

**New Brunswick
Eastern Habitat Joint Venture
Five Year Implementation Plan for the
North American Waterfowl Management Plan**



Ducks Unlimited Canada
Canards Illimités Canada



Wildlife Habitat Canada
Habitat Faunique Canada



The Nature Trust of New Brunswick Inc.
La Fondation pour la protection
des sites naturels du Nouveau-Brunswick Inc.



**New Brunswick Eastern
Habitat Joint Venture**

December 14 2007

Executive Summary

The New Brunswick Eastern Habitat Joint Venture (NB-EHJV) was established in 1989 to implement the *North American Waterfowl Management Plan* (NAWMP) in New Brunswick through a partnership of federal, provincial and regional conservation organizations. The NB-EHJV Five Year Implementation Plan to be known as the *Plan* is an update of the 1989 – 2004 *NB Eastern Habitat Joint Venture Implementation Plan*. The *Plan* outlines the current status of wetland habitats and waterfowl populations in New Brunswick and presents waterfowl population goals and habitat conservation targets for the next five years. The *Plan* is a blueprint for the conservation of important breeding, staging and wintering waterfowl habitat in New Brunswick. It describes the habitat conservation program the NB-EHJV partnership will employ to achieve the waterfowl population objectives, the methods for program assessment and the resource needs. Though this *Plan* may benefit other bird species, it does not explicitly address the objectives for the other bird Pillars of the North American Bird Conservation Initiative (NABCI).

The *Plan* will address 15% (1,105 IBP) of the 7,600 IBP population deficit for dabbling ducks (American black duck, Mallard, green-winged teal, ring-necked duck) in NB through the enhancement or restoration of 1,380 hectares of wetlands and the active management of 13,901 hectares of wetlands to optimum waterfowl brood rearing conditions. A nest box program will be used to increase wood duck and common goldeneye. The *Plan* will address needs of common eider and staging and wintering waterfowl through the securement of 2,716 hectares of wetland and associated upland habitats and coastal islands.

The *Plan* recognizes that other initiatives outside the NB-EHJV complement the NB-EHJV goals and may contribute towards achieving its objectives. Under the *Plan*, relevant complementary programs are described and will be tracked in the National Tracking System (NTS) as and where appropriate.

The *Plan* is ambitious and will require significant resources over the next five years (\$9,763,400). The *Plan* represents roughly a 3 million dollar increase over funding levels delivered the pervious five years. Additional resources must be sought and partnerships expanded if the population objectives of this plan are to be realized.

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2006-2010 NB EHJV Implementation Plan

The 2006-2010 New Brunswick EHJV Implementation Plan describes the objectives, priorities, and programs the partnership will implement in the province. The program significantly advances the goals of NAWMP within NB and provides direct and indirect benefits to other species of birds.

1.0 – INTRODUCTION & BACKGROUND

This Plan highlights the partner's desire to achieve the goals and objectives under the North American Waterfowl Management Plan (NAWMP) for wetland and waterfowl conservation. Objectives and conservation programs outlined in this plan are in concert with those of other species and will not be applied in isolation.

1.1 – North American Bird Conservation Initiative

The North American Bird Conservation Initiative (NABCI) was established in 1999 through a council resolution of the Commission for Environmental Cooperation endorsed by all three member governments (U.S., Canada and Mexico). It aims to ensure that populations and habitats of North America's native birds are protected, restored and enhanced through coordinated efforts at international, national, regional and local levels, guided by sound science and effective management.

A Declaration of Intent for the Conservation of North American Birds and their Habitat was signed in 2005 by all three countries. This declaration formally established a purpose, objectives and governance for a high-level implementation framework. The purpose is “to cooperate to conserve native North American birds throughout their ranges and habitats, and ultimately collaborate with all Participant nations regarding bird conservation”.

NABCI was designed to increase the effectiveness of existing and new initiatives through effective coordination, building on existing regional partnerships such as the Joint Ventures established under the North American Waterfowl Management Plan, and fostering greater cooperation among the nations and the peoples of the continent. It established four bird groupings, called ‘pillars’ for the purpose of conservation planning and implementation: waterfowl, waterbirds, shorebirds, and landbirds.

