Table 3. Species of amphibians, reptiles, fish, birds and mammals which are associated with wetlands and were identified on SEDA lands.

amphibians

*american toad - *Bufo americanus*
*bull frog - *Rana catesbeiana*
*leopard frog - *Rana pipiens*
*red-spotted newt - *Notothalmus viridescens*
*spring peeper - *Hyla crucifer*
*wood frog - *Rana sylvatica*

fishes

*banded killifish - *Fundulus daphanus*
*black nose dace - *Rhinicthys atratulus*
*bluegill - *Lepomis macrochirus*
*channel catfish - *Ictalurus punctatus*
*common carp - *Cyprinus carpio*
*common shiner - *Notropis cornutus*
*creek chub - *Semolitus atromaculatus*
*largemouth bass - *Micropterus salmoides*
*long nose dace - *Rhinicthys cataractae*
*spotfin shiner - *Notropis spilopterus*
*white sucker - *Catostomus commersoni*
**cyprinids spp.*
**notropis sp.*
**pimphales sp.*

reptiles

*painted turtle - *Chrysemys picta*

mammals

*beaver - *Castor canadensis*
*muskrat - *Ondatra zibethicus*
*raccoon - *Procyon lotor*

birds

*American bittern - *Botaurus lentiginosus*
*belted kingfisher - *Megaceryle alcyon*
*black duck - *Anas rubripes*
*blue-winged teal duck - *Anas discors*
*bufflehead duck - *Bucephala albeola*
*Canada goose - *Branta canadensis*
*common merganser - *Mergus merganser*
*common snipe - *Capella gallinago*
*great blue heron - *Ardea herodias*
*green-winged teal - *Anas crecca*
*hooded merganser - *Lophodytes cucullatus*
*killdeer - *Charadrius vociferus*
*mallard - *Anas platyrhynchos*
*northern harrier - *Circus cyanus*
*osprey - *Pandion haliaetus*
*red-wing black bird - *Agelaius phoeniceus*
*ring necked duck - *Aythya collaris*
*shoveler duck - *Anas clypeata*
*swamp sparrow - *Melospiza georgiana*
*tree swallow - *Iridoprocne bicolor*
*American widgeon duck - *Anas americana*
*wood duck - *Aix sponsa*

E. Non-Wetlands Associated Species

During surveys and field work conducted on SEDA lands, 41 non-wetland species were observed; 1 reptile, 3 mammals and 37 bird species were found (Table 4). Of special concern are the eastern bluebird which is declining in numbers in New York State.

Only one bluebird nest was found when the bluebird boxes were checked. The condition of the boxes ranged from missing to good. There was a high incidence of the holes being chewed and enlarged. It is important to have the exact size needed for bluebird to prevent other birds from entering and to prevent predation.

F. Recreational Use

Active military, employees and families, or guests thereof are allowed access to SEDA for recreational purposes. NYSDEC fishing and hunting licenses are required. The duck ponds and wetland areas are utilized for waterfowl hunting and limited angling. Fishing take or angler satisfaction has not been determined. During the spring, there was consistent but low-level angling observed. Anecdotal responses from creels were "always one or two out here" and "fish were knocked out by winter-kill". Other wetlands on the post are minimally used for fishing.

