SURVEYS OF MIGRATORY DUCKS IN JAMAICAN WETLANDS –

PHASE TWO: JANUARY – APRIL 2003

Report Prepared For The

Natural Resources Conservation Authority/

National Environment and Planning Agency

And

Ducks Unlimited

By

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June 2003

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Executive Summary

This report was commissioned by the National Environment and Planning Agency (NEPA) with funding from Natural Resources Conservation Authority and Ducks Unlimited. Its objectives were to assess the spring distribution of ducks in Jamaica using aerial surveys and ground truthing, and thus to compare the relative efficiency the two methods, and to use the data to provide recommendations on the sustainable management of ducks.

Surveys were conducted islandwide from the air in January and March 2003. Selected sites were surveyed from the ground in March. Aerial surveys were better for surveying migratory ducks, while ground surveys were better for the more rare and secretive resident species.

The number of migratory ducks observed was

1.0 Introduction

This report was prepared at the request of the National Environment and Planning Agency (NEPA). It was funded jointly by Natural Resources Conservation Agency (NRCA) and Ducks Unlimited (DU). The Terms of Reference are included in Appendix 1.

2.0 Objectives

- To assess the spring distribution of ducks in Jamaica using aerial surveys
- To ground truth aerial observations at selected sites in order to compare the results and relative efficiency of the two methods
- To provide recommendations on the sustainable management of ducks.

3.0 Methods

Aerial surveys (Table 1) were carried out island-wide in January and March 2003 following a protocol established previously (Haynes-Sutton & Hay 2001). A Cessna 182 aeroplane was used, flying at about 30 m (100 ft) above ground or lower, at about 160 km/hr (100 mi/hr). The principal observers were Ann Haynes-Sutton and D. Brandon Hay. Ground truthing (Table 2) was carried out in early April at sites selected from the aerial surveys because of their relatively large populations of ducks. Both sets of surveys were delayed due to difficulties with funding and contracts. These data were complemented by data from other surveys that were carried out in November 2002 (Haynes-Sutton & Hay 2001).

Table 1: Dates and Routes of Aerial Surveys 2003

DATE	ROUTE	OBSERVERS[1]	START	END	FLYING TIME
19 Jan 03	Caymanas, Port Henderson, Goat Islands, Old Harbour Bay to Jackson Bay, Hill Run	AS, BH,	6:49	8:55	2hrs 06 min
21 Jan 03	Salt Island Lagoon, Rocky Point, Rio Minho, Milk River to Scott's Cove, Black River Morass, Osbourne Store, Colbeck Hill Run	AS, BH,	6:57	8:56	2hrs 06 mins
22 Jan 03	Whitehouse, Cabaritta, Negril Morass, N. Coast to Falmouth	AS, BH,	7:10	10:57	3 hrs 47 mins
24 Jan 03	Kingston, Moneague, Port Maria, east coast, Morant Pt. to Kingston	AS, BH,	7:06	9:09	2 hrs 03 mins
25 Mar 03	Caymanas, Port Henderson, Goat Islands, Old Harbour Bay to Jackson Bay, Hill Run, Yallahs	AS, BH, HD	0645	0847	2 hrs 02 mins
26 Mar 03	Salt Island Lagoon, Rocky Point, Rio Minho, Milk River to Scott's Cove, Black River Morass, Hill Run	AS, BH, HD	0637	0931	3 hrs 6 min
27 Mar 03	[2]Whitehouse, Cabaritta, Negril Morass, N. Coast to Falmouth, Hampden	AS, BH	0610	0810	2 hrs

[1] Participants in the Surveys - AS: Ann Sutton, BH: Brandon Hay, HD: Herlitz Davis

[2] Appleton Valley was omitted due to low cloud cover

Table 2: Ground truthing – dates and routes

DATE	ROUTE	OBSERVERS[3]	NOTES
25 Mar 03	Hellshire	AS, BH, HD	
1 Apr 03	Great Pedro Ponds	AS, BH	
3 Apr 03	Great Pedro Ponds	AS, BH	
3 Apr 03	Black River Lower Morass (including Wallywash, Thatchfield, Parottee and Broadwater Pond)	AS, BH	
4 Apr 03	Portland Bight (including Salt Gully, Bushy Beach, Galleon Harbour, Longs Wharf, Hayes Ponds, Fish Ponds at Mitchell Town, Rocky Point)	BH, AS, YS, CT, RN	
6 Apr 03	Black River Upper Morass (Elim Dyke Ponds)	AS, BH	
12 Apr 03	Negril and Cabaritta	AS, BH	

4.0 Results

4.1 Population and distribution of migratory ducks

The findings confirmed the results of previous surveys (e.g. Haynes Sutton & Hay 2001) that Blue-winged Teal *Anas discors* were the most common and widespread ducks in Jamaica (Table 3). The numbers observed in January 2003 were lower than those observed in January 2001, but numbers in March 2003 were comparable to those in March 2002 (Table 3). Other migratory species that were observed included Lesser Scaup (*Aythya affinis*) which was not recorded in the aerial surveys in 2001), Northern Shoveler (*Anas clypeata*) and American Wigeon (*Anas americana).*

All three resident species of ducks (West Indian Whistling-Ducks *Dendrocygna arborea*, Ruddy Ducks *Oxyura jamaicensis* and Masked Ducks *Nomonyx dominicus*) were observed, but Masked Ducks were only identified in ground truth surveys (Tables 4 & 5). Ducks were generally most abundant in south coast habitats specially Black River Lower Morass and Portland Bight (Tables 4 & 5). The exception was Lesser Scaup, which was recorded more often on the north coast.

As in previous surveys (Haynes Sutton and Hay 2001) Great Pedro Pond in St. Elizabeth was the most important site for Blue-winged Teal, supporting more than 1000 individuals in March 2003. No ducks were seen at Salt Island Lagoon. Smaller concentrations of ducks were observed in several ponds to the east of Old Harbour Bay in St. Catherine and Mitchell Town (Clarendon) (Tables 4, 5 & 6).

Data from ground truthing generally corresponded with data from aerial surveys (Tables 4, 5 & 6) but was more difficult and time-consuming to gather.

[3] Participants in the Surveys - AS: Ann Sutton, BH: Brandon Hay, CT: Canute Tyndale, HD: Herlitz Davis, RN: Richard Nelson, YS Yvette Strong.

Table 3: Aerial surveys: Duck counts in 2003 and 2001 – results of aerial surveys

SPECIES	JAN-01	FEB-01	MAR-01	APR-01	MAR-02	JAN-03	MAR-03
American Wigeon	0	8	0	0	2	1	6
Blue-winged Teal	1732	3168	1961	236	2328	779	1995
Lesser Scaup	0	0	0	0	0	62	20
Northern Shoveler	5	17	33	0	163	60	28
Ruddy Duck	0	13	0	5	0	6	28
Unidentified ducks	3	4	0	0	50	14	
West Indian Whistling-Duck	45	6	30	5	82	25	54
Total	**1785**	**3216**	**2024**	**246**	**2635**	**946**	**2139**

Table 4: Aerial surveys: Summary of numbers of ducks in major coastal regions, January and March 2003

AREA/SITE	AMERICAN WIGEON	BLUE-WINGED TEAL	LESSER SCAUP	NORTHERN SHOVELER	RUDDY DUCK	UN-IDENTIFIED	WEST INDIAN WHISTLING-DUCK	TOTAL
January 2003								
North Coast[4]	0	38	26	7	5	3	0	**79**
East Coast[5]	0	45	36	17	0	0	11	**109**
South Coast[6]	1	653	0	29	1	11	14	**708**
West Coast[7]	0	43	0	7	0	0	0	**50**
Total	**1**	**779**	**62**	**60**	**6**	**14**	**25**	**946**
March 2003								
North Coast	0	125	14	16	10	4	0	**169**
East Coast	0	18	0	0	0		0	**86**
South Coast	6	1786	6	12	16	4	51	**1885**
West Coast	0	66	0	0	2		3	**18**
Total	**6**	**1995**	**20**	**28**	**28**	**8**	**54**	**2139**

[4] Montego Bay to Port Maria, Montpellier, Moneague and Hampden
[5] Annotto Bay to Harbour View, including major river valleys
[6] Kingston Harbour to Bluefields
[7] Paradise to Great River

