

1997 Patuxent Refuge Waterbird Census

December 1996 to December 1997

Introduction - A census of all known wetland areas large enough to have any waterbird use was commenced in the fall of 1996. This report is a compilation and discussion of results for the year commencing the first week in December 1996. This first report will go into considerably more detail than will be necessary in future years; which will be basically a comparison with previous years.

Purpose - To record to the maximum extent possible waterbird use on Patuxent Refuge by location and time of year. To determine the impacts of weather, especially drought and ice, beaver impacts, and impoundment management activities.

Methods - Census all known water areas once a week. Generally by vehicle, but if inaccessible, by foot. Record weather; i.e. temperature, cloud and wind. Record water levels. List name of unit and species and numbers of all waterbirds. Also recorded were raptors on or near the unit and pileated woodpeckers. Mammals recorded included deer and beaver. Counts were started at daybreak. The time needed to cover all 51 areas and segments of the two rivers necessitated taking two mornings; one morning for North Tract and a second morning for Central and South Tracts. It was necessary to do North Tract on Sunday during the hunting season. The late summer of 1996 was used to locate and determine the protocol for conducting the census. Locating all the beaver impoundments on North Tract was a lengthy process and is still ongoing. Most of the Central and South Tract units are man-made impoundments and were known from the beginning, the one major exception being Schaefer Lake. The main consideration for determining the route to be taken was human disturbance, particularly on North Tract. An effort was made to cover areas potentially impacted by human activities first. This was difficult to accomplish on Central Tract, particularly in Spring and Summer because of very early traffic on the dikes to the Endangered Species area.

Results - Included is a brief discussion of each unit; type of habitat, size if known, area censused, water level and ice conditions, and highlights of waterfowl species and numbers seen by time of year. There will also be a brief discussion of all waterbirds and raptors, which will by necessity, require some cross referencing to the impoundment discussion. Total and quarterly waterbird-days use tables are appendixes.

Weather - Ice covered most units the third week of December and the last three weeks of January. Some ice was present the first three weeks of February. One of the worst droughts on record commenced in early June, with no substantial relief until early November. Many units were dry during this period, which was further exacerbated by several early and higher than normal deliberate drawdowns.

NORTH TRACT

Lake Allen - Approximately 13 acres, almost entirely open, 100% coverage. A major

fishing and hunting unit. Stayed at or near full pool until early September. Drought caused a drop in water levels from the top of the boards in early September to a maximum decline of 24 inches below full pool by mid-October. The unit came back up a foot by late October. A drawdown was commenced on October 26. Drained except for channels and a small pool from mid-November to the end of the year.

Basically a goose, wood duck, and mallard unit. Only one record of black ducks and one for hooded mergansers. . Geese present from early February until the end of July. The goose season was open from September 1 to September 15. No geese recorded during this period. Geese were mostly absent from early August until the end of the year. Wood ducks returned at the end of February and were gone by the first of November. The peak was in June during the brood-rearing season and then fell off rapidly by mid-September. Mallards were present throughout the year except for freeze-up and part of the drawdown. They peaked at 40 birds in mid-April. Even after the drawdown, small numbers continued to utilize the channel. Small numbers of ring-neck ducks were recorded from mid-December until the end of March, peaking at 28 in mid-February.

Lake Allen

North Tract Open Water Ponds

Date	Goose	Wood Duck	Mallard		Goose	Wood Duck	Mallard
12/8/96	3	0	9		0	0	7
12/15	12	0	2		0	0	0
12/22	0	0	0		0	0	0
12/28	0	0	2		0	2	0
1/5/97	56	0	2		0	2	0
1/12	0	0	0	ice	0	0	0
1/19	0	0	0	ice	0	0	0
1/26	0	0	0	ice	0	0	5
2/2	14	0	29		4	0	0
2/9	25	0	29		8	0	8
2/16	46	0	20		2	0	6
2/23	36	4	24		6	2	6
3/1	22	2	19		6	2	2
3/8	10	0	15		2	0	4

3/18	10	2	16		11	10	3
3/24	12	12	22		7	12	2
3/31	6	7	18		2	8	2
4/7	25	5	30		8	4	4
4/15	26	7	23		6	8	7
4/21	15	13	40		10	6	6
4/29	12	3	24		4	5	6
5/5	27	4	16		4	10	3
5/12	27	3	2		8	2	6
5/19	28	2	6		5	2	1
5/27	16	4	15		8	2	2
6/2	19	27	22		3	2	4
6/9	26	37	22		0	9	4
6/16	31	36	0		0	9	2
6/23	30	48	19		0	11	0
6/30	26	38	26		0	1	1
7/7	25	18	13			DRY	
7/14	23	15	2		0	2	0
7/21	48	16	13		0	4	0
7/28	30	11	12		0	1	3
8/5	0	31	6		9	2	0
8/11	1	22	2		0	0	0
8/18	2	19	5		0	0	0
8/25	3	20	3		0	0	0
9/1	0	22	0		0	1	0
9/7	0	31	0		0	2	7
9/14	0	12	2		1	5	3

9/21	0	8	0		0	22	0
9/28	0	15	0		0	6	8
10/5	10	1	9		0	0	0
10/12	50	2	0		0	2	7
10/19	0	2	2		2	0	1
10/26	0	4	9		0	2	4
11/2	12	0	0		0	2	0
11/9	0	0	0	Dry	0	2	0
11/16	0	0	0		0	0	0
11/23	0	0	0		0	0	7
11/30	0	0	13		0	0	5

Rogue Harbor - Approximately 5 acres. Approximately one-third buttonbush; willow and shrubs around edges. Heavy growth of parrotfeather. Dense vegetation made accurate census difficult. From the road, only about 40% could be surveyed. Addition of foot counts at back of stable increased reliability to 70%. Beaver maintained water levels to maximum. Beaver further raised water levels in the Fall with a small dam the length of the front of the unit.

Substantially impacted by ice from mid-January to early February and again in late February. Substantial inflow from Rogue Harbor Branch keeps the upper end open except during heavy freeze. Combination of heavy inflow and beaver activity minimized impacts of drought. Full pool maintained until late July. Maximum drop of 18 inches. Restored to full pool by mid-October.

Waterfowl use almost entirely wood ducks and mallards. A major wood duck and mallard brood rearing area. Substantial use by mallards throughout year. Few birds recorded in summer during molt. Extensive cover made it difficult to determine number of birds present during molt. Low and sporadic use by geese, hooded mergansers and black ducks in late winter and early spring. Blue-wing teal were recorded twice in March.

Merganser Pond - About 2 acres. Very open; thin growth of emergents around the edge. Two islands provide additional cover. 100% coverage. No beaver, but muskrat present. Ice covered in late December, most of January and mid-February. Shallow depth and limited

inflow resulted in substantial impact by drought. Water levels started falling in early July; down two feet by early September and not back to full pool until mid-November.