1.2 – North American Waterfowl Management Plan

The North American Waterfowl Management Plan (NAWMP) is a continental approach to waterfowl and habitat conservation developed by Canada and the United States in 1986, and expanded to include Mexico in 1994. The plan uses regional partnerships, called joint ventures, to conserve wetlands and associated upland habitats for waterfowl. There are three species and 17 regional habitat joint ventures.

1.3 – Eastern Habitat Joint Venture

The Eastern Habitat Joint Venture (EHJV) was formed in 1988 and officially implemented in November of 1989 at the Wildlife Ministers' Council meeting. The EHJV is the largest habitat joint venture with nearly three million km² or 1/3rd of the Canadian land base and 65% of the Canadian population (Figure 1). The EHJV is subdivided into six sections

corresponding to the six eastern provinces (Ontario, Quebec, New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador).

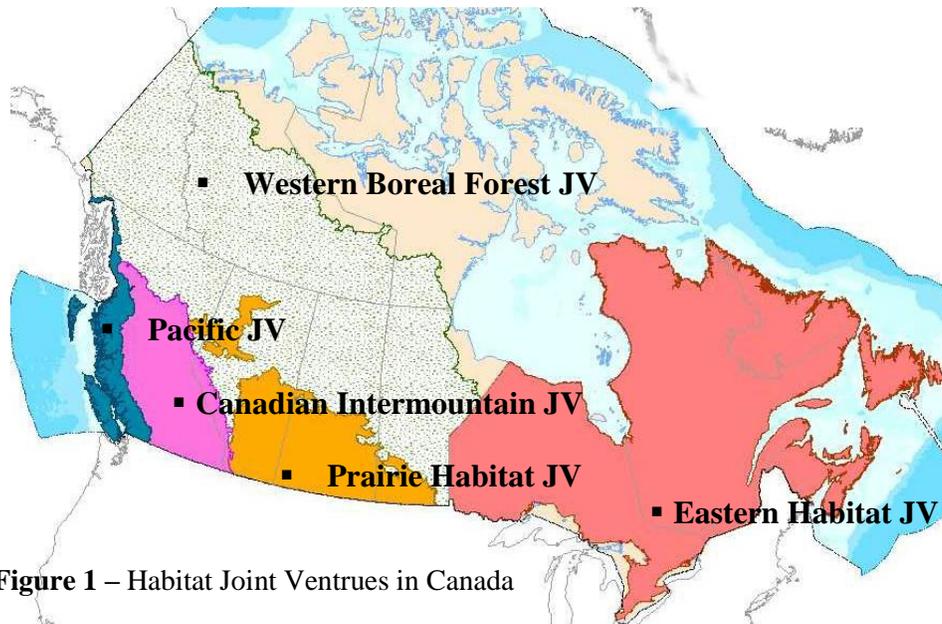


Figure 1 – Habitat Joint Ventures in Canada

A founding principle of the EHJV is to conserve the waterfowl resources of eastern Canada by maintaining and improving the quantity and quality of wetland habitats. Direct and indirect programs aimed at securing, enhancing and restoring valuable wetland and associated upland habitats are the focus of the Joint Venture’s efforts.

The major accomplishments of the EHJV from 1989 to 2004 are outlined in the 2005 EHJV Assessment Report. Direct gains in wetland and associated upland habitat conservation delivered by the EHJV partners in NB include: 12,925ha secured, 12,388ha enhanced and 10,325ha actively managed for waterfowl. In addition to direct gains, considerable progress has been made in NB related to; wetland conservation policies, regulations, inventory and public awareness.

Despite the waterfowl habitat conservation successes, challenges still remain for the NB-EHJV. Habitats continue to be degraded and lost, making them less suitable for waterfowl and other wildlife. Based on a strong scientific foundation, the NB-EHJV partnership is well suited to address these challenges through the cooperative delivery of landscape directed programs.

1.4 – Addressing other Bird Pillars

From “A Strategic Framework for the Delivery of the Eastern Habitat Joint Venture Program”

In Canada, implementation of conservation plans under NABCI will follow development of the other three bird initiatives: Canadian Shorebird Plan (CSP) for shorebirds; Wings Over Water (WOW) for sea birds, marsh birds and colonial birds; and Partners in Flight (PIF) for

landbirds. There are natural links and enhanced opportunities for delivery of programs specifically aimed at the conservation of shorebirds and waterbirds, however, opportunities for linkages with PIF are less obvious. The EHJV can work with its partners to influence activities on habitats important to species covered under these plans until the other plans are funded and ready for implementation.