Table 5: Aerial surveys: Numbers of ducks at selected wetland units, March 2003

WETLAND UNIT	SUB-UNIT	AMERICAN WIGEON	BLUE-WINGED TEAL	LESSER SCAUP	NORTHERN SHOVELER	RUDDY DUCK	UN-IDENTIFIED	WEST INDIAN WHISTLING-DUCK	TOTAL
Black River Lower Morass	Broadwater	4						23	27
	Elim		2						2
	Parottee Ponds		61					11	72
	Great Pedro Ponds	2	1254	12		4			1272
	Thatchfield				5				5
	Wallywash		3						3
Black River Lower Morass Total		6	1320	12	5	4		34	1381
Black River Upper Morass	Elim		29				4	5	38
	Maggoty				8				8
Black River Upper Morass Total			29		8		4	5	46
Cabaritta Total			7		2				9
Falmouth			48			10	4		62
Ferry/Caymanas	Caymanas		18			2			20
	Ferry		7						7
	Kingston Harbour		44	2					46
Ferry/Caymanas Total			69	2		2			73
Montego Bay[8] Total			68		10	4			82
Negril Total			59	12				3	74
Portland Bight Protected Area	Cockpit		66						66
	Hayes		6						6
	Hellshire		44					8	52
	Hill Run		2		3				5
	Jackson's Bay		0						0
	Rio Minho		20						20
	Salt Island Lagoon		0						0
	Salt Island Creek		164	2				4	170
	West Harbour		66						66

[8] Bogue Islands to Duncans

WETLAND UNIT	SUB-UNIT	AMERICAN WIGEON	BLUE-WINGED TEAL	LESSER SCAUP	NORTHERN SHOVELER	RUDDY DUCK	UN-IDENTIFIED	WEST INDIAN WHISTLING-DUCK	TOTAL
Portland Bight Total			368	2	3			12	385
Queen of Spain's Valley Total	Hampden		9						9
Yallahs Total			18						18
Grand Total		6	1995	28	28	20	8	54	2139

Table 6: Ground truth: Numbers of ducks at selected wetland units, March-April 2003

AREA/SITE	AMERICAN WIGEON	BLUE-WINGED TEAL	LESSER SCAUP	MASKED DUCK	RUDDY DUCK	WEST INDIAN WHISTLING-DUCK
Portland Bight Protected Area						
Hellshire	0	>40	0	0	0	8
Salt Gully[9]	0	130	0	0	0	0
Bushy Beach[10]	0	11	0	0	0	0
West Harbour (Mitchell Town Fish Ponds)	0	200	0	0	0	0
Great Pedro Ponds						
Pedro Ponds	0	934	0	45	6	0
Black River Lower Morass						
Parottee Ponds	0	10	0	0	0	0
Broadwater Pond	4	10	0	5	0	7
Black River Upper Morass	0	0	0	0	0	0
Westmoreland						
Negril Royal Palm Reserve	0	0	0	0	0	c. 10
Trelawny[11]						
Falmouth	0	65	2	0	0	0

4.2 Habitat assessment

4.2.1 Albion/Grant's Pen, St. Thomas

Location: South of the main road near Albion, east of Eleven Miles
Description: A small wetland about 2 km^2 dominated by red and black mangroves, comprising about 5 shallow lagoons, some of which are dry for part of the year, when rainfall is low. There is also buttonwood on the fringes and some herbaceous marsh, dominated by bulrushes.
Use by ducks: West Indian Whistling-Ducks are regularly seen in this site. Migratory Ducks including Northern Shoveler also use the site but in low numbers.

[9] Included in Salt Island Creek in Table 5
[10] Included in Salt Island Creek in Table 5
[11] Data from November 2002

Other species: Crocodiles (*Crocodylus acutus)* were regularly seen in the lagoons and other waterfowl inhabit the site.
Ownership: Not determined.
Threats: In dry seasons some of the ponds may dry out and the site is subject to fire. Direct human impact appears to be low but mangroves are harvested for firewood. Fishing and some illegal hunting has also been reported from this site.
Conservation: Conservation of this site has previously been recommended.

4.2.2 Yallahs Ponds, St. Thomas

Location: South of the main road at Yallahs
Description: The Yallahs Ponds form an extensive hypersaline lagoon system separated from the sea by a sandy berm, which supports scrubby coastal vegetation and buttonwood mangroves. On the landward side the pond is fringed by logwood scrub and pasture.
Use by ducks: Blue-winged Teal appear to use Yallahs Ponds consistently throughout the winter. However they are mainly restricted to one very small lagoon on the southern margin.
Other species: Least Terns (*Sterna antillarum)* nest on slightly raised areas of the lagoon in dry years when water levels are low. Shorebirds (including migratory species) also use the ponds. Crocodiles use the ponds, hawksbill turtles nest on the beaches and manatees frequent the adjacent sea.
Ownership: Not determined.
Threats: Inappropriate development of surrounding lands, contributing to changes in the water regime. The ponds are frequently used for waste disposal and are threatened by pollution from wastes.
Conservation recommendations: Conservation of this site has previously been recommended.

4.2.3 Salt Island Lagoon, St. Catherine

Location: Salt Island Lagoon lies to the northwest the Hellshire Hills. It is part of the Portland Bight Protected Area.
Description: Salt Island Lagoon is a large area of herbaceous wetland dominated by a mosaic of reeds and open water. It is close to extensive wetlands associated with Salt Island Creek and many wetland species move into the lagoon when it is suitable.
Use by ducks: In the winter of 2000-2001 and early winter 2001this was one of the best sites for Blue-winged Teal in Jamaica. However it is vulnerable to changes in water level (see below).
Other species: The area is used by crocodiles when the water level is suitable.
Ownership: Undetermined
Threats: The lagoon has apparently been severely affected by changes in the drainage patterns as a result of a failed fish farming enterprise in the 1980s that redirected water flows away from the pond. In good years it provides excellent shallow water habitat for ducks. However in dry years it may dry out (as it did in 2001) and in wet years it may flood and become too deep for ducks. The area is used regularly for illegal duck hunting.

Conservation: This area is part of the Portland Bight Protected Area. The duck populations of this area could be improved if measures were instituted to maintain water levels throughout the year. This would be of benefit to other waterfowl and crocodiles as well.

4.2.4 Caymanas Dyke Ponds, St. Catherine

Location: Caymanas Estate, at the foot of the hills
Description: These ponds were formed when dykes were built to collect water for irrigation. They are relatively shallow, permanent ponds, surrounded by reeds.
Use by ducks: Ducks (including Blue-winged Teal, West Indian Whistling-Ducks and Masked and Ruddy Ducks) were regularly reported from this area in the past. However they may have been driven away by illegal hunting and the occlusion by vegetation of some of the shallower feeding habitat. Surprisingly few ducks were counted in these ponds, despite their apparent suitability as habitat. Species observed included Blue-winged Teal and Northern Shoveler.
Other species: Several rare species of birds including Black Rail (*Rallus jamaicensis)* have been reported from this site. Other waterfowl particularly coots (*Fulica americana)* are common on these ponds. The waterfowl in this area may be shared with the Riverton wetlands as well.
Ownership: Caymanas Estate
Threats: The amount of open water in some of the more accessible ponds is being reduced as plants grow in and occlude it. This reduces the available habitat for waterbirds. However the main limiting factor may be disturbance by illegal duck hunters.
Conservation: This site should be protected and managed

4.2.5 West Harbour, Clarendon

Location: Located to the east of Mitchell Town and north of Portland Cottage, this is the largest remaining, relatively pristine natural harbour in Jamaica.
Description: West Harbour is encircled by Red Mangroves, with Black, White and Buttonwood behind.
Use by ducks: Hunters report that large numbers of ducks regularly use the shallow mangrove lagoons as staging areas. Blue-winged Teal were the only abundant species observed.
Other species: Crocodiles are abundant. Shorebirds are also seasonally abundant.
Ownership: Monymusk and other private interests.
Threats: Industrial development, particularly expansion of the solar salt works. Inappropriate housing development e.g. Operation Pride housing in the mangroves. Possible effects of accumulated lead shot near hunting stands.
Conservation: This area is part of the Portland Bight Protected Area and some parts are protected as a Game Sanctuary.

4.2.6 Jackson's Bay, Clarendon

Location: This wetland lines the coast from the Jackson's Bay Gun Club to Rocky Point.

Description: A series of mangrove lagoons, of varying depths and salinity (from hypersaline to saline).
Use by ducks: Blue-winged Teal and Northern Shoveler are regularly reported from this area but no ducks were observed during this survey.
Other species: Shorebirds and crocodiles are abundant. Sea turtles nest along the coast.
Ownership: Some is privately owned but most of the area is not determined.
Threats: The area is used for hunting and is the subject of development interests such as fish and shrimp farming and housing in adjacent areas.
Conservation: This area is part of the Portland Bight Protected Area and is proposed to be a special management area.