A goose, mallard and ring-necked duck unit. Geese present throughout winter, when not frozen, all through the spring and again in late summer and sporadically during the fall. Mallards present all year except when frozen and during the worst of the drought, which was also the molt period. Ringnecks common in winter and early spring. This unit and Wood Duck Pond were the only North Tract units with any substantial ring-neck use. A few blue-wing teal in spring and early fall. A pair of mute swans were recorded once. An immature tundra swan was present from mid-April until mid-May. No records of wood ducks or black ducks; only one record of a hooded merganser.

North Tract Small Open Water Ponds - Dragonfly, Gravel Pit, Cattail, Bailey Marsh, Kingfisher, Bullfrog, Salamander, Rieves, and Midway Branch at the back gate.

These units have been lumped together because of their size and similarity in habitat. Acreage is unknown except for Bailey, which is estimated at about 4 acres. 100% coverage on all units except Bailey, Kingfisher and Bullfrog where coverage approximately 70%. All are heavily impacted by ice and drought. Only Bailey has a control structure. Only Gravel Pit recorded any beaver activity. Use of these units was almost entirely restricted to spring. Mostly geese, wood ducks and mallards. Limited use by hooded mergansers; no other waterfowl species.

Rogue Harbor

Merganser Pond

Date	Wood Duck	Mallard		Canada goose	Mallard	Ring-neck Duck
12/8/96	1	19		12	20	60
12/15	0	5		45	9	97
12/23	0	1		0	0	0
12/28	0	30		1	0	10
1/5/97	0	0		12	14	4
1/12	0	0		0	0	0
1/19	0	0		0	0	0
1/26	0	15		0	0	0
2/2	0	15		11	12	0
2/9	0	16		9	20	1
2/16	0	20		2	21	0

2/23	0	6		19	13	6
3/1	6	16		17	2	1
3/8	8	7		8	10	10
3/18	8	10		8	6	12
3/24	4	6		12	8	7
3/31	2	2		4	4	2
4/7	6	10		10	7	2
4/15	2	3		20	6	0
4/21	5	4		24	14	0
4/29	6	0		8	20	0
5/5	5	7		50	8	0
5/12	28	23		51	2	0
5/19	11	17		40	3	0
5/27	33	22		29	9	0
6/2	52	33		31	7	0
6/9	25	41		25	11	0
6/16	54	29		21	12	0
6/23	45	38		21	12	0
6/30	59	49		21	7	0
7/7	39	28		9	7	0
7/14	9	0		10	7	0
7/21	9	3		0	6	0
7/28	13	12		0	6	0
8/5	0	1		0	6	0
8/11	4	0		43	3	0

8/18	2	1		0	2	0
8/25	8	0		0	0	0
9/1	1	0		0	0	0
9/7	4	1		0	0	0
9/14	4	0		9	0	0
9/21	5	0		49	1	0
9/28	7	0		97	2	0
10/5	6	2		28	6	0
10/12	0	4		39	8	0
10/19	26	41		33	3	0

New Marsh - Approximately 4 acres. 100% coverage. An open water pond divided into two units, unless at absolute maximum water levels. Some shrubs in one corner; limited emergents. Three islands provide some additional cover. Beaver present in two lodges, but appear to have little impact on water levels. Ice until mid-February. Drought started to impact by mid-June; half dry by early August, started to refill in early November; still down 6 inches at end of year.

This unit had very limited waterfowl use. Almost entirely restricted to spring for geese and mallards, and spring and early summer for wood ducks. Practically no use by other species or any waterfowl in fall and winter. Size, openness, and total access to fishermen probably account for the limited use. Human disturbance does not seem to impact nesting use by geese, wood ducks and mallards. However, no broods recorded of any species.

Blue Heron Pond - Approximately 5.7 acres. 100% coverage. An open water pond with very few emergents. The 5 islands provide additional cover. No fishing allowed, which means human disturbance is limited outside the hunting season. The Pond opened to waterfowl hunting for the first time. Goose hunting was fairly successful. Thirty birds harvested, compared with 39 on the Range, where most of the harvest has occurred in the past. There is no beaver activity on this unit. Covered with ice during January. At full pool until late June. The drought plus a partial drawdown kept the pond down 12 to 24 inches from early July until the end of the year.

Primarily a goose and mallard pond. An important goose nesting area. Broods in the area until late May and then all left. Broods remained until flight on Merganser Pond where meadows mowed, in contrast to this pond, where not mowed. Some mallard broods attempted to stay, but either left or were lost before flight. The most important fall and early winter area for

hooded mergansers on North Tract, peaking at 26 in early December. Interesting contrast with Merganser Pond, where no mergansers recorded, while no ringnecks recorded on this unit. One pair of nesting black ducks; no wood ducks or any other waterfowl species recorded.

Wood Duck Pond - Supposedly 21 acres. but this seems large. Approximately 70% coverage. Divided into two pools; one about one-half open, the other half willows and shrubs. The second unit is primarily a birch swamp. The two units are have independent water sources. . The first unit is very drought prone; the second less so. Ice-covered the last two weeks of January and the first two weeks of February. The drought started affecting the front unit by early May and was 3/4 dry by early June. The back unit remained full during this period. The back unit started falling in mid-June. The entire pond was dry by mid-August. The back pool was full by early November, while the front pool was still only 1/4 full. Beaver were present in both pools, but abandoned the front unit early in the drought. All beaver were gone by mid summer and resumed some use of the back pool in the fall.

Primarily a wood duck, mallard, black duck and ringneck duck unit. Waterfowl use almost entirely restricted to spring, with some fall mallard and black duck use when the unit refills. Limited use by geese in the spring.

Blue Heron Pond

Wood Duck Pond

Date	Goose	mallard		Goose	Wood Duck	Mallard	Black Duck	Ring-neck Duck
2/2/97	6	2		16	0	6	3	2
2/9	0	0		0	0	0	11	5
2/16	0	0		0	0	2	10	7
2/23	0	0		0	8	2	4	2
3/1	0	0		8	0	0	0	14
3/8	0	2		0	0	0	2	37
3/18	14	2		2	10	8	0	13
3/24	10	2		2	10	6	0	25
3/31	19	2		0	0	0	0	3
4/7	30	3		2	4	4	0	15
4/15	30	5		6	2	6	0	0
4/21	38	7		24	2	2	0	0

4/29	19	24		4	1	6	0	0
5/5	20	21		4	2	5	0	0
5/12	57	10		2	0	8	0	0
5/19	0	0		2	0	8	0	0
5/27	7	0		0	2	5	0	0
6/2	0	2		0	0	3	0	0
6/9	0	3		0	6	0	0	0
6/16	0	1		0	0	4	0	0
6/23	0	0		0	5	4	0	0
6/30	0	0		0	5	4	0	0

Millrace Pond - Reported at 4.5 acres, but probably considerably larger. A heavily wooded beaver swamp full of trees; live, dying, dead and fallen. No indication of beaver during the worst of the drought. They became active again in November. Approximately 60% coverage. Impacted by ice from the beginning of the year until mid-February. Heavily impacted by drought. Water levels started falling in mid-July. It was 3/4 dry from early August until the first of November. Full for about a week and then water levels started falling again to down about a foot at the end of the year. The unit was full in the fall of 1996 in contrast to 1997 when almost dry. 1996 use by wood ducks (including a roost), mallards and black ducks was substantial. The unit is most important for nesting and brood rearing by wood ducks and hooded mergansers. Of some importance in the spring to geese, mallards and black ducks. No use by any other waterfowl species.