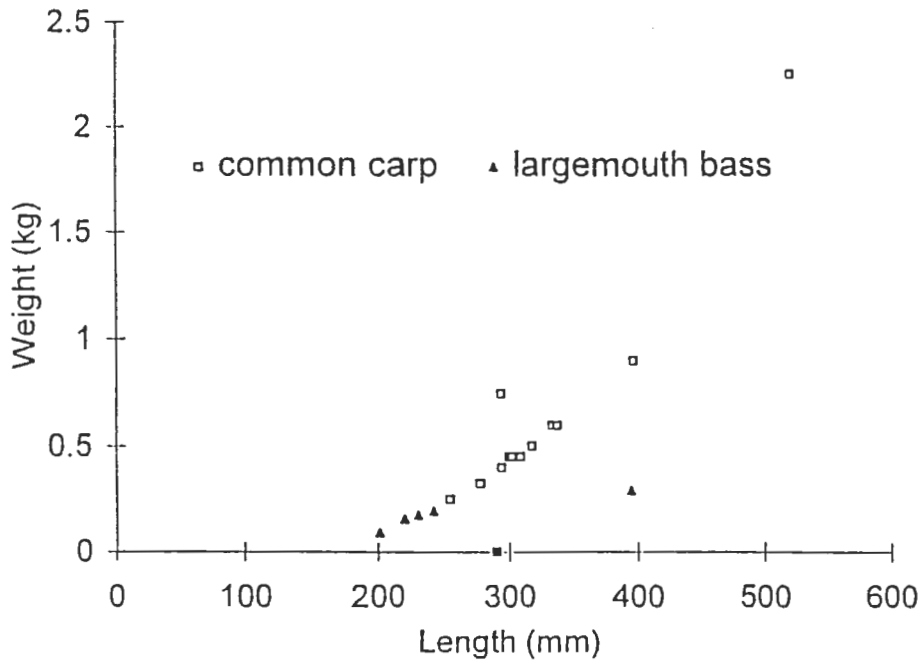


Figure 9. Length (mm) and weight (kg) frequencies of largemouth bass and common carp collected from SEDA duck ponds.

Table 4. Species of amphibians, reptiles, fish, birds and mammals identified on SEDA lands which are not usually associated with wetlands.

reptiles

garter snake - *Thamnophis spp.*

mammals

grey squirrel - *Sciurus carolinensis*
meadow vole - *Microtus pennsylvanicus*
ground hog - *Marmota monax*
white-tail deer - Ocoileus virginianus

birds

American robin -*Tardus migratorius*
barn swallow - *Hirundo rustica*
blue jay - *Cyanocitta cristata*
chipping sparrow - *Spizella passerina*
common flicker - *Colaptes auratus*
cowbird - *Melothrus ater*
eastern bluebird - *Sialia sialis*
eastern meadowlark - *Sturnella magna*
flycatcher spp-
great horned owl - *Bubo virginianus*
mourning dove - *Zenaida macruora*
pheasant - (ringneckedXsechaun hybrid)
redtail hawk - *Buteo jamaicensis*
ruby crowned kinglet - *Regulus calendula*
screech owl - *Strix varia*
European starling - *Turnus vulgaris*
turkey vultures - *Cathartes aura*
white-breasted nuthatch - *Sitta carolinensis*
yellow warbler - *Dendroica petechia*
American kestral - *Falco sparverius*
black-capped chickadee - *Parus atricapillus*
northern cardinal - *Cardinalis cardinalis*
common grackel - *Quiscalus quiscula*
common yellow throat - *Geothlypis trichas*
American crow - *Corvus brachyrhynchos*
eastern phoebe - *Sayornis phoebe*
field sparrow - *Spizella pusilla*
American goldfinch - *Carduelis tristis*
hermit thrush - *Catharus guttatus*
ovenbird - *Seiurus aurocapillus*
red-eyed vireo - *Vireo olivaceus*
ring neck pheasant - *Phasianus colchicus*
rufus-sided towee - *Pipilo erythrophthalmus*
song sparrow - *Melospiza melodia*
tufted titmouse - *Parus bicolor*
wild turkey - *Meleagris gallopavo*
wood thrush - *Hylocichla mustelina*

VII. DISCUSSION / MANAGEMENT RECOMMENDATIONS

This plan recommends management by each habitat complex while addressing fisheries and NAWMP concerns. The species include: yellow perch, smallmouth bass, largemouth bass, bullhead, catfish, crappie, sunfish, mallard duck, blue-winged teal duck, wood duck, black duck, widgeon duck, bufflehead duck, goldeneye duck, common merganser, Canada goose, and nongame migratory/wetland species. Requirements of select gamefish, NAWMP, and non-game migratory birds are presented in Appendix 1. The recommendations are actions which will allow SEDA to manage for balanced communities and human recreation. If SEDA wishes an outside source such as the Service to implement any of these management activities, a separate contract and work plan will be developed.

A. Manage duck ponds for improved reproduction, growth and migration areas for resident fish, osprey, waterfowl, and other wildlife through reduction of eutrophication symptoms and habitat enhancement. The duck ponds are shallow man-made impoundments which experience summer algae blooms, oxygen depletion over the winter or summer, and an overabundance of macrophytes due to eutrophication. Low oxygen levels can stress fish and cause fish kills. Algae blooms decrease oxygen and are not aesthetic. Macrophyte overabundance may create stunting of forage fishes because the larger predators are unable to reach them and the available food is partitioned out among more fish. Management options are reducing nutrient loading and decreasing light reaching the bottom, which will also aid in managing macrophytes. It is possible to manipulate oxygen levels by aeration through mechanical means, decreasing nutrient loading and thus biological oxygen demand (BOD), and decreasing temperatures so that more oxygen is dissolved. To achieve this bio-manipulation, dilution/flushing, manual removal, water shade, lake protection and chemicals have been used.