Under the present structure, with significant NAWMP funding being provided through the North American Wetlands Conservation Act (NAWCA), waterfowl and their habitats remain a clear priority of the EHJV. Implementation of the other bird initiatives by an expanded EHJV partnership will be undertaken as plans are completed and funding becomes available. In the interest of getting the other bird initiatives operational, the EHJV may facilitate the completion of these other plans, and their integration, by providing technical assistance and limited funding. However, it is unlikely that the EHJV will become heavily involved in their implementation, unless there is a strong overlap with existing programs, until additional sources of funding become secured. Once the plans are completed, the EHJV could become the delivery arm of the other plans and provide funding to support “first step” projects that are compatible with the NAWCA funding guidelines while additional funding and resources are acquired. The EHJV Board must be linked into national and international level activities and viewed as the delivery agent responsible for the delivery of other bird initiatives with implementation carried out at the provincial level.

2.0 – PLAN CONTEXT

This section provides information on New Brunswick’s waterfowl populations, provincial habitats and the risk and threats to these resources.

2.1 - New Brunswick Waterfowl populations

2.1.1 – Breeding Waterfowl

Sixteen species of waterfowl are known to regularly breed in New Brunswick (Table 1). Four other species (greater scaup, Eastern Harlequin, redhead and ruddy duck) are infrequent breeders. Common eiders nest colonially on offshore islands and rear their broods in the tidal waters along the province’s coasts. All other breeding waterfowl are widely dispersed throughout the province’s freshwater and coastal wetlands during breeding and brood rearing. Several waterfowl species (e.g. gadwall, wigeon, northern shoveler) have only established breeding populations in New Brunswick during the past century, and occur mostly in the larger managed wetlands (e.g. constructed wetland impoundments). NB’s breeding waterfowl contribute mostly to the Atlantic flyway and some waterfowl to the Mississippi flyway.

Of the sixteen species of waterfowl breeding in NB, nine show increasing trends in breeding, while 7 populations show a stable breeding trend with the remaining 3 appear to be decreasing in breeding population size (Table 1).

Table 1 – Centennial Trends (1970-2003) of Breeding Waterfowl in New Brunswick

Breeding Waterfowl	Status	Breeding Waterfowl	Status
American black duck	Decreasing	Northern pintail	Decreasing
American wigeon	Stable	Northern shoveler	Increasing
Blue-winged teal	Stable	Red-breasted merganser	Increasing
Canada goose	Increasing	Ring-necked duck	Increasing
Common eider	Decreasing	Wood duck	Increasing
Common goldeneye	Stable	Occasional/Infrequent Breeders*	
Common merganser	Increasing	Greater scaup	Stable
Gadwall	Increasing	Harlequin duck	Stable
Green-winged teal	Increasing	Redhead	Stable
Mallard	Stable	Ruddy duck	Increasing

* No records to confirm annual breeding by these species in New Brunswick

2.1.2 – Staging Waterfowl

New Brunswick has many coastal areas where large numbers of waterfowl traditionally congregate during the spring and fall migration. The number of birds staging and wintering in NB is related to continental and local breeding population size, habitat conditions, food availability and weather. The province’s staging waterfowl are primarily associated with the Atlantic flyway.

Staging and wintering contributions from NB may be as important as breeding contributions to continental waterfowl populations. This statement is supported by the diversity of species and the migration numbers. Estimates of fall flights in Atlantic Canada are 3 million waterfowl. However, these estimates are conservative as they consistently under represent sea ducks. The province plays a critical role in the spring migration of black scoter, with roughly 100,000 of the 250,000 Atlantic population (Bondage, D., and J.P. Savard. 1995) stopping off to rest and feed in the Bay of Chaleur during their trip North (Figure 2).

Currently there are no standardized waterfowl staging surveys conducted in the province to determine population estimates and duration at these sites during migration periods. Information on waterfowl use days is lacking, however, it is assumed that residency times of field feeding waterfowl are relatively long.