4.2.7 Great Pedro Ponds, St. Elizabeth

Location: East of Treasure Beach
Description: A series of shallow, spring-fed, freshwater, brackish and saline ponds, ranging from very small seasonal ponds, to large, more permanent ones
Use by ducks: These sites are used by many species of migratory and resident ducks, including Blue-winged Teal, American Wigeon, Greater and Lesser Scaup and Northern Shoveler. West Indian Whistling-Ducks are seen regularly, and Masked and Ruddy Ducks breed there during the winter. Cinnamon and Green-winged Teal (*Anas cyanoptera* and *Anas crecca*) have also been reported (A. Haynes Sutton, pers. obs.).
Other species: The site is of outstanding importance for shorebirds. Least Terns and Grasshopper Sparrows (*Ammodramus savannarum*) breed around the pond in some years. Crocodiles also use the ponds regularly. Some ponds are important for the endemic Jamaican Slider Turtle (*Pseudemys terrapen).*
Ownership: Private.
Threats: Tourism and housing development.
Conservation: This site is in urgent need of conservation and has great potential for interpretation and ecotourism.

4.2.8 Black River Upper Morass, St. Elizabeth

Location: The upper basin of the Black River north of Lacovia.
Description: An extensive freshwater marsh, with large areas of sedges, patches of reeds and *Melaleuca*, much altered by drainage, and surrounded by cane fields and fish ponds, but still of great value for wildlife.
Use by ducks: West Indian Whistling- and Masked Ducks breed in the area. Blue-winged Teal are abundant in winter.
Other species: The area supports large populations of herons, egrets, ibis, night-herons, coots and grebes, as well as crocodiles and Jamaican Sliders. The Black Rail, Yellow Breasted Crake (*Porzana flaviventer*) and other rare species inhabit the area
Ownership: Private and government
Threats: Drainage, pollution from Appleton Estate.
Conservation: This area has been proposed for conservation as a protected area, and has also been proposed for inclusion in an extended Black River Ramsar site.

4.2.9 Black River Lower Morass and adjacent areas, St. Elizabeth

Location: Coastal St. Elizabeth and the lower basin of the Black River

Description:
The majority of the Lower Morass is dominated by herbaceous wetland, with small patches of swamp forest and limestone islands. Open water is found in the rivers and streams and in the following areas:

- Great Pedro Ponds (see section 4.2.8 above for a detailed description).
- Thatchfield Ponds. Mangrove ponds beside the coast and spring-fed freshwater ponds in the pastures.
- Parottee Ponds. Hypersaline mangrove lagoon system close to the beach, with herbaceous wetlands including many tiny shallow ponds to the east.
- Luana/Font Hill Ponds. Mangrove lagoons and spring-fed ponds
- Hodges Ponds. Freshwater ponds in pastures
- Broadwater Pond. Freshwater pond in the western morass, surrounded by *Typha*.
- Wallywash Pond. Spring-fed freshwater pond, surrounded by *Typha* with some herbaceous marsh.
- Other small water bodies in the morass.

Use by ducks:
The complex of areas that form the Lower Morass provides some of the best habitat in Jamaica for resident and migratory ducks in Jamaica. Ducks probably move among the areas according to the availability of food and shelter, as well as in response to disturbance.

- Rivers and streams These are mainly steep-sided and deep and rarely support ducks.
- Thatchfield Ponds Blue-winged Teal and resident West Indian Whistling-Duck, Masked Duck and Ruddy Duck regularly use these ponds.
- Parottee Ponds Small numbers of Blue-winged Teal use the main ponds. West Indian Whistling-Ducks use the mangroves and herbaceous marsh for roosting and feeding.
- Luana/Font Hill Ponds The West Indian Whistling-Duck, Blue-winged Teal and other waterfowl can be found in these ponds.
- Hodges Ponds: They support small numbers of ducks, mainly Blue-winged Teal. It is likely that they are used by whistling-ducks at night but this needs to be verified.
- Broadwater Pond The resident West Indian Whistling-Duck Ruddy and Masked Ducks have been seen in this pond. Migratory Blue-winged Teal are common and American Wigeon were also recorded here.
- Wallywash Pond West Indian Whistling-Ducks have been reported from the pond about ten years ago but no ducks were observed there during the surveys.

Other species: The Black Rail, Yellow Breasted Crake and other rare species inhabit the area. Jamaican Slider Turtles, American Crocodiles many species of rare plants can also be found in these wetlands.
Ownership: Government and private.
Threats: Inappropriate development, abstraction of water for irrigation, ganja cultivation, and illegal hunting.
Conservation: The Lower Morass is a Ramsar site and a proposed protected area.
The Font Hill Ponds are part of a Wildlife Reserve owned and operated by the Petroleum Corporation of Jamaica but needs management and interpretation to improve value for humans and wildlife.

4.2.10 Negril, Westmoreland and Hanover

Location: The Negril Environment Protected Area includes the entire watershed.
Description: The Negril Morass is largely dominated by herbaceous wetland, and the areas of open water suitable for ducks are limited to the following areas:

- Sewage ponds near Sheffield
- Shallow ponds in pastures at Negril Spots
- Mangrove and Giant Swamp Fern ponds south of the South Canal
- Artificial ponds at the Royal Palm Reserve
- Shallow water in the morass to the northwest of the airport
- Mangrove lagoons north of the North Canal
- Fish ponds near Orange River and Green Island.

These areas form less than 5% of the total area of the wetland.
Use by ducks: Small numbers of Blue-winged Teal and Northern Shoveler occur regularly in most of the areas, but mainly in the ponds south of the South Canal. West Indian Whistling-Ducks roost and breed in the Royal Palm Reserve. Their population may be up to 60 individuals.
Other species: The relatively uncommon Yellow-breasted Crake also occurs in the Royal Palm Reserve. Crocodiles are present in the Negril Morass.
Ownership: Government of Jamaica and private
Threats: Ganja cultivation, drying out of the morass due to channelization and levies, fire.
Conservation: The entire area is protected in the Negril Environmental Protection Area. However there is a need for management and habitat restoration and improved interpretation. The Royal Palm Reserve has great potential for conservation and education and has been proposed as the site for a watchable wildlife pond.

4.2.11 Cabaritta, Westmoreland[12]

Location: The Frome sugar estate and adjacent lands on the plain that surrounds Savanna-la-Mar.
Description: The Cabaritta wetland was once an extensive area of mangroves, herbaceous wetland and swamp forest that encircled Savanna-la-Mar. The area has been extensively drained and the rivers and streams canalised. The remnants include coastal mangroves and swamp forest, an unusual isolated patch of inland mangroves, a large area of abandoned rice cultivation, canals, rivers a blue hole and many permanent and seasonal ponds, most of which are surrounded by cane or pasture.
Use by ducks: Blue-winged Teal were most numerous in the abandoned rice cultivation, but were also seen in small numbers in many other small ponds. The sheltered bays of the Paradise estate and other places to the west are among the few places in Jamaica in which ducks such as Lesser Scaup are regularly seen in groups at sea. West Indian Whistling-Duck also use the area

[12] An attempt was made to visit as many as possible of the Cabaritta Ponds, however vehicular access is very limited to some areas, and there was insufficient field time to allow for a thorough search.

Other species: This area has not been well studied and there is little information on other species that use the wetland. During aerial surveys large numbers of other waterfowl such as ibises, herons and egrets are often observed.
Ownership: Frome Estate, other private land owners
Threats: Duck hunters regularly use this area and shoot whistling ducks as well as teal (D. Grizzle, pers. comm.).
Conservation: The area is insufficiently known and no recommendations have been made for conservation. However selected areas, including the wetlands at Paradise and several other spots should be considered for protection.

4.2.12 Falmouth, Trelawny

Location: The Falmouth wetlands encircle the town of Falmouth, stretching from Flamingo Beach in the west to White Bay in the east and north along the Martha Brae.
Description: The area includes the Half Moon Bay, the Phosphorescent Lagoon and other smaller associated lagoons, all of which are lined with Red Mangroves, with Black Mangroves and Buttonwood behind, and occasional White Mangroves. South of the town there are extensive dense Red Mangroves with small lagoons, as well as fish ponds, some of which are abandoned and are mostly being re-colonized by Red Mangroves.
Use by ducks: Few ducks were observed in these ponds, but most observations were of Blue-winged Teal. West Indian Whistling-Ducks used to live in the ponds at Mountain Spring Point, but have not been seen there for more than 5 years. An attempt to locate them using playback at dusk in November 2002 produced no response.
Other species: These ponds are used by many species of waterbirds (including the uncommon Yellow-breasted Crake), and by crocodiles.
Ownership: Not determined.
Threats: Construction of the North Coast Highway to the north and across the eastern corner may change drainage patterns. Illegal hunting of ducks has been reported from this area.
Conservation: The area is listed as a candidate for inclusion in Jamaica's protected areas system (NRCA 1997) but no steps have been taken towards implementation.