North Tract Beaver Ponds - Range Pond, New Swamp, "K" Swamp, Powerline Swamp, and Beaver Valley. These are all small, wooded, beaver swamps. Beaver Valley is a string of 6 beaver ponds from the outlet of Wood Duck Pond to Range 10. Acreage is unknown. Coverage was approximately 60% on all units. They are all impacted by ice more than any other units except Millrace. They were covered by ice from December until the end of February. Due to beaver activity, the drought generally affected them later than other units. The size of the watersheds had the greatest impact on the severity of the drought. Beaver in "K" Swamp dredged canals from their lodge in an attempt to hold water. Range Pond and Powerline Swamp were least impacted by the drought and maintained water levels at least half full. Beaver Valley became almost totally dry. Beaver became very active in all units by mid-November, even in Beaver Valley, where fresh cuttings were found in 3 of the 5 units.

The units are of importance to wood ducks, particularly for spring pair isolation, nesting and broods. They were somewhat less important in fall, although the drought certainly impacted

use at that time. Comparison with the fall of 1996, when the units were full, indicated these units important at that time for mallards and black ducks, as well as wood ducks. There was limited use by pairs of geese, mallards and black ducks in spring, and summer use by mallards. Black ducks were much more frequent in wooded units than open ones in contrast to mallards. No use by other waterfowl species.

Millrace Pond

North Tract Beaver Ponds

Date	Goose	Wood Duck	Mallard	Black Duck	Hood Merg		goose	Wood Duck	Mallard	Black Duck
2/23/97	6	26	6	2	6		0	22	6	2
3/1	4	6	8	4	8		0	4	0	0
3/8	10	12	4	0	8		2	26	3	0
3/18	2	28	8	4	6		4	22	10	2
3/24	2	8	2	0	0		2	32	14	6
3/31	0	6	2	0	3		2	6	4	0
4/7	8	23	3	2	4		4	22	5	0
4/15	12	5	0	0	3		6	5	5	0
4/21	12	6	0	1	0		4	5	0	0
4/29	2	4	2	0	0		2	19	2	0
5/5	10	46	3	2	15		2	25	2	0
5/12	7	45	2	2	16		2	51	2	0
5/19	6	50	2	12	24		4	26	14	0
5/27	2	57	4	0	21		3	48	16	0
6/2	0	60	2	0	0		0	72	12	2
6/9	1	35	4	0	0		0	35	10	0
6/16	0	36	0	0	0		0	55	6	0
6/23	0	29	0	0	0		0	57	9	0
6/30	0	31	0	0	0		0	46	6	0
7/7	0	17	0	0	0		0	57	7	0

7/14	0	6	0	0	0		0	25	2	0
7/21	0	7	0	0	0		0	12	0	0
7/29	0	22	1	0	0		0	14	2	0
8/5	0	1	0	0	0		0	12	0	0
8/11	0	5	0	0	0		0	1	0	0
8/18	0	6	0	0	0		0	2	0	0
8/25	0	17	0	0	0		0	2	0	0
9/1	0	8	1	0	0		0	5	0	0
9/7	0	3	0	0	0		0	6	0	0
9/14	0	2	0	0	0		0	2	0	0
9/21	0	11	0	0	0		0	6	0	0
9/28	0	4	0	0	0		0	14	0	0
10/5	0	2	0	0	0		0	5	2	0
10/12	0	21	0	0	0		0	6	0	0
10/19	0	6	0	0	0		0	17	0	0
10/26	0	0	0	0	0		0	4	0	0
11/2	0	2	0	0	0		0	7	0	0
11/9	0	0	0	0	0		0	4	0	0
11/16	0	0	0	8	4		0	0	0	16
11/23	0	0	0	3	5		0	2	0	0
11/30	0	0	0	4	0		0	0	6	3

Green -Tree Pond and Patuxent Marsh - The two green-tree reservoirs are lumped together because of similar habitat and management. Green Tree is approximately 5 acres in size and Patuxent Marsh 4.5 acres. Coverage was approximately 100% on Green tree and 70% on Patuxent Marsh. These are primarily demonstration areas for green tree management. They are of marginal value at this latitude. By the time they are flooded, winter has set in. In 1996-97 they were nearly full by the first of December, but were covered with ice until late February. Boards are pulled in mid-May and reinstalled in early November. Waterfowl use is basically

restricted to spring. Both ponds were used by mallards, with some nesting and brood use on Green-tree. Ringnecks used Green-tree but not Patuxent, while hooded mergansers and wood ducks used Patuxent Marsh but not Green-tree. Overall waterfowl use was much higher on Green-tree than Patuxent - 3276 days use vs 637.

CENTRAL TRACT

Hobbs Pond - Approximately 9 acres. Coverage near 100%. An open water unit, formerly a gravel pit. Considerable emergent vegetation with some shrubs in the back. The 21, mostly cross-shaped islands, create additional cover. It was completely frozen only during two weeks in mid-February. At full pool until the end of June when a drawdown was initiated. It was mostly dry until partially reflooded in early November. Substantial impact by beaver until drained. A chronic problem with beaver plugging up the outlet and flooding the nesting islands in the spring. Beaver reappeared at the end of the year.

The drawdown produced a bumper crop of nutgrass and resulted in heavy waterfowl use, particularly by geese, mallards, wood ducks and small numbers of green-wing teal and gadwall. This unit was heavily utilized by geese throughout the year; for nesting, but not broods, loafing and feeding after the unit refilled. Wood duck, mallard and black duck use primarily after reflooding. Some hooded merganser use in winter and ringnecks in winter and early spring.

Schaeffer Lake - Approximately 16.5 acres. Coverage near 100% by walking completely around the unit. A former gravel pit of mostly open water, with three substantial islands providing additional cover. The most isolated of the Central Tract units; very rarely any human disturbance. A former gravel pit that would not be flooded if it were not for a beaver dam. Approximately 6 lodges on the lake.

Ice the last three weeks of January and the second two weeks of February. Drought started to impact in early July. About half dry by mid-August. Slow to refill; still down about a foot at the end of the year.

Had the highest wood duck use of any unit on the refuge with the exception of Cash Lake. Present throughout the year, but no nesting. Over 100 birds were recorded in mid-October. An important goose nesting area, but broods disappeared immediately after hatching. Some mallard use throughout the year, but mostly in the fall. Black ducks much more common than mallards, particularly in late summer and fall. Some hooded merganser use in winter. Ringnecks in winter and spring.