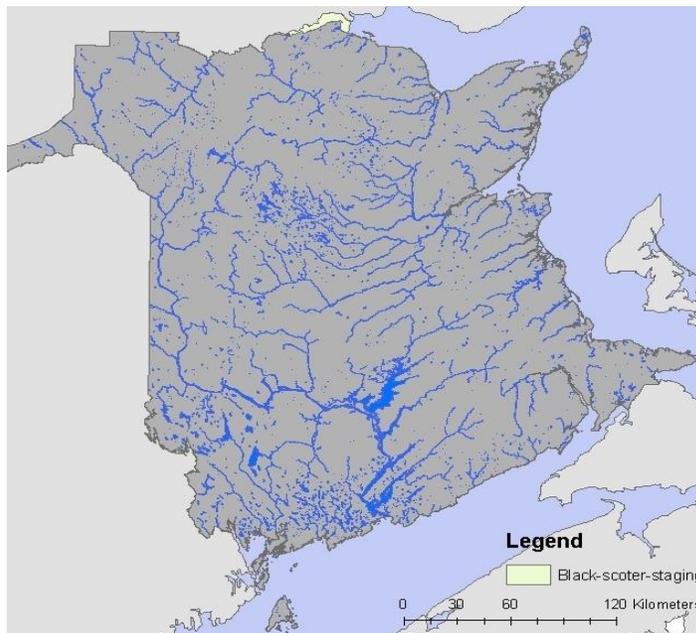


Figure 2 – Black Scoter Staging

2.1.3 – Wintering Waterfowl

New Brunswick's coast lines provides wintering habitat primarily for black duck, common eider, barrows and common goldeneye. Sixteen species of waterfowl are known to regularly over-winter in the open coastal waters surrounding New Brunswick (Table 2). Long-term trend data is not available for many species as current surveys are sporadic and relatively small in scale. Additional data are required to develop trend estimates for wintering waterfowl in Atlantic Canada. Recently, milder winters have resulted in longer ice free periods that are resulting in increased wintering populations as well as potentially increasing the residency time of waterfowl during migration.

Table 2 – New Brunswick Wintering Waterfowl Status and Trends

Wintering Waterfowl			
Species	Status	Species	Status
American black duck	Increasing	Common merganser	n/a
Barrows goldeneye	Stable	Red-breasted merganser	n/a
Black scoter	n/a	Harlequin	Stable
Brant	n/a	Long-tailed duck	n/a
Bufflehead	n/a	Mallard	Increasing
Canada Goose	Increasing	Scaup	n/a
Common eider	Increasing	Surf scoter	n/a
Common goldeneye	n/a	White-winged scoter	n/a

2. 1.4 – Species at Risk

The Eastern Harlequin duck is the only waterfowl species in the province listed under the Provincial Endangered Species Act. The Barrow’s goldeneye joins the Eastern Harlequin duck as a provincially occurring species listed nationally as a *Species of Special Concern* by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

2. 2 – New Brunswick Habitats

New Brunswick covers a land area of 7,278,440 hectares, with an additional 2.1 million hectares of tidally-influenced submerged Crown land and overlying waters. Eighty-three percent of the Province is forested. Provincial Crown land accounts for 3.3 million hectares with the remaining 3.9 million hectares being private land which occurs mostly along the coasts and Saint John River.

2. 2.1 – New Brunswick Wetlands

New Brunswick has over 400,000 hectares of freshwater and coastal wetlands and coastal islands, covering 6% of the province (Table 3). Many waterfowl species use New Brunswick’s wetlands and coastal habitats throughout the year for nesting, brood-rearing, migration and wintering. These wetlands and coastal habitats support a variety of wildlife and waterfowl including American black duck, green-winged teal, Mallard, ring-necked duck, wood duck and many of the province’s species at risk. Many species use coastal islands as they are relatively free of mammalian predators and provide excellent habitat for nesting and migrating seabirds, waders and songbirds. Colonial breeding birds such as common eider, puffin and razorbill nest exclusively on islands. Islands along the southern end of New Brunswick provide ideal rest stations for thousands of migrating birds on their way north and south during their flight through the Atlantic flyway (Appendix I). The province’s islands also provide habitat for species at risk such as the Eastern Harlequin duck, which winters and feeds along exposed rocky headlands and reefs of coastal islands.