4.2.13 Duncans, Trelawny

Location: Close to the coast at Duncans
Description: Small shallow coastal lagoons
Use by ducks: These ponds are regularly used by small numbers of Blue-winged Teal
Other species: Several species of shorebirds frequent these shallow saline ponds.
Ownership: Private
Threats: Coastal development
Conservation: The area is listed as a candidate for inclusion in Jamaica's protected areas system (NRCA 1997) but has not been implemented

5.0 Discussion

5.1 **Species conservation**

Management considerations for migratory and resident species are different. The abundance of most species is determined by two factors – the suitability of the habitat and the level of disturbance. The biology of the migratory species is well known, while relatively little is known about West Indian Whistling-Ducks and Masked Ducks.

5.1.1 **Migratory Species**

5.1.1.1 **Blue-winged Teal**

Blue-winged Teal are the most abundant species of ducks in Jamaica. They are also the most important potential game species (see section 5.3.1).

On any given date during the wintering season the number of ducks that can be observed in aerial surveys in Jamaica is between 2000-3000, the majority of which are observed at Salt Island Lagoon and Great Pedro Ponds. Jamaica is not an important location for over-wintering Blue-winged Teal or other migratory species It may be important for transients, but this cannot be determined without marking individual ducks. Similarly, the importance of particular sites to individual ducks (site-fidelity) cannot be determined without a study of marked individuals. Many neotropical migrants have high levels of site fidelity but there is no information about site fidelity of migrant ducks in Jamaica.

The numbers in Jamaica are trivial compared to those in Cuba, where a single site provides over-wintering habitat for a million ducks. Duck abundance is dependent on water depth and food availability as well as level of disturbance. These factors can be managed. Therefore there is potential to increase their populations (see below).

It is important to note that with more than 1000 potential hunters in Jamaica, the population of ducks is unlikely to be able to sustain a satisfactory hunting season. Ducks also have ecological value and considerable potential for eco-tourism.

5.1.1.2 Other migratory ducks

Other species are now relatively uncommon but they have always been recorded in habitats that also support Blue-winged Teal. Whereas much is known about the requirements of different species for successful nesting less is know about whether wintering birds have such specific requirements. It appears likely that the wetlands could be managed to suit various types of ducks. The majority of ducks commonly reported in Jamaica are dabbling ducks. These generally require relatively shallow waters that will support healthy populations of aquatic vegetation that ducks can dabble for from the surface. They are also very sensitive to disturbance and seem to prefer ponds that afford some vegetative cover close by. This means that large areas of shallow open water possibly containing emergent trees or other cover would be best for increasing numbers of ducks wintering in Jamaica.

5.1.2 **Resident Ducks**

5.1.2.1 **West Indian Whistling-Duck**

Conservation measures are urgently needed to ensure the survival of this species. Measures that are currently being implemented include:

- A conservation education programme bringing "Wondrous Wetlands of the West Indies" to educators throughout Jamaica.
- Development of "Watchable Wildlife Ponds. e.g. Royal Palm Reserve

Further measures that are needed include:

- Protection of key habitats such as Black River Upper Morass.
- A status and distribution survey to determine the various threats to the groups of whistlers in Jamaica and implementation of mitigation measures to address each threat.

5.1.1.3 **Masked Duck**

This species is very uncommon regionally and locally and is in need of specific conservation measures. They appear to use very similar habitats types as Ruddy Ducks but are not usually as common. They require shallow freshwater ponds with a lot of aquatic vegetation particularly surface vegetation such as water lilies, water hyacinth and water lettuce. This means that wetlands managed for Blue-winged Teal and most other species of ducks will be less suitable for Masked Ducks. Areas with an abundance of cover and minimal disturbance will have to be maintained separately to accommodate this species.

5.1.1.4 **Ruddy Duck**

They are more common than Masked Ducks even though they seem to prefer very similar habitats. This may be because Ruddy Ducks appear to be more tolerant of open water and are more willing to remain in shallow ponds that do not support emergent vegetative cover as long as there is sufficient food available.

5.2 **Habitat conservation**

5.2.1 **Protection of critical habitats for threatened species**

The following sites should be conserved and managed in the interest of resident ducks and other threatened species:

- Great Pedro Ponds
- Black River Upper Morass
- Luana/Font Hill.

5.2.2 **Protection of refuges for migratory ducks**

"*Refuges should be considered as reservoirs that ensure a sustained yield from a renewable resource" "instead of birds being 'burned out' of a district during the early part of the hunting season, their movements along the migration route are more leisurely because of the presence of resting areas protected from shooting*." Salyer 1945.

Jamaica's populations of migratory ducks are unstable and vulnerable to disturbance. The creation of a system of refuges would help to stabilize the population and could play an important role in making hunting sustainable (see section 5.3.1). These refuges are

mainly in already identified protected areas (including areas which have been identified in other reports such as Black River Upper and Lower Morasses, Portland Bight, Negril).

5.3 **Sustainable use of ducks**

5.3.1 **Hunting**

Hunting has proved to be an important means to provide added recreational value from waterfowl while providing funds to support conservation of habitat and threatened species and research and monitoring. Illegal hunting is currently a problem in many of the wetlands studied and is possibly responsible for the local extirpation of ducks from various wetlands. The current pressure on the environment by human activity means that if hunting to be sustainable and to provide a net benefit to the environment it will require careful and qualified management. In the short term it is important that increased enforcement and education is implemented to reduce the impact of poaching.

5.3.1.1 **Increasing the numbers of ducks**

There is sustained interest in hunting (e.g. proposals from the Game Bird Committee for a hunting season). The levels and impact of poaching is undetermined. Duck populations in Jamaica are small. Migratory ducks tend to occur at the same sites as threatened species. Therefore the potential for sustainable hunting is currently very limited. This potential could be increased through

- management of habitats (e.g. control of water levels, protection of refuges, protection of critical habitats for threatened species)
- protection of refuges in protected areas adjacent to hunting areas to attract ducks on migration to stay in Jamaica and to act as reservoirs throughout the season, replenishing areas which may be managed for hunting.

5.3.1.2 **Managing hunting at selected sites**

Development of innovative partnerships between hunters and conservation interests to create and manage hunting reserves for ducks is an essential prerequisite for sustainable hunting.

- Potential sites that could be considered include Mountain Spring Point near Falmouth, Caymanas Dyke Ponds and Salt Island Lagoon in St. Catherine.
- Hunting at selected sites could commence in October as the birds begin to arrive, but should end in January, as pair formation begins.
- Hunting could start one hour after sunrise and end one hour before sunset, this should minimise impacts on nocturnal species such as West Indian Whistling-Duck and Masked Duck.
- Hunting should be limited to one or two days per week with several days break shooting sessions.

5.3.1.3 **Managing hunting effort**

Due to the very limited supply of ducks, it may be necessary to limit entry into the hunt if too many persons want to hunt. Other countries in the region have done this by arranging a lottery for hunting opportunities.

5.3.1.4 **Managing hunting**

Due to the extreme sensitivity of hunting enforcement, education and habitat management are essential to minimise the potential negative impacts of hunting on resources that are already under considerable pressure from human activity.

5.3.2 **Tourism**

The potential for development of nature attractions that could provide important recreational opportunities for Jamaica is significant. Tourists visiting Jamaica find such attractions particularly inviting as the environmental awareness and curiosity of the average visitor to the island is growing. This is clear from the global increase in attractions marketing themselves as eco-tourist destinations. Significant income could be generated if Jamaica is able to develop high quality nature based attractions that could compete with the more well-known eco-tourism destinations in South and Central America. Development of board walks and hides has been proposed for several sites (including Negril Royal Palm reserve, West Harbour and Rocky Point. Such attractions are dependent on abundant wildlife for visitors to see and Blue-winged Teal provide an exhilarating spectacle.

5.4 **Research and monitoring**

It is important that monitoring of habitat and populations is continued in the medium to long term to determine trends in duck populations. Monitoring is especially important in areas where wetlands are threatened or are being managed to increase populations. Specific research into the biology and ecology of threatened species such as the West Indian Whistling-Duck may provide NEPA and Protected Area managers with crucial information needed to provide for their management and to enhance recovery efforts. The aerial survey method has long been established as the most efficient method for monitoring population trends in migratory ducks and it is important that this be continued. Aerial surveys should be conducted a **minimum** of two times a year (December and March) to monitor trends locally. It could also help to determine how population trends throughout their migratory range affects trends in Jamaica and examine the influence of weather on the numbers of ducks over-wintering in Jamaica. This would be possible if Jamaica continues to participate in regionally integrated survey efforts such as the one supported by Ducks Unlimited.

In addition the data generated from aerial survey flights could be optimised using readily-available computer and GPS technology and training in order to provide results on other wildlife, habitat and threats. Currently, data are recorded manually which limits the number of observations that can be recorded without interfering with observations. Automatic recording, using computers, microphones and GPS technology can greatly increase the quantity and quality of data that can be recorded.