Hobbs Pond

Schaeffer Lake

Date	Goose	Wood Duck	Mall	Black Duck	Ring neck		Goose	Wood Duck	Mall	Black Duck	Ring neck
12/8	4	0	7	2	3		0	0	1	16	10
12/12	303	0	0	0	0		0	0	0	0	16
12/18	0	0	0	0	1		0	0	3	0	12

Schuefer

12/28	0	0	0	0	2		2	0	0	0	7
1/5	20	0	0	0	3		42	0	0	0	26
1/12	2	0	0	0	0		0	0	0	0	0
1/19	0	0	0	0	0		0	0	0	0	0
1/26	5	0	4	0	0		0	0	0	0	0
2/2	49	0	0	0	0		30	0	2	1	16
2/9	18	0	13	4	6		0	0	0	0	0
2/16	46	0	4	0	3		9	0	2	0	3
2/22	57	0	2	0	2		44	2	2	2	30
2/28	66	0	4	0	9		32	6	0	2	52
3/10	47	0	2	0	4		16	4	2	0	34
3/17	44	0	4	0	2		19	20	10	0	62
3/25	54	0	4	0	0		32	4	0	0	50
4/1	23	0	0	0	4		32	0	4	0	20
4/8	40	0	2	0	0		18	4	2	0	8
4/16	50	0	0	0	0		36	5	5	0	0
4/22	36	1	0	0	0		36	0	3	0	0
4/28	57	2	2	0	0		48	3	0	1	0
5/6	27	1	2	0	0		34	11	0	0	0
5/13	54	0	0	0	0		20	16	0	0	0
5/20	33	0	0	0	0		10	34	0	0	0
5/26	10	1	2	0	0		2	14	0	0	0
6/3	25	0	0	0	0		4	20	0	0	0
6/10	35	0	0	0	0		25	24	0	2	0
6/17	17	0	0	0	0		6	14	0	0	0

Schaefer

6/24	23	6	2	0	0		2	32	0	0	0
7/1	47	15	1	0	0		20	13	0	0	0
7/8	0	0	0	0	0		0	22	0	0	0
7/15	0	0	0	0	0		8	26	4	0	0
7/22	18	4	0	0	0		0	42	0	2	0
7/29	10	2	0	0	0		0	38	0	0	0
8/7	0	4	0	0	0		0	35	0	0	0
8/12	0	2	0	0	0		0	23	0	0	0
8/19	13	0	0	0	0		0	21	0	2	0
8/26	0	0	0	0	0		0	27	2	6	0
8/31	0	0	0	0	0		0	39	0	0	0
9/8	0	1	0	0	0		0	37	0	0	0
9/17	0	1	0	0	0		0	47	0	0	0
9/22	17	0	0	0	0		0	20	0	1	0
9/29	52	0	0	0	0		0	31'	0	6	0
10/7	39	2	0	0	0		0	48	0	6	0
10/14	4	0	0	0	0		0	108	0	15	0
10/20	0	12	0	0	0		0	64	7	22	0
10/27	104	24	4	12	0		6	43	2	14	0
11/3	112	3	27	2	0		0	61	33	39	0
11/10	101	91	6	54	0		2	32	15	24	3
11/17	88	10	93	87	3		0	1	0	41	1
11/24	0	0	45	15	0		22	0	0	6	0
12/1	0	0	0	1	0		27	0	0	16	2

Duval 1 - Approximately 12.5 acres. Formerly a wooded impoundment; now mostly open as all

trees in the water have fallen. Considerable belt of shrubs and trees on margins of unit. Emergent growth heavy on East side. Coverage 80%. Drawn down from summer of 1996 until first of April 1997. A number of deep pools were below the level of the spillway and could not be drained. Back at full pool by end of May. Less impacted by drought than most units. Affected from mid-July until mid-September. Down about one-fourth at maximum. Significant beaver activity after full pool, but did not impact outlet structure to any degree. This was the only unit in the Knowles/Duvall Complex to have significant beaver activity after the drought ended. Due to the long drawdown, waterfowl use was insignificant prior to June, except for geese in December. This has always been an important wood duck brood pond and broods started returning as soon as water levels were back into the shrub/emergent growth. Limited mallard, black duck and hooded merganser use in the fall. Goose use very sporadic.

Duval 2 - Approximately 8.5 acres. 100% coverage. Essentially two pools. The back pool is very shallow and formerly wooded. It is separated from the front pool by three wooded islands. The front pool is a dredged basin. The back pool is heavily impacted by drought, even in normal years. The front pool maintains some water even under the driest of conditions. Impacted heavily by ice throughout the winter. Back pool water levels started falling rapidly by mid-May. Boards were pulled at the end of May, which completed the draining of the back pool. No beaver activity. Most use confined to fall and spring, especially by geese, mallards and black ducks. Some wood duck use in summer and fall. Blue-wing teal use in spring more than most units. A few gadwall and widgeon in fall.

Knowles 1 - Approximately 37 acres. Near 100% coverage. Formerly divided between a cleared and wooded unit. All trees now down and entire unit an open marsh. Substantial buttonbush and emergent growth on backside. Considerable beaver use until the drawdown. Because of size and openness, less impacted by ice than many units. Completely iced-over only during the first two weeks of January. At full pool until the end of May when drawdown began. Drawdown continued until the end of the year. Some water maintained by channels in front and back of unit. Heavy rain reflooded about 1/4 of unit from end of October until mid-November. Heavy goose use throughout the year. Substantial use in winter and spring by mallards, hooded mergansers and ringnecks. Some spring use by blue-wing teal, pintail and widgeon. Considerable wood duck use in spring until drawdown. Early drawdown prevented normal substantial brood use. Rain-water flooding in fall resulted in substantial use by geese, mallards, black ducks and for a short period in early November, green-wing teal.

Knowles 2 - Approximately 17 acres. 90% coverage. Mainly an open water unit. A large island shelters a substantial part of the back 1/3 of the unit. Considerable buttonbush and other emergents on the east and south sides of the unit. Drained from the summer of 1996 until the first of April. A channel from Knowles 1 through the unit maintained a small amount of water in the front of the unit. At full pool by the first of May. Impact by drought began first of July, but because of Knowles 1 drawdown, of limited impact. Pulled down 2 feet in mid-September to facilitate Knowles 1 drawdown. Maintained at this level until the end of the year. No beaver activity from mid-summer on even though the unit not drained. Spring use primarily limited to geese and mallards. Full pool resulted in substantial use by geese, wood ducks, mallards and hooded mergansers, particularly broods. Late summer use was

limited mostly to a few wood ducks. Fall use by geese, mallards, black ducks and a few hooded mergansers. No other waterfowl use, except a few blue-wing teal in spring.