For a permanent solution, the source of these nutrients must be determined and corrected. It is possible that the overload is from the sewage treatment. (See following recommendation).

To provide immediate benefits for both the avian and fish communities, the pond would benefit from excavation. Any renovations should be accomplished before the osprey return to nest in the spring. A deeper hole near the water control structure would allow for deeper, cooler waters which should reduce both summer and winter oxygen stresses on fish. The hole should

be at least 2 m in depth and 100 square meters in surface area, the organic fill could be spread over the meadow. Increasing overhanging vegetation at the shoreline would add cover habitat. Increased survival will result in increased diet items for the osprey. During an extended drawdown for dredging, the soil will be oxygenated which increases decomposition of the organic layer. Attention to timing and duration of these activities is needed to minimize affects on the benthic layer. An earlier schedule will force fish to pick deeper areas so that nests or fry will not be desiccated. After dredging is completed, stocking of appropriate fish communities will be necessary. For this area, suggested species include centrarchids, and percids.

Additional habitat for nesting and feeding could be attained by providing dense nesting cover and feeding areas for ground nesting birds adjacent to the ponds. Dense nesting cover consists of tall stiff-stemmed grasses. These areas can be encouraged by seeding with grasses such as switch-grass and discing, or burning the low successional meadows on 2-3 year rotations. This rotation prevents woody plants from invading the herbaceous cover.

Beaver activity at the duck pond should be left alone. At the southern area of the duck ponds, they are providing added diversity for this wetland habitat. Preventative plans could be developed to install beaver tubes if flooding of the roads becomes a problem.

B. Evaluate the effect of the water treatment marsh on fish and wildlife reproduction by monitoring water quality, soil contaminants and contaminant levels in resident wildlife. The sewage treatment marsh is linked by overland flow to the duck ponds. It is used for filtration of secondary sewage. The marsh may not be effective as the tertiary treatment if nutrient overload is occurring at the duck ponds. Water quality of contaminants and sediment output should be monitored. Analysis for chemical levels in amphibian and waterfowl eggs and ducklings may be warranted if contaminant levels are not satisfactory, and the possibility of fish and wildlife health impairments were evident by elevated levels of external deformities. Because of their mobility, an analysis of adult waterfowl would not determine the source of contamination.

C. Protect habitat utilized as amphibian breeding areas. Protection from disturbance and conservation is necessary because of the scarcity of this habitat type. There is opportunity to have additional areas for amphibian refugia. A shallow wetland (< 1 m deep 'pond') south of

the 'burn off area' has spotted newt and american toad breeding in large numbers. Because of its shallow depth, it warms quickly in early spring (April-May) when amphibians are breeding. The shallow pond is devoid of fish which prey on eggs, and it has a shallow ditch leading to a forested area which provides cover for adult amphibians moving to their terrestrial habitat. This area should be undisturbed and human activity minimized during the spring. This area should be protected from herbicide and pesticide spraying and the stormwater runoff. A possible interpretive sign could be designed to illustrate the 'textbook' amphibian wetland.

There are 2-3 other ponds located throughout the post which serve multiple purposes due to juxtaposition with larger wetlands. They provide cover for breeding pairs of wood duck, feeding for wading birds, possible amphibian reproduction and/or fishing opportunities. The presence of fish should be investigated. Where fish are not present, they should not be introduced in order to promote amphibian breeding success.

The area south of epsilon igloos (mostly restricted to the east of Silver Creek) is a large complex of wetland and upland habitat. With this habitat diversity, quantity of plant and wildlife species also increase. Numerous vernal pools are available for amphibian and other wildlife benefits. Vernal pools are unique and an increasingly rare type of wetlands. This large upland/wetland mix area is unique on the post. It is important to preserve these area types because many have been filled.