Table 3 – NB Wetlands (NBDNR Wetland Inventory)

NB Wetlands and Coastal Features (ha) by Ecoregion									
Wetland Type	Region 1	Region 2	Region 3	Region 4	Region 5	Region 6	Region 7	(ha)	%
Aquatic Bed	134	313	406	362	2000	1582	700	5497	1%
Bog	444	893	1670	4331	9183	64621	1223	82365	20%
Emergent	338	845	1108	2057	11419	6368	13932	36067	9%
Fen	676	1062	1553	2530	13397	42960	1792	63970	15%
Forested	423	550	305	111	1556	1466	245	4656	1%
Shrub	7789	20337	13109	6898	54048	53642	7723	163547	40%
Salt marsh	0	406	0	2675	44	11133	0	14258	3%
Beach/Dune	0	196	0	680	73	3305	0	4253	1%
Tidal Flat	0	726	0	7180	288	15673	0	23868	6%
Rock outcrop	0	8	0	2561	546	50	0	3165	1%
Wetland*	108	76	9301	0	2290	0	0	11775	3%
Total	9913	25411	27451	29384	94846	200801	25616	413422	100%

2.3 – Risk & Threats

In New Brunswick, like many other places in North America, wetlands and other natural habitats have suffered from human development. Traditional land use practices have resulted in the loss of wetlands, degraded water quality, streamside erosion, and altered habitats for wildlife. In New Brunswick, there have been substantial declines in wetlands within the agricultural and coastal areas of the province. A significant though unknown amount of wetlands in agricultural areas has been lost through the infilling or drainage of smaller wetlands. By the early 1900s upwards of 65% (12,332 ha), of the original coastal wetlands in the upper Bay of Fundy had been converted to agricultural land (Reed and Smith 1972). On the Tantramar Marshes alone, approximately 80% of the original wetlands were lost to dyking.

Even with the emphasis placed on the value of conservation, wetlands and coastal habitats are still threatened through human activities. Some of the threats to wildlife and habitat conservation that exist in the province today are:

- Land clearing, draining, dyking for agricultural, residential, cottage and industrial development.
- Industrial encroachment of undeveloped and unprotected coastal and inland areas.
- Expanding aquaculture industry.
- Tanker traffic and the potential for catastrophic oil spills along the coast.
- Ecotourism and other human related disturbance to colonial nesting birds.
- Baitworm harvesting on some mudflats.
- Human made barriers that continue to restrict the natural ebb and flow of the tide to many coastal wetlands.
- All Terrain Vehicle (ATV) use in wetlands

2.4 Priority Waterfowl

2.4.1 – Waterfowl Conservation Region 14

New Brunswick is located in Waterfowl Conservation Region (WCR) 14 (Appendix II). Table 4 outlines the “waterfowl prioritization” rankings for WCR 14. The American black duck, common eider and Mallard all rank “high” as a continental priority in WCR 14 and efforts to conserve habitat for these species will be a priority for the NB-EHJV Program. The Canada goose (NAP) ranks as “moderate high”, and green-winged teal and ring-necked ducks both rank as “moderate” as a WCR 14 continental priority.

Table 4 – Waterfowl Prioritization Chart for WCR 14 (adopted from NAWMP 2004 Implementation Plan)