Knowles 1							Knowles 2				
Date	Goose	Wood Duck	Mall	Black Duck	Home	Ring Neck		Goose	Wood Duck	Mall	Black Duck
12/5	37	0	11	2	2	5		9	0	0	0
12/12	61	0	12	0	5	21		0	0	0	0
12/18	0	0	10	0	2	36		13	0	0	0
12/28	41	0	18	10	2	17		10	0	0	0
1/5	0	0	19	0	8	42		26	0	0	0
1/12	1	0	1	0	0	0		0	0	0	0
1/19	0	0	0	0	0	0		0	0	0	0
1/26	4	0	0	2	10	3		0	0	0	0
2/2	8	0	10	0	10	6		4	0	0	0
2/9	7	0	20	8	20	10		0	0	0	0
2/16	2	0	2	3	14	3		0	0	0	0
2/22	14	0	9	0	0	8		6	0	0	0
2.28	23	0	8	0	2	19		2	0	0	0
3/10	6	0	6	8	0	5		8	0	2	2
3/17	12	0	6	2	2	11		2	0	0	0
3/25	18	2	2	4	1	14		6	0	2	0
4/1	12	2	9	2	0	0		26	6	12	2
4/8	20	4	0	0	0	0		12	0	7	1
4/16	12	0	2	0	0	0		8	0	5	0
4/22	16	10	0	0	0	0		10	0	4	0
4/28	13	2	2	1	0	0		10	1	4	2
5/6	14	7	0	0	0	0		6	0	2	0

5/13	21	15	0	0	0	0	8	0	0	2
5/20	21	21	2	0	0	0	4	29	2	0
5/26	12	0	0	7	0	0	18	21	0	0
6/3	0	7	2	0	0	0	13	32	14	2
6/10	0	6	2	7	0	0	10	38	0	0
6/17	9	13	2	7	0	0	17	36	24	0
6/24	20	28	7	7	0	0	34	36	24	0
7/1	0	14	7	7	0	0	35	36	24	0
7/8	30	6	0	7	0	0	90	32	15	1
7/15	12	2	4	6	0	0	6	1	0	0
7/22	8	5	2	4	0	0	0	19	0	0
7/29	33	0	0	1	0	0	12	12	2	0
8/7	20	21	2	3	0	0	0	7	0	2
8/12	13	0	0	0	0	0	0	4	0	1
8/19	121	2	0	0	0	0	0	1	2	0
8/26	12	3	0	0	0	0	0	4	0	2
8/31	25	1	0	0	0	0	0	7	1	0
9/8	47	1	0	0	0	0	0	5	0	0
9/17	60	4	0	0	0	0	0	1	0	2
9/22	79	0	0	0	0	0	1	17	0	0
9/29	64	0	0	0	0	0	4	10	7	3
10/7	57	0	0	0	0	0	85	9	0	2
10/14	50	0	0	0	0	0	9	8	0	4
10/20	90	0	25	6	0	0	0	8	13	10
10/27	165	27	39	32	0	0	4	0	0	0

11/3	0	0	4	4	0	0	3	0	1	3
11/10	432	2	69	17	0	0	15	0	4	0
11/17	36	0	0	0	0	0	30	1	30	14
11/24	2	0	23	4	4	0	31	0	2	2
12/1	51	0	22	6	0	0	4	0	22	0

Knowles 3 - Approximately 13 acres. 100% coverage, due to not being at full pool throughout the year. This unit has been partially drained since the summer of 1996. An attempt was made to drain the entire unit, but beaver kept plugging up the outlet. The beaver left the unit after the drought began and had not returned by the end of the year. The unit was 50% full until the drought took full affect. The unit was dry by July 1. One-half of the boards were put back in mid-October, and all but one board back in by mid-November. After mid-November the unit was about 3/4 full.

It received very limited use, mostly by geese until late November. Almost all use was between the islands and the road, mostly by geese, mallards and black ducks. Limited use by hooded mergansers and wood ducks.

Mallard Pond - Approximately 4 acres. At full pool until impacted by the drought. Water levels began falling in mid-June and reached a maximum of 18 inches below full pool at the end of August. The stream running out of Bluegill continued to flow throughout the drought. Although the unit never dropped more than 50%, there was no beaver activity after early summer.

For such a small unit, waterfowl use, particularly by hooded mergansers and ringnecks, was substantial. Also, considerable use by geese, mallards and black ducks.

Hance Ponds 1 and 2 - Hance 1, approximately 4.5 and Hance 2, approximately 3.0 acres. 100% coverage. Both units are very shallow and severally affected by ice and drought. Covered by ice in mid-November and again the last 3 weeks of January and the first 3 weeks of February. Drought began to impact by late May. Both units were nearly dry by late September. Both were full again by late October. An effort was made to drawdown Hance 2, but beaver forced the effort to be aborted. Beaver were very active in Hance 1 by November. Substantial goose-use in winter, spring and fall. Considerably heavier use by black ducks than mallards, especially in spring and fall. Limited use by wood ducks and hooded mergansers, particularly in the fall.

Snowden and Uhler 1 and Uhler 2 - Snowden, 8 acres, Uhler 1, 7 acres and Uhler 2, 5 acres. 100% coverage. Snowden Pond is deep and little affected by drought and is more open than the

Uhler units so less affected by ice. Uhler 1 was drawn down throughout 1996 and into 1997 until early April. Uhler 2 was drained in late May. The boards were replaced in mid-October. Beaver were active throughout the year on Snowden Pond. They returned to Uhler 1 in the fall. There was no beaver activity on Uhler 2 after the drawdown. These two units were ice-covered from mid-January until mid-February.

All three units, but especially the Uhler units, were heavily used by geese in winter, spring and fall. Most duck use was in the spring, especially ringnecks, mallards and wood ducks. Some hooded mergansers in December. Very little use by black ducks.

South Tract

Cash Lake - 53 acres. 100% coverage. This unit is among the least impacted by ice and drought. The bubblers also lessen the impact of ice. Considerable ice only during the two weeks in mid-January. No substantial impact by drought until late August. Maximum drop in water level of two feet at the beginning of September. Beaver activity throughout the year.

Substantial use by geese, wood ducks and ringnecks. Goose use high in spring and fall, erratic in winter. Wood duck use very high in summer and fall. The highest use by ringnecks of any unit in winter and spring. Use by mallards and black ducks limited; blacks much higher than mallards in the fall. More variety of use by other waterfowl species than most units, especially blue-wing teal in early fall. Unusually high and prolonged use by ruddy ducks in the fall; up to 20 in mid-November.