D. Management for NAWP goals of increased waterfowl and nongame migratory birds.

Waterfowl populations have declined because wetlands have been degraded by agriculture, urban development, industry, pollution, and some water control forestry practices. The decrease in habitat caused by the combination of stressors has been determined as the major cause of declining waterfowl populations by NAWMP. Decline of nongame migratory birds is also associated with loss of nesting, migration and wintering habitat.

SEDA, because of its diverse wetlands, has valuable wetland and upland habitat for both breeding and migrating populations. Many waterfowl species may be encouraged by maintenance of the wetlands and surrounding grasslands. Often beaver improve habitat for nesting, feeding and migration by providing diverse wetland habitat types. The post may want to supplement areas by planting native warm season grasses mixed with clover. Specific

requirements by species are discussed in Appendix 1. Examples include predator-proof nesting locations for wood duck or flooded timber areas for black duck. Upland grass fields for blue-winged teal nesting habitat adjacent to wetlands, need to be evaluated.

Active management for wood duck populations has been successful in the past. Though not monitored presently, wood duck seem to be thriving. Wood duck nesting boxes need to be re-spaced and should be repaired, maintained and monitored for reproduction success.

Eastern blue bird *Sialia sialis* boxes are located throughout SEDA. These boxes should be monitored and maintained to aid this NYS species of concern. Because of competition problems with european starlings and house sparrows, the boxes have specific design requirements. Blue bird nesting boxes should be repaired, maintained and monitored for reproduction success.

The previously mentioned 2-3 ponds located throughout the post serve multiple purposes due to juxtaposition with larger wetlands. They provide cover for breeding pairs of wood duck and feeding for wading birds. It is recommended that nesting and brooding of avian species be monitored. If there are nesting boxes present, they should be cleaned, maintained and monitored. Where fish are not present, they should not be introduced.

E. Conduct a threatened and endangered survey of Federal/State threatened/ endangered/candidate (t/e/c) plants and animals present on SEDA and develop management plan. Threatened and endangered species have not been surveyed. According to Ecological Services, USFWS, habitat for or t/e/c federal species do not exist. New York State Natural Heritage survey has no records for SEDA property. Yet, some t/e/c species have been identified on SEDA. A northern harrier (NYS threatened) was observed frequently during the three week Spring 1994 field-season. An American bittern, which has similar habitat needs as the least bittern (NYS species of concern), was observed south of the USCG. Osprey (NYS threatened) were observed in late Summer 1994, and returned in 1995. Two young were hatched. This breeding pair of Osprey inhabit the duck ponds. Finally, an eastern bluebird (NYS species of concern) nest with four eggs was identified when the bluebird boxes were being checked. More species may be present. A comprehensive survey should be conducted with a resulting management plan to enhance t/e/c species and their habitat.

F. Protect, enhance and conserve habitat which supports threatened and endangered species (t/e/c). Until a t/e/c species survey and management plan are conducted, interim recommendations for enhancing known t/e/c species are provided. The south eastern portion of open lands on post have the habitat necessary for two New York State species of concern. They are the northern harrier and the American bittern. Hayfields and grasslands provide breeding habitat. Early succession of wetland meadows are needed for feeding and may be maintained by mowing or burning on 3-4 year rotations. These disturbances should be done during dry periods, after fledging is complete (late June/August). The trees and shrub are needed for cover. Northern harrier and the least bittern habitat exists in large amounts here. In addition to the necessary grasslands and shrub wetlands, this area has a low human disturbance.

G. Encourage multiple-use recreational opportunities in non-sensitive areas. Nature observation stations, walking trails, bird watching, wildlife photography and other non-impact activities should be encouraged given habitat sensitivity, physical constraints and military mission limitations. Possible examples include interpretive trails at the duck ponds along the opposite side of the osprey nest and informative signs at the toad/salamander pond. These areas should be accessible and designed to increase awareness of the environment to encourage use of the area by non-fishing visitors.

H. Determine angler satisfaction with SEDA fisheries and enhance recreational fishing opportunities. Limited fishing opportunities exist. The duck ponds are probably the sole area for fishing. An unattended creel box with questionnaire and attached pen would be the easiest method of determining what and how the fish are being taken as well as a general satisfaction rating of the anglers. A 1980's assessment of Kendaia Creek determined that a put-and-take trout fishery was possible and that the duck ponds had catfish and largemouth bass. The streams are no longer viable habitat for larger sport fishes due to water quality parameters and flow availability. The duck ponds have remnant largemouth bass. No catfish were observed to survive the Winter of 1993/94. See discussion under duck pond recommendations.