Ground surveys are essential to provide data on resident species that are not monitored effectively. However ground truthing is relatively inefficient because it requires a lot of human resources, time, equipment and vehicles. Therefore ground truthing programme should be carefully designed and focused to address specific management-related questions such as:

What is the distribution and status of resident duck species in relation to potential game species? Which sites are most important for the conservation of resident species?

In contrast to aerial surveys, there is no standard methodology for ground truthing tropical ducks. West Indian Whistling Ducks and Masked Ducks are particularly difficult to census. The Society for the Conservation and Study of Caribbean Birds (SCSCB) is currently developing a standard survey manual for West Indian Whistling Ducks (Haynes-Sutton, in prep.).

Given the shortage of resources efforts should be focused on maximising data collection in existing protected areas (Negril and Portland Bight) and by NEPA staff. It should be possible to provide training to NEPA staff and NGOs to enable reliable data collection to be conducted in a cost effective manner from key habitats islandwide

6.0 Conclusions

The main conclusions of the study include:

- The number of teal present in Jamaica is not apparently sufficient to sustain the traditional type of open hunting season. Therefore a new approach is needed if hunting is to be considered. Detailed recommendations have been made for duck hunting, based on extensive discussions with duck hunters and managers from the Americas.
- Sites that were of special importance for ducks in 2003 included
    - Great Pedro Ponds
    - Black River Upper Morass
    - Luana/Font Hill

In contrast to previous years, there were no ducks in Salt Island Lagoon.

- The ecological and tourism value of ducks should also be considered in the development of plans to manage duck populations for sustainable use.
- Surveys and monitoring to form the basis for adaptive management of ducks should continue. Costs can be minimized by using NEPA staff and participants from NGOs. Aerial surveys are most effective for surveying migrants, while ground surveys are necessary to survey resident species

7.0 Recommendations for sustainable management of ducks[13]

Management of Ducks in Jamaica

Pressure to open a duck hunting season continues, in the light of continued reported increases in fall flights of Blue-winged Teal in North America. Before a hunting season can be opened in Jamaica, it is necessary to meet the following preconditions:

- There should be evidence that duck populations are sufficient to sustain hunting. The evidence from surveys suggests that duck populations are not sufficient to meet the realistic expectations of hunters. Therefore a limited entry hunt should be considered (see below).
- There should be effectively managed protected areas, including key habitats for resident and migrant species. Theses should be geographically paired with hunting areas in order to maximize the benefit. Although some duck habitat is included in the protected area system (e.g. Negril Environment Protected Area and Portland Bight Protected Area) these areas are not currently providing effective protection for ducks or their habitats.
- NEPA and other agencies should have the capacity for effective law enforcement. The current columbid season stretches NEPA's enforcement capacity to the limit and it is unclear whether there is the capacity to add a second hunting season, without negatively impacting other enforcement activities.
- There should be a hunters' education programme designed to increase awareness of resident species, especially W.I. Whistling Duck
- There should be a ban on use of lead shot for hunting

[13] See also summary recommendations provided to NEPA, Appendix

- The timing (dates, hunting days and time of day) of any hunting season should be designed to minimize collateral damage to other ducks and non-game wetland species.

None of the above conditions have been met and therefore at the present time **an An ISLAND WIDE OPEN SEASON for the hunting of Migratory Ducks in Jamaica WOULD NOT BE SUSTAINABLE due to the absence of effective management and protection of wetland habitats and the lack of capacity to enforce laws, particularly with respect to the more vulnerable resident species**.

However all the above preconditions could be addressed, if there is commitment on the behalf of hunters to ensuring sustainable hunting. Once the preconditions have been met then a season could be opened.

The management structure for hunting in breeding areas such as North America is not directly transferable to Jamaica however important lessons can be learned from abroad. In North America the formation of Joint Ventures between hunters, conservation interests and other partners has proved very effective in improving hunting while enhancing other uses. Similarly the development of new partnerships (between NRCA, Hunting Clubs and NGOs such as Caribbean Coastal Area Management Foundation CCAM) to create effectively managed hunting reserves and protected areas is necessary to fund and implement duck hunting.

Species conservation
Although the number of ducks wintering in Jamaica is relatively small the overall health of the global population of Blue-winged Teal suggests that a limited hunting season for that species could be sustainable. The island is not a primary wintering ground and as such the sustainability of the hunt and the protection of resident populations requires great control over hunting activities as the ducks will move on if they are disturbed. Monitoring programmes for non-game wetland species should be implement to ensure that any impacts can be assessed.

Ground surveys and aerial surveys produced very similar results for migratory and resident species. However ground truthing proved better than aerial surveys for surveying Jamaica's resident duck populations. This is because of the nocturnal and crepuscular behaviour of these species. West Indian Whistling Ducks usually conceal themselves in trees or reed beds during the daytime. Masked Ducks (and to some extent Ruddy Ducks) also spend the day concealed in dense vegetation. Their smaller size and habit of diving when threatened makes them difficult to observe from an aircraft. In particular Masked Ducks were not identified from the air in March 2003 although ground surveys revealed unusually high numbers of Masked Ducks in several ponds in south western Jamaica.

- Aerial surveys should be continued in October, January and March to estimate migratory ducks.
- Survey and monitoring methodologies for resident ducks should be developed.
- NEPA should develop its capacity to survey ducks

- A Recovery Action Plan for West Indian Whistling Ducks should be developed and implemented.

Habitat conservation

The surveys have demonstrated that duck populations in Jamaica are small but could be increased through management of selected areas. Trial projects are urgently needed. It is well documented that the creation of duck refuges close to hunting areas greatly improve shooting in the area. Birds filter out gradually from such rest areas and feeding grounds and therefore provide a more uniform and longer shooting season. In North America many hunters belong and donate money to conservation organizations such as Ducks Unlimited that make a significant contribution to wetland conservation. This tradition is part of the columbid hunting culture in Jamaica but is yet to be expanded to cover duck habitats. Duck hunting has the potential to contribute significantly to wetland conservation, to the mutual benefit of hunting and conservation. This link should be explored.

- In Jamaica, reserves close to hunting areas are essential to sustainable, quality hunting because of the low numbers of ducks over-wintering on the island and the need to protect non-game species.
- A network of shooting preserves and game reserves must be developed using scientific survey results, habitat assessments, local knowledge and experience and hunter inputs.
- Once areas have been designated it is essential that revenues from hunting be applied directly to support management of shooting preserves and restorative strategies to optimize the habitat quality of the game reserves.

Limited entry hunt

The object of the season should be to provide a quality hunting experience for the participants. The primary objective of whatever system is employed must be to provide equitable access to a sustainable hunt for eligible persons. Given the limited numbers of ducks available it seems likely that we will have to adopt a limited entry system. This will ensure that people who hunt can have a reasonable expectation of getting their bag, thus reducing frustration that can lead to non-game species being taken. It could also provide a mechanism to generate the revenue needed to manage hunting areas and associated reserves. The specific design of any limited entry system will have to be developed in consultation with duck management experts from other countries, local hunters, scientists and conservation interests. The structure could be based on a lottery system which is practiced in many areas in the world, including State Wildlife Management Agencies in the United States. In this system, biologists determine the number of hunting opportunities that the duck population can sustain. Prospective hunters buy lottery tickets and a predetermined number win the opportunity to hunt. These people are allowed to buy hunting permits and to shoot in predetermined areas.

Hunters' Education

Duck hunters should be required to learn and demonstrate knowledge of hunting such as species identification, environmental stewardship, hunting ethics and regulations.

Hunting Season in Jamaica – timing

Hunting season could begin as soon as Blue-winged Teal begin to arrive, usually in October. It is known that pair formation and courtship displays take place here in Jamaica so that breeding can begin as soon as they arrive on their breeding grounds. Hunting should cease in sufficient time to allow for successful pair formation to avoid negatively impacting the breeding success of those birds that are not harvested. Teal typically begin to leave the island in early April and have all left by mid April. Hunting days should be spaced to provide resting periods between hunting disturbance. Hunting sessions should begin and end only when there is adequate daylight to afford positive identification of species. This is especially important given the fact that W.I. Whistling ducks are often flying between roosting and feeding areas during these times of low light.

These surveys have illustrated that conservation measures are urgently needed to prevent the loss of many of Jamaica's wetlands and some waterfowl species. The sustainable hunting of Blue-winged Teal may be possible ONLY if stringent management measures limit the damage to non target populations and wetland habitats. The revenues from this activity can be used to enhance the ecological and recreational value of Game Reserves and provide for the recovery of locally threatened waterfowl.

Literature Cited

Salyer, J.C. 1945. The permanent value of refuges in waterfowl management. Transactions of the North American Wildlife Conference. 10:43-47.