Cash Lake

Lake Redington

Date	Goose	Wood Duck	Mall	Black Duck	RNDU		Goose	Wood Duck	Mall	Black Duck	RNDU
12/5	0	0	6	2	148		0	0	10	2	38
12/12	615	0	0	3	128		11	0	2	3	33
12/18	2	0	2	2	150		38	0	2	2	57
12/28	63	0	0	8	85		28	0	2	0	45
1/5	0	0	2	3	151		6	0	6	0	67
1/12	61	0	6	3	228		0	0	0	0	0
1/19	0	0	0	0	0		0	0	0	0	0
1/26	0	0	0	0	8		0	0	2	4	0
2/2	4	0	2	4	34		2	0	4	2	22
2/9	15	0	4	4	122		31	0	8	6	30

2/16	31	0	0	2	61		0	0	4	0	54
2/22	16	0	4	0	71		95	2	6	2	57
2/28	73	0	2	0	76		41	2	2	0	50
3/10	61	0	2	0	100		42	4	8	0	89
3/17	43	0	4	0	154		19	3	2	2	91
3/25	80	14	6	2	80		38	25	2	2	21
4/1	47	4	0	0	65		50	11	2	0	13
4/8	48	12	2	2	24		50	2	4	0	0
4/15	56	3	2	2	7		38	18	3	0	0
4/21	58	9	4	2	3		50	6	5	0	0
4/28	30	4	1	0	0		50	7	0	0	0
5/6	42	2	0	2	0		82	19	3	0	0
5/13	27	13	0	2	0		27	6	3	0	0
5/20	25	0	1	2	0		42	12	2	2	0
5/26	0	6	2	0	0		2	10	1	0	0
6/3	0	0	0	0	0		53	9	0	0	0
6/10	0	3	1	2	0		45	10	1	1	0
6/17	0	0	0	0	0		0	10	2	1	0
6/24	0	41	0	0	0		55	5	0	0	0
7/1	0	37	1	1	0		86	4	0	0	0
7/8	13	20	0	0	0		18	2	0	1	0
7/15	30	5	0	0	0		22	1	3	0	0
7/22	12	23	1	3	0		20	2	0	0	0
7/29	5	33	0	0	0		23	0	0	0	0
8/7	0	19	1	0	0		42	18	0	0	0

8/12	43	12	0	2	0	1	23	0	0	0
8/19	6	59	0	8	0	4	31	0	0	0
8/26	0	91	4	5	0	0	13	0	0	0
8/31	0	85	7	6	0	20	19	1	3	0
9/8	8	101	6	13	0	0	32	0	5	0
9/17	0	134	3	10	0	0	32	1	1	0
9/22	0	113	0	10	0	0	36	0	0	0
9/29	4	101	4	12	0	76	18	0	8	0
10/7	33	43	9	13	0	717	4	3	9	1
10/14	2	43	3	22	4	582	13	0	3	5
10/20	136	47	2	18	34	633	0	0	0	1
10/27	154	40	1	3	62	222	16	1	0	43
11/3	122	17	4	11	184	167	0	0	0	30
11/10	0	0	2	4	239	221	3	2	4	36
11/17	0	0	0	5	247	0	0	13	11	99
11/24	0	0	11	6	118	0	0	13	1	71
12/1	366	0	4	7	237	1	0	5	0	79

Redington - 31 acres. Near 100% coverage. Somewhat more ice and drought impacted than Cash Lake. Iced-over the last 3 weeks of January. The unit was drawdown about 50% in mid-June to repair the outlet structure. The boards were back in the first of July but the drought prolonged the drawdown. The unit fell a maximum of 42 inches in late September. Did not return to full pool until mid-November. Beaver use much reduced during the drought; considerably lower activity in the fall.

Waterfowl use mostly comparable to Cash. Exceptions included very high use by native and migrant geese for roosting and loafing from October to mid-November, after which they basically disappeared. Considerably less wood duck and ringneck use. Exceptional use by ruddy ducks from early October to the end of the year, maxing at 41 in late November.

South Tract Small Ponds - All the rest of the water areas on South Tract have been lumped together, as waterfowl use is limited and generally comparable. Included are: Goose Pond - 2 acres, Harding Spring Pond - 3 acres, Mabbott Pond - 5 acres, Fire Trail Pond - 2 acres,

Spillway - 2 acres, and Mitigation Pond, Sewage ponds and Borrow Pit ponds - unknown acreage. 100% coverage. All vulnerable to ice and drought. The most vulnerable to human disturbance of all Patuxent water areas. Covered with ice from the beginning of the year until late February. All units heavily affected by drought except Mabbott Pond and the Sewage Ponds. Mabbott Pond was drained from 1996 until the end of April. It was spilling by the end of April. Mabbott dropped a maximum of 2 feet by mid-August and full again by mid-September. Boards pulled in Harding Spring at the end of April; dry by the end of May; boards back in mid-November; nearly full by the end of the year. Goose Pond started falling in early May; boards pulled in July; dry until November; some of boards back in October; about 1/4 full at end of year. Mitigation and Fire Trail dry or nearly so after early July. Most waterfowl use in spring, almost entirely by geese, wood ducks and mallards. Very little use by any species the rest of the year.

Patuxent and Little Patuxent Rivers - The Patuxent was censused along River Road and up and downstream from Duval Bridge. The river bottoms was censused along Mill Race, River Road, Duval Bridge Road and the backside of Schaeffer lake. The Little Patuxent is censused along the Visitor Center trail, up and down stream from the two bridges, and from near the back gate to the Bailey Bridge. These water bodies are the last to be affected by ice, and the main stems rarely freeze. The bottoms have most of the waterfowl use, and they were heavily impacted by the drought. They were dry, or nearly so, from early May until the end of the year. Beaver were very active on both rivers, but particularly on the Patuxent. They have dammed up a number of the side channels. The main waterfowl use is in spring, particularly by wood ducks, but also geese, mallards, black ducks, and some hooded mergansers. When impoundments freeze up, black ducks concentrate on the main stem of the Patuxent.

SPECIES ACCOUNTS

This will include a brief summary of results of all species recorded during 1997. The "Summary of 1997 Waterbird Counts" table is attached.

SWANS

Tundra Swan - A flock was recorded on South Tract in the spring. A family spent a week on Merganser Pond. There were a few other scattered sightings during the spring.

Mute Swan - One record of a pair in spring on Merganser Pond.

GEESE

Canada Goose - At almost 140,000 days-use, this was by far the most abundant species on the Refuge. Over 1/2 of the use was on Central Tract. Except during the nesting season, most of the use was on large, open water impoundments. Migrants made up about one-half the use in the fall. During the nesting season, there was some use on almost all units where islands or even small stump mounds were available. North Tract use was mostly limited to Lake Allen, Merganser Pond, and Blue Heron Pond, except during the nesting season. Central Tract use included all open water units. Use frequently shifted from week to week in the fall and winter but was heaviest on Hobbs Pond, Duvall 2, and the Knowles Units. Outside of spring, South

Tract use was almost entirely on Cash and Redington.

Lesser Snow Goose - One immature was seen once on South Tract.

Domestic goose - A gander accompanied a female Canada goose on several occasions on both North and South Tracts.

Hybrid Domestic/Canada goose - A brood was reared on Burbur Lake. One was killed during the hunting season on the Range. Another was seen several times on North Tract.

DUCKS

Wood Duck - With just under 50,000 days of use, this was the second most abundant waterbird on the Refuge. It was most abundant on North Tract, slightly less so on Central Tract, and considerably less so on South Tract. It was virtually absent during the winter quarter. It was widely scattered during the spring quarter, particularly favoring small, wooded areas. Beaver ponds were highly favored, particularly in spring and summer. Most flocks in fall still favored wooded areas; however, there was a very high concentration on Cash Lake just prior to migration. Wood ducks are basically absent from the refuge from mid-November until the end of February.