Indian Creek may have the largest potential for self-sustaining warm-water sport fish populations, if stream flow was unimpeded. Presently with the beaver dams in place, the newly

formed green tree palustrine areas provide ideal habitat for black duck nesting, wading bird nesting and feeding. If a supplemented fishery is desired, water quality and available flow will need to be improved. Habitat in terms of cover and substrate is adequate to optimal. See Appendix 1 for appropriate species to introduce if post's outdoors recreation management objectives concur.

I. Develop an advance protocol plan for control of infrastructure flooding by beaver activity, through integrated beaver tubes, beaver deterrents and possible trapping. Wetlands have increased on SEDA land due to beaver activity; however, these increased wetlands benefit fish and wildlife species differently. Though most wildlife diversity is increased, open stream fish habitat is compromised. The beaver can benefit many wildlife species' habitats by creating the diversity of wetlands. The long-term wildlife use decreases after a pond becomes abandoned for more than 4-5 years. Both A/B and C/D beaver dams are in advanced stages and beavers will probably move out of the area. At this point, to actively retain waterfowl productivity, a complete drawdown should be considered to aerate the soils and encourage new growth of emergent vegetation. Old beaver ponds may be left and possibly used for fishing opportunity. The dams will, however, eventually breach if abandoned. The Indian Creek beaver dam is increasing the marsh and flooded forest area, but reduces stream flow and at times covers the road. Unless numbers increase to nuisance levels, it is recommended that the beaver be managed by low-intensity maintenance. It is the intention to <u>not</u> manage beavers, unless their activities flood roads and impair other post operations.

J. Develop an advance protocol plan for control of exotic plant invaders, especially for purple loosestrife. Two major invasive exotic wetland plant species which displaces native species are *phragmites* and purple loosestrife. Their ability to displace native plant species is detrimental because diversity is lost at all levels. Phragmites was the only species observed on post, but purple loosestrife is abundant in the county. The best management approach is prevention. Identification of this plant should be taught to managers who should immediately remove it on a plant by plant basis. If this plant encroaches on a wetland, more involved actions will be necessary in the future. These will include water-level manipulation, herbicides, and possible applications of an insect control.

K. Monitor and evaluate the success of management activities. After the completion of initial bird and aquatic surveys, populations should be monitored to assess the progress of management objectives: enhancing fishing opportunities and increasing breeding populations of waterfowl and non-migratory birds through habitat improvements and protection. It will be necessary to compare wetlands succession, water quality, fisheries, amphibian, waterfowl/ non-game species on 2-5 year rotations. Comparisons at the population level should include: the abundance and trends of fishes -game and forage, black duck, wood duck, bluebird, and amphibian populations.

VIII. UNIT WORK SUMMARY

A. Formulate Baseline

HABITAT

- Evaluate status of wetlands - **completed Spring/Summer 1994.**
- Evaluate and delineate specific wetlands when land use plans change.

SPECIES

- Conduct stream and duck pond fisheries assessment for game and non-game species - **completed Spring/Summer 1994.**
- Conduct 5-8 dawn and dusk bird counts in diverse habitat - **completed Spring 1994.**
- Conduct a threatened/endangered species survey - **planned for 1996.**
- Conduct a complete herpetological inventory due to NYSDEC concern of declining amphibian populations - **planned as part of t/e survey 1996.**
- Map and identify all SEDA wood duck nesting boxes - **inventoried Summer 1994.**
- Map and identify all SEDA eastern blue bird nesting boxes - **inventoried Summer 1994.**
- Other - Update ongoing upland bird and mammal species lists during duck and other migrating bird censuses.
- Additional possibilities include an invertebrate survey to determine available fish and waterfowl forage. A qualitative analysis will be less expensive in terms of time and effort.

B. Implement According to Objectives

HABITAT

- Evaluate the status of the post's wetlands inventory every 5 to 10 years.
- Conduct an assessment of source of nutrients loading, possible sewage treatment wastewater and remedy sources.
- Drain or dredge duck pond - oxygenate soils and increase depth, decrease light.
  - → Plan/design channel and islands.
  - → Permitting process through Army Corps of Engineers and NYSDEC.
  - → Drawdown and dredge channel and deep holes.
  - → Seed islands and meadows to the northwest with native grasses. May need a 3-5 year mowing/burn/discing schedule to keep at a low succession stage.
  - → Fill ponds and restock with desired game fishes.
  - → Minimize disturbances during migration and nesting periods (April - Oct).