Haynes-Sutton, A. and Hay, B. 2001. Surveys of migratory ducks in Jamaican wetlands. Report prepared for National Environment and Planning Agency and Ducks Unlimited.

Haynes-Sutton, A. In prep. Survey manual for West Indian Whistling Ducks.

Appendix 1: TERMS OF REFERENCE FOR THE PRINCIPAL CONSULTANT ON MIGRATORY DUCKS

SPECIFIC TASKS

1. Carry out aerial surveys to determine the distribution and populations of ducks (19-23 March 2003).

2. Carry out ground truth assessments of duck populations in areas that support relatively large numbers of ducks, (including West Indian Whistling-Ducks) as determined from the aerial surveys, including West Harbour, Jackson's Bay, Great Pedro Ponds, Black River Upper and Lower Morass, Luana/Font Hill, Parottee Ponds, and Negril.

3. Provide recommendations about the sustainable management of the duck population in the selected areas.

5. The report should be typed in simple, clear language and formatted as follows:

    - Main headings should be bold and title case
    - Subheadings should be title case and underlined
    - Double column
    - Font size 12
    - Page setup is letter size

    The final document should be provided as a hard copy and on CD and as Word 97 format or higher.

Output

The total Contract period is 10 man-days, which will be extended over the period March 2003 to May 2003. The due date for each output is as follows: -

- Final report including recommendations submitted by 31 June 2003.

Appendix 2: Data from Aerial Surveys

	19-JAN- 2003			
TIME	LOCATION	NUMBER	SPECIES	HABITAT
6:58	Riverton	2	BWTE	Mangrove lagoons
6:58	Riverton	15	BWTE	Mangrove lagoons
7:01	Riverton	9	BWTE	Mangrove lagoons
7:01	Riverton	2	BWTE	Mangrove lagoons
7:04	Caymanas Dyke Ponds	13	BWTE	Reeds and freshwater ponds
7:05	Caymanas Dyke Ponds	2	BWTE	Reeds and freshwater ponds
7:06	Caymanas Dyke Ponds	30	BWTE	Reeds and freshwater ponds
7:15	Portmore Mall	7	BWTE	Mangrove lagoons
7:23	Flashes/Marble Mine	5	BWTE	Mangrove lagoons
7:30	Manatee Bay	12	BWTE	Mangrove lagoons
8:17	Portland Cottage	8	BTWE	Mangrove lagoons
7:39	Salt Island Creek Pond	10	BWTE	Mangrove lagoons
7:39	Salt Island Creek Pond	38	BWTE	Mangrove lagoons
7:39	Salt Island Creek Pond	8	BWTE	Mangrove lagoons
7:39	Salt Island Creek Pond	2	BWTE	Mangrove lagoons
7:40	Salt Island Creek Pond	3	BWTE	Mangrove lagoons
7:40	Salt Island Creek Pond	11	BWTE	Mangrove lagoons
7:40	Salt Island Creek Pond	4	BWTE	Mangrove lagoons
7:42	Amity Hall Small Pond	50	BWTE	Mangrove lagoons
7:43	Amity Hall Small Pond	7	BWTE	Mangrove lagoons
7:48	Old Harbour Bay E Large Pond	100	BWTE	Mangrove lagoons
7:49	Old Harbour Bay E Large Pond	9	BWTE	Mangrove lagoons
8:04	West Harbour	11	BWTE	Mangrove lagoons
8:05	Rocky Point Peninsula	10	BWTE	Mangrove lagoons
8:11	Portland Cottage E	1	BWTE	Mangrove lagoons
8:11	Portland Cottage E	7	BWTE	Mangrove lagoons
8:11	Portland Cottage	9	BWTE	Mangrove lagoons
8:11	Portland Cottage	15	BWTE	Mangrove lagoons
8:18	Portland Cottage E	12	BWTE	Mangrove lagoons
8:21	Mitchell Town Ponds	4	BWTE	Abandoned fish ponds
8:21	Mitchell Town Ponds	13	BWTE	Abandoned fish ponds
8:22	Mitchell Town Ponds	3	BWTE	Abandoned fish ponds

	19-JAN- 2003			
TIME	LOCATION	NUMBER	SPECIES	HABITAT
8:24	Mitchell Town Ponds	2	BWTE	Abandoned fish ponds
8:27	Mitchell Town Ponds	17	BWTE	Abandoned fish ponds
8:35	Hartlands	25	BWTE	Fish ponds
8:46	Hartlands	29	BWTE	Fish ponds
7:30	Manatee Bay	2	NSHO	Mangrove lagoons
7:52	Old Harbour Bay SE	5	NSHO	Mangrove lagoons
7:53	Old Harbour Bay SE	10	NSHO	Mangrove lagoons
8:15	Portland Cottage	3	NSHO	Mangrove lagoons
8:35	Hartlands	5	NSHO	Fish Ponds
7:06	Caymanas Dyke Ponds	1	NSHO	Reeds and freshwater ponds
7:23	Hellshire	6	UNKNOWN	Mangrove lagoons
7:20	Flashes	2	WIWD	Mangrove lagoons
7:54	Old Harbour Bay Power Station N	1	WIWD	Mangrove lagoons
8:35	Hartlands	2	WIWD	Fish ponds

	21-JAN-2003			
TIME	LOCATION	NUMBER	SPECIES	HABITATS
8:00	Treasure Beach Shopping Centre	1	AMWI	Freshwater pond
7:15	Jacksons Bay	13	BWTE	Mangrove lagoons
7:23	Rio Minho	6	BWTE	River bed and associated ponds
7:24	Rio Minho	15	BWTE	River bed and associated ponds
7:24	Rio Minho	10	BWTE	River bed and associated ponds
7:25	Rio Minho	23	BWTE	River bed and associated ponds
7:25	Rio Minho	3	BWTE	River bed and associated ponds
7:29	Hayes Pond	15	BWTE	Sewage Ponds
7:55	Gt. Pedro Pond	8	BWTE	Hypersaline coastal lagoon fringed with grass
7:56	Gt. Pedro Pond	25	BWTE	Hypersaline coastal lagoon fringed with grass
8:15	Hodges	5	BWTE	Freshwater ponds in grass
8:25	Hodges	5	BWTE	Freshwater ponds in grass
8:27	Baptist Pond/Broadwater Pond	5	BWTE	Freshwater pond fringed with Typha
8:44	Elim	2	BWTE	Freshwater ponds in grass
8:46	Elim S	6	BWTE	Freshwater ponds in grass
8:47	Elim N	5	BWTE	Freshwater ponds in grass
9:00	Santa Cruz	2	BWTE	Freshwater ponds in grass
7:55	Gt. Pedro Pond	3	NSHO	Hypersaline coastal lagoon fringed with grass
7:59	James Pond	1	RUDU	Freshwater ponds in grass

	21-JAN-2003			
TIME	LOCATION	NUMBER	SPECIES	HABITATS
8:27	Baptist Pond/Broadwater Pond	5	UNKNOWN	Freshwater pond fringed with Typha
8:12	Parottee	9	WIWD	Hypersaline coastal lagoon fringed with mangrove

	22-JANUARY-2003			
TIME	LOCATION	NUMBER	SPECIES	HABITATS
8:05	Savanna la Mar Ponds	13	BWTE	Abandoned rice fields
8:05	Savanna la Mar Ponds	8	BWTE	Abandoned rice fields
8:05	Savanna la Mar Ponds	4	BWTE	Abandoned rice fields
8:12	Savanna la Mar Ponds	4	BWTE	Abandoned rice fields
8:29	Little London	8	BWTE	Mangrove lagoon
9:33	Montpelier	8	BWTE	Freshwater ponds in citrus
9:33	Montpelier	3	BWTE	Freshwater ponds in citrus
9:52	Salt Marsh Bay	2	BWTE	Mangrove lagoon
10:03	Queen Of Spains Valley	2	BWTE	Freshwater ponds in cane
10:14	Queen Of Spains Valley	15	BWTE	Freshwater ponds in cane
10:21	E Of White Bay	2	BWTE	Mangrove lagoon
10:25	Braco	10	BWTE	Mangrove lagoon
10:25	Braco	4	BWTE	Mangrove lagoon
7:59	Paradise	22	LESC	Shallow bay
8:08	Savanna la Mar Ponds	14	LESC	Abandoned rice fields
9:44	Bogue Sewage Ponds	9	LESC	Sewage ponds
9:43	Bogue Sewage Ponds	15	LESC	Mangrove lagoon
10:19	White Bay (Falmouth)	2	LESC	Mangrove lagoon
8:34	S South Negril Canal	3	NSHO	Mangrove lagoon
8:34	S South Negril Canal	3	NSHO	Mangrove lagoon
8:34	South Canal Nr Sewage	8	NSHO	Sewage ponds
8:34	South Canal Nr Sewage	3	NSHO	Sewage ponds
8:32	Royal Palm Reserve	4	WIWD	Freshwater pond in grass
8:33	South Canal Nr Sewage	7	WIWD	Mangrove lagoon
10:05	Queen Of Spains Valley	1	NSHO	Freshwater ponds in cane
10:26	Rio Bueno	6	NSHO	Mangrove lagoon
10:36	Priory	5	RUDU	Mangrove lagoon
9:52	Salt Marsh Bay	1	UNKNOWN	Mangrove lagoon
10:05	Queen Of Spains Valley	2	UNKNOWN	Freshwater ponds in cane