Species/Population	Continental Priority	Breeding Importance	Breeding Need	Nonbreeding Importance	Nonbreeding Need	Continental Trend 1970-2003
American black duck	HIGH	HIGH	HIGHEST	MOD HIGH	HIGH	decreasing
Common eider	HIGH	HIGH	HIGHEST	HIGH	HIGHEST	decreasing
Lesser scaup	HIGH			MOD LOW	MOD	decreasing
Mallard	HIGH	MOD LOW	MOD	MOD LOW	MOD	stable
Northern pintail	HIGH	MOD LOW	MOD	MOD LOW	MOD	decreasing
Canada goose – NAP	MOD HIGH			HIGH	HIGH	increasing
American wigeon	MOD HIGH	MOD LOW	MOD LOW	MOD LOW	MOD LOW	stable
Black scoter	MOD HIGH			MOD LOW	MOD LOW	decreasing
Blue-winged teal	MOD HIGH	MOD LOW	MOD LOW			stable
Common goldeneye	MOD HIGH	MOD HIGH	MOD HIGH	MOD HIGH	MOD HIGH	stable
Long-tailed duck	MOD HIGH			HIGH	HIGH	decreasing
Surf scoter	MOD HIGH			HIGH	HIGH	decreasing
White-winged scoter	MOD HIGH			MOD HIGH	MOD HIGH	decreasing
Barrow’s goldeneye	MODE			MOD HIGH	MOD HIGH	stable
Bufflehead	MOD	MOD LOW	MOD LOW	MOD LOW	MOD LOW	increasing
Gadwall	MOD	MOD LOW	MOD LOW			increasing
Green-winged teal	MOD	MOD HIGH	MOD HIGH	MOD LOW	MOD LOW	increasing
Harlequin duck	MOD			MOD HIGH	MOD HIGH	stable
Ring-necked duck	MOD	MOD HIGH	MOD HIGH			increasing
Wood duck	MOD	MOD HIGH	MOD HIGH	MOD LOW	MOD LOW	increasing
Atlantic brant	MOD LOW			MOD HIGH	MOD	stable
Common merganser	MOD LOW			MOD HIGH	MOD	increasing
Hooded merganser	MOD LOW	MOD HIGH	MOD			increasing
Red-breasted merganser	MOD LOW			MOD HIGH	MOD	increasing

The NSST developed scores for threats to habitats within WCRs by using the following criteria:

- Very Low: Expected future conditions better than historical conditions.
- Low: Expected future conditions similar to historical conditions – no known threats.
- Moderate: Slight to moderate decline in future habitat abundance or quality, but current conditions similar to historical conditions; or, future conditions expected to be stable but significant habitat losses have already occurred.
- Moderately High: Severe past or expected future deterioration or decline in habitat quality or availability.
- High: Extreme past or expected future deterioration or decline in habitat quality or availability.

2.4.2 - NB – EHJV Priority Waterfowl

Similar to the efforts made to rank the continental priority of the 24 species of waterfowl occurring in WCR 14, the NB-EHJV made an effort to prioritize waterfowl species as they relate to the provincial EHJV program (Table 5).

Based on the following criteria, eleven species were listed as “key waterfowl species” in New Brunswick;

- species that are a NAWMP priority waterfowl species,
- species that are important to the continental harvest and to the flyway harvest
- species that are important to the provincial harvest,
- species that are responsive to management techniques.
- Species of “Special status” (Species At Risk Act) were also included.

Table 5 – Key waterfowl species for the NB-EHJV and seasonal relevance

Species	Seasonal Relevance
Ducks	
American black duck	Breeding, Staging, Wintering
Barrow's goldeneye	Wintering
Black scoter	Staging
Common eider (all 3 sub species)	Breeding, Staging, Wintering
Common goldeneye	Breeding, Staging, Wintering
Green winged teal	Breeding, Staging, Wintering
Harlequin – Eastern	Wintering
Mallard	Breeding, Staging
Ring-necked duck	Breeding
Wood duck	Breeding
Geese Canada goose – NAP	Staging

3.0 – Population Goals and Targets

The goal of the EHJV partnership is to maintain habitat to support breeding waterfowl populations at the relatively high levels observed during the past decade and improve the nutritional status of migrating and wintering waterfowl thereby increasing their survival and reproductive potential. Habitat objectives are linked to the desired long-termed population goals for a group of key species. Habitat objectives for key species are assumed to reflect and accommodate the needs of other waterfowl species within NB. However, population and habitat objectives will be refined and adjusted as new biological and environmental information is developed and integrated into a model-based decision making process.

3.1 – Breeding Waterfowl

Goal: The NBEHJV goal is to increase populations of priority waterfowl species breeding in New Brunswick so that average population size in the future (*20+ years*) equals levels observed during the best years of the past decade.

Targets: Management targets for species and species groups are described below and presented in Table 6. Habitat conservation activities to achieve these targets are described in section 5.0.