SPECIES

- Conduct annual migration surveys once a week from March 25 - April 30, and September 26 - October 31, to monitor waterfowl use.
- Maintain wood duck boxes annually (fall to early spring) to nesting. Winter may be optimal because boxes can be accessed on ice.
  - → Install predator guards under all nest boxes to reduce predation attempts.
  - → Record data on nest box variables which may affect nest box use. This will allow SEDA to determine which are under-utilized or where additional ones should be erected.
  - → Check and maintain all boxes once a year, at a minimum, after nesting (fall - early spring). Hatching information may be collected simultaneously with cleaning and maintenance.
- Maintain and clean eastern blue bird nest boxes, annually, in late summer or fall.
  - → Record data on nest box variables which may affect nest box use. This will allow SEDA to determine which are under-utilized or where additional ones should be erected.
  - → Check and maintain all boxes once a year, at a minimum, after nesting (fall - early spring). Hatching information may be collected simultaneously with cleaning and maintenance.
- Assess annual population dynamics of duck pond fish species. Knowing growth, reproduction and mortality rates will aid in determining management.
- Investigate possible sites for installation of interpretive trails.
- Plan and construct interpretive stations (e.g. toad pond and duck pond complex).
- Install drop box for creel surveys at duck ponds.
- Assess species diversity of streams on a 3-5 year rotation.
- Monitor stream populations annually, if supplemental recreational fisheries are to be developed.
- Evaluate lane cutting in northern harrier habitat and possibly reduce fire lanes. Reduce all disturbances during nesting periods of northern harrier, bittern species (least and american).
- Beaver management
  - → Survey beaver sites yearly, in the fall. Distinguish between active and non-active sites to obtain an accurate rate and distribution of colonies.

- → Maintain current beaver tubes.
- → Use water level control tubes to control undesirable water levels.
- → Work cooperatively with NYSDEC and the Service to establish cost of nuisance beaver and benefits of habitat improved.
- → Consider trapping as it is the only currently accepted method of removing surplus beaver. NYSDEC regulations apply to all trappers and trapping organizations.
- → Develop a beaver plan of action for Silver and possibly Reeder Creeks.

▸ Develop an exotic plant species management plan.

C. Monitor/evaluate success

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X. APPENDICES

A. Limiting Factors for Select Fish and Wildlife Species

1. Fish species requirements

Brook trout, *Salvelinus fontinalis,* have the most restrictive habitat needs of the fishes discussed here. Optimal streams are clear, cold, with a 1:1 pool riffle ration, with well vegetated stream banks and abundant cover (instream cover $\geq$ 15% and 50-75% mid-day shade). Optimal lacusterine habitat is clear, cold, and oligotrophic. They will spawn in streams or ponds with groundwater upwellings at 4.5-10° C. Suitable pHs are 3.5-9.8 and dissolved oxygens should be at least 50% saturation at 12-15° C.

Channel catfish, *Ictalurus punctatus,* in lacusterine systems prefer warm temperatures, high productivity, and abundant cover. As they mature, their diet progresses from plankton, insects, detritus, crayfish to fish. Boulders or debris in deep-water for over-winter cover is needed. Optimal spawning temperature is 21° C. Growth temperatures are 26-29° C. Dissolved oxygen below 5 mg/l will stress catfish. Fry use sand and mud edges for cover, <u>not</u> macrophytes because of centrarchid predation.

Yellow perch, *Perca flavescens,* are popular for eating and are often used as a forage species as well as angling. Their preferred spawning habitat is in deeper tributaries, yet they will spawn over deep springs. Temperature ranges should be 7-13° C. Habitat requirements are moderate amounts of macrophytes (>20% of area) for cover and spawning habitat in clear waters. Vegetation (1.3.7 m deep) in slow moving water (<5 cm/s) is used for spawning habitat. Gravel will be used if vegetation is unavailable. Winter temperatures must be a minimum of 10° C for maturation. Rising waters in the summer give more inundated terrestrial vegetation thus increasing young-of-the-year survival. Mid-summer temperatures of 17-25° C are optimum. Water quality minimums are 5 mg/L O_2 and pH's of 6.5-8.5 .