	23-JANUARY 2003			

TIME	LOCATION	NUMBER	SPECIES	HABITAT
7:35	Wag Water River	3	BWTE	River
7:39	Wag Water River (Lagoon)	5	BWTE	River lagoon
7:50	Buff Bay	7	NSHO	River
8:24	Plantain Garden River	8	BWTE	River
8:50	Yallahs Pond	4	BWTE	Hypersaline pond
8:52	Yallahs (Berm Pond)	23	BWTE	Hypersaline pond

	25 MARCH 2003			
TIME	LOCATION	NUMBER	SPECIES	HABITAT
6:52	Duhaney River/Riverton	2	BWTE	Mangrove lagoon
6:55	Duhaney River/Riverton	2	NSHO	Mangrove lagoon
6:55	Duhaney River/Riverton	1	BWTE	Mangrove lagoon
6:57	Duhaney River/Riverton	17	BWTE	Mangrove lagoon
6:57	Duhaney River/Riverton	8	BWTE	Mangrove lagoon
6:57	Duhaney River/Riverton	12	BWTE	Mangrove lagoon
6:58	Duhaney River/Riverton	4	BWTE	Mangrove lagoon
7:00	Caymanas Dyke Ponds	2	BWTE	Reeds and freshwater ponds
7:00	Caymanas Dyke Ponds	2	BWTE	Reeds and freshwater ponds
7:00	Caymanas Dyke Ponds	2	SCAUP	Reeds and freshwater ponds
7:01	Caymanas Dyke Ponds	8	BWTE	Reeds and freshwater ponds
7:01	Caymanas Dyke Ponds	1	BWTE	Reeds and freshwater ponds
7:01	Caymanas Dyke Ponds	1	BWTE	Reeds and freshwater ponds
7:01	Caymanas Dyke Ponds	4	BWTE	Reeds and freshwater ponds
7:03	Ferry Pond	7	BWTE	Reeds and freshwater ponds
7:14	UDC Pond Hellshire	7	BWTE	Mangrove lagoon
7:14	UDC Pond Hellshire	35	BWTE	Mangrove lagoon
7:16	UDC Pond Hellshire	2	BWTE	Mangrove lagoon
718	Shrimp hatchery Hellshire	6	WIWD	Mangrove lagoon
718	Shrimp hatchery Hellshire	2	WIWD	Mangrove lagoon
725	Devils Race (S SI Creek)	16	BWTE	Mangrove lagoon
725	Devils Race (S SI Creek)	4	BWTE	Mangrove lagoon
725	Salt Island Creek	2	WIWD	Mangrove lagoon
725	Salt Island Creek	2	WIWD	Mangrove lagoon
725	Cabaritta Point	2	BWTE	Mangrove lagoon
734	Devils Race (S SI Creek)	4	BWTE	Mangrove lagoon
736	Devils Race (S SI Creek)	43	BWTE	Mangrove lagoon
738	Salt Gully	80	BWTE	Mangrove lagoon
741	E. Old Harbour Bay	2	BWTE	Mangrove lagoon
741	E. Old Harbour Bay	8	BWTE	Mangrove lagoon
741	E. Old Harbour Bay	2	NSHO	Mangrove lagoon
742	Salt Gully	5	BWTE	Mangrove lagoon

743	Cockpit Salt Marsh	56	BWTE	River
743	Cockpit Salt Marsh	4	BWTE	River
749	Cockpit Salt Marsh	4	BWTE	River
752	Burial Ground	2	BWTE	Mangrove lagoon
754	Mitchell Town Fish Ponds	2	BWTE	Abandoned fish ponds
754	Mitchell Town Fish Ponds	2	BWTE	Abandoned fish ponds
756	Mitchell Town Fish Ponds	60	BWTE	Abandoned fish ponds
759	West of solar salt ponds	2	BWTE	Mangrove lagoon
834	Yallahs Pond	18	BWTE	Hypersaline mangrove lagoon

	26 MARCH 2003			
TIME	LOCATION	NUMBER	SPECIES	HABITAT
710	Rio Minho	2	BWTE	River and associated ponds
710	Rio Minho	2	BWTE	River and associated ponds
710	Rio Minho	12	BWTE	River and associated ponds
711	Rio Minho	4	BWTE	River and associated ponds
715	Hayes	6	BWTE	Sewage ponds
715	Pedro Pond	2	BWTE	Hypersaline coastal lagoon fringed with grass
739	Pedro Pond	2	NSHO	Hypersaline coastal lagoon fringed with grass
740	Pedro Pond	50	BWTE	Hypersaline coastal lagoon fringed with grass
740	Pedro Pond	1200	BWTE	Hypersaline coastal lagoon fringed with grass
742	Pedro Pond	2	BWTE	Hypersaline coastal lagoon fringed with grass
742	Pedro Pond	2	AMWI	Hypersaline coastal lagoon fringed with grass
742	Pedro Pond	10	NSHO	Hypersaline coastal lagoon fringed with grass
742	Pedro Pond	4	SCAUP	Hypersaline coastal lagoon fringed with grass
749	Thatchfield	5	RUDU	Mangrove lagoons
750	E of Parotee	6	BWTE	Mangrove lagoons
750	S of Wallywash	3	BWTE	Freshwater pond fringed with grass
751	E of Parottee	5	BWTE	Freshwater pond fringed with sedges
751	Parottee	2	BWTE	Mangrove lagoon
754	E of Parotee	2	WIWD	Freshwater pond fringed with sedges
755	Parotee	9	BWTE	Mangrove lagoon
755	E of Parotee	8	BWTE	Freshwater pond fringed with sedges
755	Near Parottee	20	BWTE	Freshwater pond fringed with sedges
755	Near Parottee	8	BWTE	Freshwater pond fringed with sedges
756	E of Parotee	4	WIWD	Freshwater pond fringed with sedges
756	E of Parotee	2	WIWD	Freshwater pond fringed with sedges
757	E of Parotee	3	BWTE	Freshwater pond fringed with sedges
758	Near Parottee	3	WIWD	Freshwater pond fringed with sedges

	26 MARCH 2003			
TIME	LOCATION	NUMBER	SPECIES	HABITAT
758	Baptist/Broadwater Pond	3	WIWD	Freshwater pond fringed with Typha
812	Baptist/Broadwater Pond	2	WIWD	Freshwater pond fringed with Typha
812	Baptist/Broadwater Pond	4	AMWI	Freshwater pond fringed with Typha
813	Baptist/Broadwater Pond	18	WIWD	Freshwater pond fringed with Typha
816	Elim	2	BWTE	Freshwater ponds, rivers and canals
821	Elim	2	BWTE	Freshwater ponds, rivers and canals
821	Elim	3	BWTE	Freshwater ponds, rivers and canals
821	Elim	5	BWTE	Freshwater ponds, rivers and canals
821	Elim	3	BWTE	Freshwater ponds, rivers and canals
821	Elim	4	BWTE	Freshwater ponds, rivers and canals
821	Elim	1	WIWD	Freshwater ponds, rivers and canals
821	Elim	4	UNKNOWN	Freshwater ponds, rivers and canals
823	Elim	2	BWTE	Freshwater ponds, rivers and canals
823	Elim	10	BWTE	Freshwater ponds, rivers and canals
829	Elim	4	WIWD	Freshwater ponds, rivers and canals
925	Hill Run	2	BWTE	Fish ponds
925	Hill Run	3	RUDU	Fish ponds

	27 MARCH 2003			
TIME	LOCATION	NUMBER	SPECIES	HABITAT
706	Maggotty Mini-dam	8	RUDU	Freshwater reservoir
711	Savanna-la-Mar ponds	2	BWTE	Abandoned rice fields
733	Pond N of Savanna-la-Mar	2	RUDU	Freshwater ponds fringed with pasture
736	Pond NW of Savanna-la-Mar	5	BWTE	Freshwater ponds fringed with pasture
742	Negril Royal Palm Reserve	3	WIWD	Freshwater ponds fringed with swamp vegetation
756	Negril S Canal	10	NSHO	Mangrove lagoons
757	Negril S Canal	2	NSHO	Mangrove lagoons
757	Negril S Canal	16	BWTE	Mangrove lagoons
759	Negril S Canal	2	BWTE	Mangrove lagoons
800	Negril S Canal	3	BWTE	Mangrove lagoons
801	Negril S Canal	2	BWTE	Mangrove lagoons
801	Negril S Canal	2	BWTE	Mangrove lagoons
833	Negril N Canal	3	BWTE	Mangrove lagoons
834	Negril N Canal	11	BWTE	Mangrove lagoons