Mallard - Use totaled close to 30,000 days in 1997. Almost all use was divided almost evenly between North and Central Tracts; use was very low on South Tract. Mallards were present throughout the year. They used all wetland habitats, and could be found in small numbers almost everywhere throughout the year. Large flocks preferred the larger, shallow open water units, particularly in the fall after units were reflooded following drawdown. Fall and winter concentrations on North Tract were primarily on Rogue Harbor, Lake Allen, and Merganser Pond, and on Central Tract, Hobbs Pond and the Knowles/ Duval Complex.

Black Duck - A little over 10,000 days were recorded. The bulk of use was on Central Tract in fall and early winter. A large number of birds were recorded in fall mixed with mallards on the reflooded drawdown units. Blacks were much more common than mallards on North Tract beaver units. They were also much more common on Schaeffer Lake.

Mallard/Black Duck Hybrid - One or two individuals were seen on Central Tract in the fall.

Hooded Merganser - A little over 6,000 days were recorded. They were most common in late fall, winter, and early spring. Very few birds were seen from mid-summer to late fall. Males disappeared entirely by mid-March, leaving only nesting hens. Records were about equally divided between North and Central Tracts. Nesting was only in Central Tract and Millrace Swamp of North Tract. They were found in pairs or small groups in winter and spring, mostly on the small open units.

Ringnecked Duck - The only common wintering migrant duck. Over 36,000 days use recorded in 1997; of which over 26,000 were on Lakes Cash and Redington. The first birds appeared in early October and were gone by the end of April.

Ruddy Duck - Ruddies were unusually common in 1997; almost 2,000 days entirely confined to Lakes Cash and Redington during the late fall.

Other diving ducks - Scattered buffleheads, primarily immatures, were seen in the fall. There was one record each of a canvasback and old squaw.

Other puddle ducks - Several species come through in fall in small numbers. They tend to concentrate on the shallow, open water units, especially reflooded drawdown units. Included were blue-wing teal (735 days), greenwing teal (595), widgeon (126), gadwall (273), shoveler

(84), and pintail (28).

Coot - Almost 900 days of use in 1997. Birds generally appear in mid-October, disappear in early December, reappear in mid-March and disappear by early June. There appears to be a very definite affinity for Knowles 1. The unit was flooded in the fall of 1996, and over 800 days of use was recorded. The unit was drained in the fall of 1997, and use was only 133 days for the entire refuge for the fall quarter. Outside of Knowles 1, there was never more than 2 or 3 recorded in any one unit. The maximum number recorded in 1997 was 21 on Knowles 1 in early April.

Common Moorhen - One bird was recorded on Knowles 1 in May 13.

Pied-billed Grebe - Present the year-around, with a total of 1477 days use. The minimum of one or two was recorded during the winter quarter. Populations starting increasing in mid-March, reaching 14 to 16 from the end of March until the middle of April. Populations then fell off rapidly to only one or two (the brood on "K" Swamp excepted) until late September. Fall populations peaked at 13 in mid-October. They were widely scattered over the Refuge. During peak periods they were consistently seen on 7 to 10 units. During the year, they were recorded at least once on 23 of the 51 units. They were never seen on the rivers. They were seen most frequently on Lake Allen (22 weeks), Cash Lake (13), Knowles 1 and Mabbott (11), and Hobbs and Merganser Ponds (10). Except for pairs in the spring, they were always widely scattered. It appears the drought had a substantial affect, as in the Fall of 1996, 644 days-use were recorded, compared with 483 in the fall of 1997.

WADING BIRDS

Great Blue Heron - The over 7,000 days of use were recorded throughout the year. Almost 4,000 on North Tract, but less than 900 on South Tract. The low of one to four birds was recorded during freeze-up from mid-December until mid-February. The most ubiquitous species on the Refuge; recorded on every unit, plus the rivers, except Midway, Green-tree, Rieves, and Firetrail. They were seen more consistently on Lake Allen than any other unit, 37 weeks, followed by Millrace and Redington (27 weeks), Knowles 1 and Cash (26), Duval 2 (22), the rivers (20), Blue Heron (19), Rogue Harbor and "K" Swamp (18), Knowles 2 and Schaeffer (16), and Hance 1 and Hobbs (15). The spring peak was 61, most of which on the Millrace rookery. The population declined to 6 in late May and reached a summer peak of 102 in mid-July. There were substantial concentrations on the drawdown units, especially on Knowles 1, which peaked at 51 in late July. Numbers started declining in late August, with 15 to 20 birds scattered over the Refuge from early September to mid-October. They fell off to 6 to 10 the rest of the year.

Green Heron - The 1800 days use were recorded from mid-April until the end of September. The departure date was the same week in 1996! Almost 1,000 of the use days were on North Tract, only 70 on South Tract. A very solitary species, recorded on 35 units and both rivers. They were at their peak from mid-August to mid-September, with a peak of 32 in early September. The spring peak was 17 in early June. The largest number recorded was 9 on Uhler 1 during the drawdown. They were most frequently seen on Millrace (19 weeks), Knowles 1 (13), "K" Swamp (10), the Rivers and Uhler 1 (9), and Merganser, Schaeffer and Duval 1 (8). The drought/drawdowns appeared to have the most significant impact on Central Tract. There were 259 days use in the fall of 1996 compared with 112 the fall of 1997.

Great Egret - The 780 days of use were recorded between the end of June and the middle of October. Birds concentrated on Lake Redington during the partial drawdown, peaking at 35 in late July. Only 175 days were recorded on North Tract. Most use was concentrated within a small period of time, from late July until early September. Most observations were individual birds, but there were more small groups than seen with either the Great Blue or Green Herons. Outside of Redington, the largest group seen were 6 on Millrace.

Little Blue Heron - Only 27 days use were recorded in 1997 compared to 287 in 1996. One adult bird was seen on May 13. Immatures were seen on August 19 and 25, and September 17.

Black-crowned night heron - There were 4 records; an immature on Millrace on May 31, and single adults on Wood duck pond on April 29, Midway on June 9, and the Little Patuxent River on June 30.

American Bittern - There were two records; on the Patuxent River on April 16, and New Marsh on April 29.

SHOREBIRDS

Killdeer - This is the only common shorebird on Patuxent. The 4400 days use were recorded throughout the year. The birds concentrated on drawdown units in the fall, with over 3,000 days use on Central Tract. There were a number of rather dramatic fluctuations throughout the year. A very few birds were recorded in late winter, rose modestly to a peak of 17 in the spring, fell off to the breeding population less than 6 pairs in late spring and early summer, rose rapidly in July and early August to a peak of 58 the first of August, fell off to a very minimum in early September, began to increase rapidly again in late September to a peak of 31 in mid-October, fell off rapidly to two in early November, rose rapidly to 60 in mid-November and maintained high numbers until the end of the year. Throughout the year, the largest numbers were found on drawdown units, especially Knowles 1. They were recorded on 23 units, none on the rivers. They were recorded on Knowles 1 during 20 weeks, Redington (17), Merganser Pond (15), Blue Heron (14), and Hobbs and Knowles 2 (13).