Largemouth bass, *Micropterus salmoides*, are popular as a tournament fish in impoundments. They mature at 3-4 years. Spawning temperatures are 16-22° C . Anything but silt will be used by largemouth bass yet gravel is preferred at depths .3 to .9 m. Lakes that are with 25% shallow vegetation (less than 6 m and 25% submergent) and have holes 30-40% deeper than 6 m for over-wintering are prime habitat. Greater than 40-60% cover of the pools reduces the prey availability. Water quality preferences are pHs of 5-10.

White crappie, *Pomoxis annularis*, mature in 1-3 years and do best in lakes or streams greater than 2.02 ha. Spawning temperatures range from 16-20° C. Males guard nests made on clay, gravel or sand near filamentous algae or inundated habitat/vegetation. Winter and summer requirements are similar to largemouth bass. Mid-summer temperatures of 17-30° C are optimum. Water quality minimums are 5 mg/l dissolved oxygen (O_2) and pHs should be around neutral (6.5-8.5). White crappie are more tolerant of turbid waters than black crappie.

Smallmouth bass, *Micropterus dolomieu*, have the best populations in mesotrophic riverine systems. Adults reach spawning size in 3+ years (~20-56 cm). They will adapt to reservoirs and lakes. They prefer cooler temperatures than the largemouth bass for spawning; the temperatures should be around 16° C. Spawning males guard nests on a substrate of gravel beds with slow moving water, usually located near a velocity refuge/cover large boulder or log. Mid-summer temperatures of 25° C are optimum. Habitat/vegetation requirements for young-of-the-year include macrophytes or cobble for protective cover. Water quality should be 6 ppm O_2 and pH of 7.9-8.1.

Black bullhead, *Ictalurus melas*, reach desirable angling sizes but can become stunted because of density dependent factors. Then they are utilized mostly as forage for wading birds. Spawning temperatures are 20° C. Suitable habitat includes weedy areas with 50% fines and depths of 0.5-1.5 m. They especially frequent backwaters with $\geq$ 20 cover. In lakes more cover ($\geq$ 25% littoral areas) is necessary. Clear waters increase their growth rates but muddy water increases their survival. Bullhead are the most tolerant of poorer water quality levels; O_2 have been recorded as low as 3.0 mg/L in 18° C, and pH's may range from 3.4-7.7 without severe mortality occurring.

Bluegill, *Lepomis macrochirus*, mature in 1-2 years. These fish are popular with young anglers but are utilized mostly as a forage fish. Spawning temperatures are 17-31° C. They survive in a range of temperatures (10-35° C), but the optimum range is optimal 22-27° C. Habitat/vegetation requirements are $\geq$ 20% of littoral zone in a lake with cover in form of habitat/vegetation requirements, logs, and brush. Stunting can occur with excessive cover when the bluegill is not vulnerable to predators. Substrate may be anything, but prefer sand or fine gravel. Water quality preferences are pHs of 6-8.5.

2. Waterfowl requirements

The wood duck, *Aix sponsa*, prefers red maple, american elm, american sycamore or american beech for natural cavity nesting. Human-made nesting boxes are also good for encouraging these ducks to reproduce. Height of nests may be up to 18.3 m. At least a 0.2 km buffer around all wetlands without logging is needed so that ducklings have cover to reach the water. Food items include coleoptera and diptera water shield.

The black duck's, *Anas rubripes,* optimal habitat for nests are flooded green timber areas. They nest on the ground usually at the water's edge often near a break in vegetation. Nest baskets are not recommended because of the high mallard populations which may hybridize. A 50:50 mix of open/emergent and shrub/scrub wetlands are recommended for habitat. Preferred food items include mollusca and mayflies, odonata, isopods, sedge, spike rush, pond lily, burr reed and sedge arrow head.

The common merganser, *Mergus merganser*, nests near relatively cool, clear medium gradient streams. They need good visibility to locate prey and nest in cavities or nest boxes.

The blue-winged teal, *Anas discors*, need upland fields to reproduce similar to northern harrier feeding grounds. They nest in meadows, pastures, dry sedge, hayfields, or along the edges of paths, roads or railroad tracks under a concealing canopy of vegetation (20-61 cm). Location is usually within 91.4 m of water. Food items include gastropoda and spike rush.