Limiting Factors: Attaining waterfowl breeding population goals in NB will require an increase in the breeding populations of black ducks, Mallards, green-winged teal and ring-necked ducks. In effect, programs must reduce or eliminate limiting factors to overcome the population deficit. The key limiting factor for black ducks, Mallards and green-winged teals is assumed to be duckling survival as influenced by breeding habitat availability (assessed through waterfowl settlement rates). However, other factors such as inter-specific competition maybe important drivers of black duck populations. The timing of the Indicated Breeding Pair (IBP) surveys is not optimal for priority waterfowl species such as green-winged teal and ring-necked duck. Key limiting factors for ring-necked ducks are currently unknown.

3.1.1 – Black duck, Mallard, Green-winged teal and Ring-necked duck,

The NB-EHJV established targets for breeding black duck, Mallard, green-winged teal and ring-necked duck considering population density estimates from the Indicated Breeding Pair (IBP) surveys (CWS) from 1996 – 2005 (Figure 3). A benchmark was calculated for each species by averaging the top three years over this period (Appendix III). The long-term waterfowl target is to increase breeding black ducks by 7,600 pairs. The target equals the difference between the benchmark and the 10-year mean for black duck and Mallard combined (Table 6). The target represents a twenty-four percent increase over the ten year IBP average. As current IBP surveys do not adequately represent IBP densities in the agriculture landscape (priority ecodistricts), targets are expressed in terms of additional breeding pairs rather than absolute population levels. A 24% increase over the ten year mean for black duck population targets was also applied to the other species in this group because survey confidence for these species is not as strong.

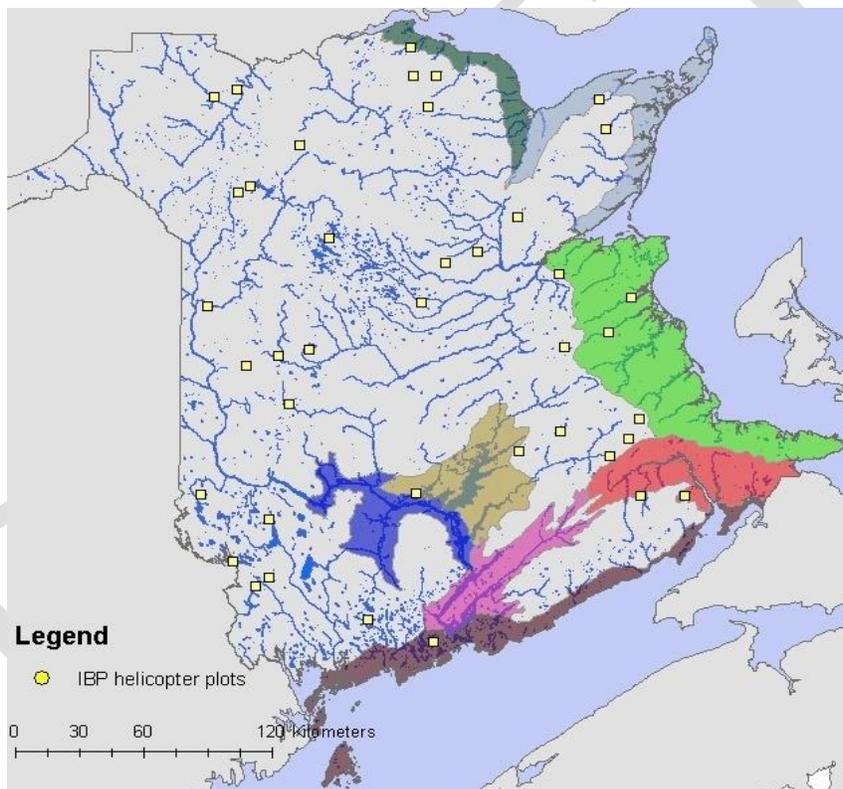


Figure 3 – IBP survey plots & priority ecodistricts

3.1.2 – Common goldeneye and Wood duck: Goals and management targets for breeding common goldeneye and wood duck were established in a manner similar to that for the black duck group using IBP based population estimates (CWS) (Table 6). The long-term management target for this group is an increase of 1300 breeding pairs which corresponds to a 47% increase over the 10 year mean population estimate.