Solitary Sandpiper - The 602 days of use occurred between April 28 and October 7. One/half of the use was on Central Tract, with most of the rest on North Tract. As befits their name, they were rarely seen in groups. The exception being on drawdowns, especially on Duval 2, Hobbs, and Knowles 1. The maximum number of birds was 22 on May 12. They disappeared at the end of May and reappeared in mid-July. Given the small number recorded, the number of units where they were seen was rather surprising; 23 in all, 10 of which they were only recorded once. They were seen on Knowles 1 in 7 weeks, Duval 2 and Dragonfly 5 weeks, and Kingfisher, Blue Heron and Hobbs Pond during 4 weeks.

Spotted Sandpiper - This species had 133 days of use, 77 on North Tract, 35 on Central Tract and 21 on South Tract. They were present the last two weeks in May and again sporadically from mid-June until early October. Ten birds were seen in mid-May. No more than 3 were seen during any other week. All sightings were of single birds scattered over 12 different units.

Common Snipe - The vast bulk (266) of the 357 days of use was in Central Tract, almost entirely on drawdown units. Birds were recorded from mid-March until the end of April, and again from late July until early December. The maximum number recorded was 16 on March 25. They were considerably more common in spring than in the fall. They were only recorded on 8 units. In spring, they were fairly wide spread, in fall, almost all sightings were on Knowles 1.

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Yellowlegs - Greater and Lesser have been lumped due to some uncertainty of identification. It is believed that most sightings were Greater. Most of the 238 days of use were on Central Tract (161). Birds were recorded from April 21 to mid-May, and again from mid-August until mid-November. Spring and late summer records were infrequent with a maximum of 5 on April 21. They were somewhat more common in the fall with a peak of 6 in late October. They were recorded on 13 units, with most fall records on drawdown units.

Least Sandpiper - They were recorded on two occasions; once on Blue Heron on September 14 and 4 birds on Knowles 1 on September 22.

Pectoral Sandpiper - They were recorded on two occasions; one bird on February 28 on Uhler 1, and 3 birds on October 27 on Knowles 1.

Double-crested Cormorant - Single birds were recorded on 5 occasions on Cash Lake between the end of April and early June.

GULLS AND TERNS -

Gulls - The four species recorded on the refuge were almost entirely confined to Lake Redington where they came to loaf and bathe after feeding at the Bowie Landfill. Gulls were not seen on the Refuge prior to the landfill. Because the birds were not always present during the count, numbers recorded did not correspond very well with actual use.

Laughing Gull - This was the most abundant species, with over 28,000 days use recorded. They were the first species to appear in the fall and the first to disappear. They were present from early October until mid-December, but most had gone by mid-November.

Ring-billed Gull - Over 17,000 days use were recorded. This species was recorded in spring as well as fall and winter. It was the only species of gull recorded outside the South Tract.

Herring Gull - Small numbers were recorded in late fall and winter.

Great-black back Gull - Very small numbers were recorded in late fall and winter.

Bonapart's Gull - A flock of approximately 70 was recorded on Lake Redington on April 8.

Terns - The Caspian Tern was recorded once on Cash Lake on April 21.

Least Tern - There were four records of single birds, probably the same bird. It was seen throughout June, three times on Merganser Pond and once on Blue Heron Pond.

Belted Kingfisher - Almost 1500 days use were recorded, of which over 800 were on North Tract, 530 on Central Tract and only 140 on South Tract. Kingfishers are present throughout the year. They were scattered over 35 units and both rivers. They are usually solitary, except for occasional pairs in the spring. They were recorded in very small numbers in winter and spring, and became increasingly common after the nesting season. The peak number recorded was 19 in mid-August. They were seen most frequently on Lakes Allen and Shaeffer (17 weeks), Range Pond (13), Rogue Harbor (12), Blue Heron (11) and New Marsh (10).

RAPTORS

Bald Eagle - Eagles are most often seen on Lake Redington. They were also recorded on 9 other units. They were seen 6 times on Knowles 1, 4 on Duval 1 and 3 times each on Cash Lake and Millrace. Records were scattered throughout the year. Nine of the 25 records were of

non-adults; 4 juveniles and 5 in their 2nd year or older, but not adult.

Red-tailed Hawk - Widely scattered over 15 units the year around. Recorded during 8 weeks on Blue Heron Pond, 5 weeks on Powerline and Dragonfly, and 3 weeks on Mabbott Pond and Lake Redington.

Red-shouldered Hawk - This was by far the most abundant raptor. It was evenly distributed throughout the refuge with records on 35 units and both rivers. It is present year around, and was recorded in every month and most weeks. Most counts were one to three; with the maximum seen of 7 in early September. It was recorded during 6 weeks on Beaver Valley and Knowles 3, 5 weeks on New Marsh and Schaeffer Lake, 4 weeks on Uhler 2, Mallard Pond, Powerline, Lake Redington, Hobbs Pond, Millrace and Gravel Pit.

Broad-winged Hawk - Recorded once at Wood Duck Pond on May 5.

Pileated Woodpecker - This species was recorded whenever seen over or near a unit. Although they are resident year-around, none were recorded from mid-October until the end of the year. They were seen on 17 units plus the Patuxent River bottoms. They were recorded in small numbers with a peak of 8 in late August. Maximum records were 8 weeks on Schaeffer Lake and Millrace, and 4 weeks on "K" Swamp, Beaver Valley and the River. They were only recorded twice on South Tract. They were frequently seen in pairs.

MAMMALS - Any mammals seen within the units were recorded. This was almost entirely beaver, and their activities, and deer. Muskrats were rarely seen.

Beaver - Beaver activity was recorded on almost every unit on the Refuge, and was responsible for the existence of most of the North Tract units. None of the South Tract and only one of the Central Tract (Schaeffer Lake) units resulted from beaver activity. However, they were present in most of the impoundments on Central and South Tract. The combination of drought and an unusual number of early drawdowns drove the beaver out of most units in mid-summer. It would appear that they went to the rivers, where a great deal of activity was recorded. A number of dams were found on side channels of the Patuxent River. It was found that November is the best time to determine which units have beaver, as this is when most cutting is recorded along with dam and lodge repair and establishment of winter food caches. It was rather surprising that beaver returned to so many areas after the prolonged and severe drought. By November, they had returned to all units created by beaver. They had not returned to any of the Knowles units, Duval 2, Mallard Pond, the Uhler units or Duck Pond.

White-tailed Deer - Deer were recorded when seen in the impoundments. They concentrated on the drawdown units of Central Tract from early July until mid-September. They were particularly concentrated on Knowles 1 with 11 to 33 recorded between July 8 and September 17. The peak was at the end of July.