	27 MARCH 2003			
TIME	LOCATION	NUMBER	SPECIES	HABITAT
834	Orange Bay	20	BWTE	Mangrove lagoons
849	Sewage Ponds Montego Bay	10	RUDU	Sewage ponds
850	Bogue Islands	1	BWTE	Mangrove lagoons
858	Lilliput	1	BWTE	Mangrove lagoons
900	Greenwood	12	BWTE	Mangrove lagoons
900	Greenwood	4	BWTE	Mangrove lagoons
900	Greenwood	50	BWTE	Mangrove lagoons
900	Greenwood	4	SCAUP	Mangrove lagoons
903	Salt Bush	3	BWTE	Mangrove lagoons
906	Falmouth Fish Ponds	36	BWTE	Fish ponds
907	E Falmouth small pond	2	BWTE	Mangrove lagoons
907	Mountain Spring Point	2	BWTE	Mangrove lagoons
908	E Falmouth small pond	4	UNKNOWN	Mangrove lagoons
910	E of Trelawny Beach hotel	10	SCAUP	Mangrove lagoons
911	Further E coastal lagoon	5	BWTE	Mangrove lagoons
919	Hampden	4	BWTE	Freshwater ponds surrounded by cane
921	Hampden	3	BWTE	Freshwater ponds surrounded by cane
921	Hampden	2	BWTE	Freshwater ponds surrounded by cane

Appendix 3: Data from Ground Truthing

DATE	TIME	LOCATION	BWTE	RUDU	MADU	WIWD	AMWI	NOTES
25-Mar-03	11:00	Hellshire shrimp farm		0	0	8	0	
25-Mar-03	12:00	Hellshire - UDC site office	>30	0	0	0	0	Difficult to count because view obscured
1-Apr-03	17:04	Pen Pond	0	16	0	0	0	
1-Apr-03	17:10	James Pond	0	0	0	0	0	
1-Apr-03	17:20	Maylen Pond	0	17	5	0	0	
1-Apr-03	17:41	Cokes Pond	4	0	23	0	0	
1-Apr-03	18:08	Main Pond	>119	0	0	0	0	
1-Apr-03	18:30	SiWind Pond	0	0	0	0	0	
3-Apr-03	9:40	Long Pond	11	0	0	0	0	
3-Apr-03	9:51	Mas Jim's Pond	0	0	0	0	0	Dry
3-Apr-03	9:53	Cuba/Long Pond	0	0	0	0	0	
3-Apr-03	10:17	Pen Pond	0	15	0	0	0	
3-Apr-03	10:42	Maylen Pond	0	7	6	0	0	
3-Apr-03	10:48	Main Pond	923	23	0	0	0	Plus many obscured by dense vegetation
3-Apr-03	12:00	Fort Charles mangroves	0	0	0	0	0	
3-Apr-03	12:48	Thatchfield 1	6	0	0	0	0	
3-Apr-03	12:59	Thatchfield 2	0	0	0	0	0	
3-Apr-03	13:09	Thatchfield 3	1	0	0	0	0	
3-Apr-03	13:29	Thatchfield 4	0	0	5	0	0	
3-Apr-03	13:50	Top Hill1	0	0	8	0	0	
3-Apr-03	13:52	Top Hill 2	0	0	0	0	0	
3-Apr-03	14:06	Top Hill 3	0	0	3	0	0	
3-Apr-03	14:24	Wallywash	0	0	0	0	0	
3-Apr-	14:41	Top Hill 4	0	0	0	0	0	

DATE	TIME	LOCATION	BWTE	RUDU	MADU	WIWD	AMWI	NOTES
03								
3-Apr-03	15:20	Parottee	10	0	0	0	0	
3-Apr-03	17:49	Broadwater Pond	10	0	5	7	4	
4-Apr-03	8:33	Salt Gully	130	0	0	0	0	
4-Apr-03	11:05	Bushy Beach	11	0	0	0	0	
4-Apr-03	12:03	Longs Wharf	14	0	0	0	0	
4-Apr-03	14:57	Hayes Ponds	3	0	0	0	0	
4-Apr-03	16:04	Mitchell Town fish ponds 1	52	0	0	0	0	
4-Apr-03	16:23	Mitchell Town fish ponds 2	148	0	0	0	0	
4-Apr-03	18:42	Rocky Point Fishing Beach	0	0	0	7	0	
? Apr 03		Black River Upper Morass - Elim dyke ponds	0	0	0	0	0	
12-Apr-03	11:30	Negril Royal Palm Reserve	0	0	0	10	0	WIWD heard only, reports indicate 25-50
12-Apr-03	14:00	South Negril Canal	0	0	0	0	0	Could not access adjacent ponds
12-Apr-03	17:00	Negril Sewage Ponds	0	0	0	0	0	

Appendix 4: Scientific names of plants mentioned in the text

Black Mangrove	*Avicennia germinans*
Bulrush	*Typha domingensis*
Logwood	*Haematoxylon campechianum*
Red Mangrove	*Rhizophora mangle*
White Mangrove	*Laguncularia racemosa*
Water Hyacinth	*Eichhornia crassipes*
Water Lettuce	*Pistia stratiotes*
Water Lily	*Nymphaea* spp.

Appendix 5: Recommendations For Sustainable Use Of Migratory Ducks
Prepared by: Ann Sutton Ph.D. and D. Brandon Hay B.Sc.
Date: 25 October 2003.

Can duck hunting be sustainable in Jamaica?
Yes, but it would have to be managed in a completely different way from the columbid season. There cannot be an open season for migratory ducks.
This is because low numbers of ducks over-winter in Jamaica. Neotropical migratory birds generally have very high site fidelity. If the few ducks that are found in Jamaica are mainly the same individuals each season, this could have tremendous implications for the sustainability of hunting.
Therefore intensive management is essential to limit the considerable negative impacts that could result from excessive hunting.
Provision of hunting opportunities, if properly managed, could be a tool to provide revenue for management of duck populations.
Duck hunting would be based on the development of creative partnerships between hunters, land owners and managers, and conservation interests.

What are the preconditions for sustainable duck hunting?
Limitation of hunting to sites managed for sustainable hunting.
Practical management of sister reserves close to hunting sites, to serve as reservoirs for game species and refuges for threatened species, (including control of water levels to maximize suitable habitat).
The number of hunting opportunties should not exceed the estimated carrying capacity of the resource. This will ensure satisfactory hunting experiences and minimize collateral damage to other species. It will probably be necessary to implement a limited entry system (possibly managed under a lottery mechanism, if the number of hunters exceeds the carrying capacity).
Adequate resources for effective enforcement.
Regulations enacted to prohibit the use of lead shot for duck hunting.
Regulations enacted to make compulsory hunter education a prerequisite for obtaining a duck hunting permit. Environmental stewardship, legal, management and conservation issues must be a part of the curriculum for hunter certification courses.
Research and monitoring of the impacts of the hunt, which will be essential to evaluating the season and defining the terms of subsequent seasons including modification of bag limits or suspension of the season where this may be indicated.

Where are the potential hunting/reserve sites?
Potential sites that could be considered include Mountain Spring Point near Falmouth, Caymanas Dyke Ponds, Salt Island Lagoon, and West Harbour. All proposed hunting areas should be evaluated based on biological and practical management criteria.

What are the proposed hunting dates?
Hunting at selected sites could commence in October as the birds begin to arrive, but should end in January, as pair formation begins.
Hunting should be limited to one or two days per week with several days break between shooting sessions.

What time of day is suggested?
Hunting could start one hour after sunrise and end one hour before sunset, this would minimize impacts on nocturnal species such as West Indian Whistling-Duck and Masked Duck.

How will the season be funded?
Revenue from hunters' fees should be the primary source of funds that will support the management of the season, research and monitoring as well as habitat of reserves.
It is important that whatever fees are charged they must be sufficient to meet all these needs. This will be difficult given the fact that the numbers of ducks is low and the cost of the sport may become very high.

How will the bag limit be determined?
By a committee that will meet regularly during the season. Factors to be considered will include:
The number of people seeking to hunt
Numbers of birds migrating through Jamaica, as determined by on-going surveys.

What species could be hunted?
Blue-winged Teal is the only species with adequate populations in Jamaica to sustain hunting.

Appendix 6: Powerpoint presentation