Management for the mallard duck, *Anas playrhynchos,* is not recommended. The NAWMP doesn't encourage management for mallard in New York because of the species' propensity to hybridize with black duck.

The American widgeon, *Anas americana*, is not usually associated with small ponds or temporary ponds. Larger bodies of water with abundant submerged vegetation and open shorelines are preferred.

The Common goldeneye, *Bucephala clangula*, is not known to breed outside of the Adirondacks or Lake Champlain regions. Flooded woodlands and beaver ponds with northern hardwoods adjacent to large marshes are preferred. Cavities 5.5-6.1 m above land or 1.5 m above water are used.

3. Non-Game Migratory Birds

The American bittern, *Botaurus lentiginosus*, have a diet of mostly amphibians. Nests are typically in wet marshes but can be on dry land. Materials used may include cattail, cordgrass, bulrush or sedge. They prefer to nest and feed in dense stands of cattails and bulrushes (10-30/cm) adjacent to open water. Shrub-scrub and woods also provide visual barriers.

The least bittern, *Ixobrychus exilis,* is classified as a species of concern by the state of New York. Their requirements are similar to the American bittern. Because they prefer more inconspicuous locations, larger areas of undisturbed marshes are desired.

Northern harrier, *Circus cyanus*, are threatened in the state of New York. They require open habitat, fallow fields of wet meadows, and shrub uplands for feeding and cover. Hayfields and grasslands are utilized for nesting.

Osprey, *Pandion haliaetus,* are threatened in New York. They feed primarily on fish. They need large snags or platforms. Habitat is usually large areas of undeveloped land for their nests. These raptors utilize manmade platforms when suitable snags are unavailable.

The eastern bluebird, *Sisalia sialis,* is a species of concern in New York State. It prefers habitats of open woodlands and meadows. Edge habitat is important. Farmlands and orchards are often areas utilized for nesting. They nest in cavities and boxes. Care must be taken in design to prevent starling and house sparrow use which often displace them. Diet items include invertebrates and small fruits.

4. Other Mammals and/or Non-Wetland Species

Beaver, *Castor canadensis*, do a good job of enhancing their own environments. Areas of young saplings which may be flooded with dam construction are chosen and are good habitat for waterfowl and wading birds because of their high productivity of macro-invertebrates and amphibians.

Muskrat, *Ondatra zibethicus,* management should be similar to beaver. Unless a nuisance occurs, do not actively manage their populations. Their numbers will naturally fluctuate. Feeding and lodge building activities can create openings in emergent wetlands for waterfowl and wading bird use.

B. Migration Data Sheet

Date:
Observer:

SPECIES	TRANSECTS								TOTAL
	1	2	3	4	5	6	7	8	

C. Nest Box Data Sheet

Box: Date erected:
Location: Direction:
Tree species: Height:

Wetland habitat (cover > 30% wetland)

System: lacusterine riverine Class: open water Aquatic bed
palusterine other___ emergent scrub-shrub
Beaver influence?_____ forested other_____

Location of box attachment: shoreline Overwater inland other_____

General comments:_____
_____
_____

D. Waterfowl Brood Survey Data Sheet

Box number: Location:

Date checked	Comments

E. Waterfowl Brood Survey Data Sheet

Observers: Date:
Plot number: Start time:
Survey method:
Survey type: initial follow-up End time:
Weather conditions: Water conditions: High low normal
Plot type: wetland aquatic upland meadow forest
***do not include obvious migrant individuals

	Mallard	Black Duck	Hybrid/* Mixed Pair	Wood Duck	Canada Goose	Other (Name)	TOTAL
Pairs							
Pairs + Male							
Lone Male							
2 Males							
3 Males							
4 Males							
Lone** Female							
Other # Groups							
TOTAL SEEN							

* indicate drake and hen species for pairs
** indicate if hen is with a brood
***indicate number of birds in each group

F. Fishery Population Assessment Data Sheet

Observers: Date: Weather:
Air temp: Ph: Do: Water temp:
Waterbody: Location:
Site: Collection method/effort:

Species	Length	Weight	Mark	Recapture	Notes:

G. Stream Habitat Data Survey Form

Observers: Weather: Date: Time:
Air temp: Water temp: pH: DO:
Comments:

trans point	width	depth	substr	cover	cover %	comments