3.1.3 – Common eider: Goals and management targets for breeding common eider was established in a manner similar to that for the black duck group considering population estimates from the bi-annual Bay of Fundy eider breeding pair survey conducted between 1994 and 2006 (Table 6). The long-term management target for common eider is an increase of 1300 breeding pairs which corresponds to a 31% increase over the mean population estimate. This plan will focus on securing critical breeding habitat for common eiders. Securement will not result in increase breeding pairs; however it is a necessary first step due to the climate of increasing coastal property prices and development pressures. The next 5 year NB-EHJV plan will focus on increasing breeding success for common eiders (enhancement).

Table 6. Breeding waterfowl management targets for the NBEHJV. Calculated as the difference between the mean IBP (1996 – 2005) and the Benchmark IBP.

Species	IBP trend (1995-2005)	Benchmark IBP	Mean IBP (1995-2005)	Long-Term Waterfowl Management Target	% increase over 10-yr mean	Primary Habitat Program
Black Duck	Stable	37,000	30,420			
Mallard	Stable	2,500	1,525			
Large Dabblers		39,500	31,945	+7600 pairs	24	Restoration & enhancement program
Green-winged Teal	Stable	7,000	5,905	+ 1400 pairs	24	
Ring-necked Duck	Stable	16,000	11,882	+ 2850 pairs	24	
Common Goldeneye	Decreasing	2,000	1,638		22	
Wood Duck		2,100	1,148		83	Nest box program (new construction & refurbishment)
		4,100	2,786	+1,300 pairs	47	
Common Eider		9,000	7,653	+1,300 pairs	31	Coastal securement program

3.2 – Staging and Wintering Waterfowl

Goal: The NB-EHJV set habitat objectives for staging and wintering waterfowl to maintain those habitats required to support the current use by the Atlantic populations of black scoter, black duck, green-winged teal, common goldeneye and Canada goose (NAP), and subsequent increases associated with breeding waterfowl objectives (Appendix IV).

Targets: Due to the extent of historical losses of coastal wetland, salt marsh restoration and securement remain priorities for staging and wintering waterfowl in NB. Management targets for species and species groups are presented in Table 7. Priority areas for action were established in the NB Coastal Securement Strategy (Appendix V).

Limiting Factors: The abundance and accessibility of quality foods are considered limiting factors for many migrating and wintering waterfowl. For sea ducks and coastal waterfowl it is assumed that the current mix of habitat and food resources is sufficient to meet their needs. Anthropogenic factors however, may be influencing access to these resources.

Table 7 – Ten year population goals for priority New Brunswick Waterfowl

Species	10 Year IBP Population Goals		
	Breeding	Staging	Wintering
American black duck	37,000	*	10,000
Barrow's goldeneye	Based on SARA	*	Based on SARA
Black scoter		Meet requirements of Atlantic Pop.	N/A
Canada goose – NAP		Meet requirements of Atlantic Pop.	N/A
Common eider	9,000	*	15,000
Common goldeneye	2,000	*	*
Green-winged teal	7,000	*	*
Harlequin – Eastern		*	Based on SARA
Mallard	2,500	*	*
Ring-necked duck	16,000	*	*
Wood duck	2,100	*	*

*No goal set

4.0 – HABITAT CONSERVATION STRATEGY:

This section describes the provincial landscape planning units and habitat conservation programs and strategies used to affect them for the conservation of waterfowl in NB. Implementation targets and resource needs are presented in section 5.0.

4.1 - Adaptive Management

An adaptive management approach will be used in the development and refinement of the NB-EHJV conservation programs. Directed studies will be relied on to assess many of the assumptions in the conservation plan. New knowledge will be incorporated into future decisions made in this plan as it becomes available and techniques will be reinforced, altered or discarded accordingly. The NB-EHJV Technical and Steering Committees will evaluate the program on an annual basis and make appropriate changes based on the best science available

4.2 Key Program Areas (KPA)

The Province of New Brunswick is broken up into seven distinct ecoregions (Figure 4). Ecoregional borders are defined primarily by their climate which is in turn dictated by major landforms, latitude, elevation, marine influences and other broad aspects. The seven ecoregions are refined further into 35 ecodistricts based on the geographic distribution of indicator plant species, forest stand types, wetland types and tree species.

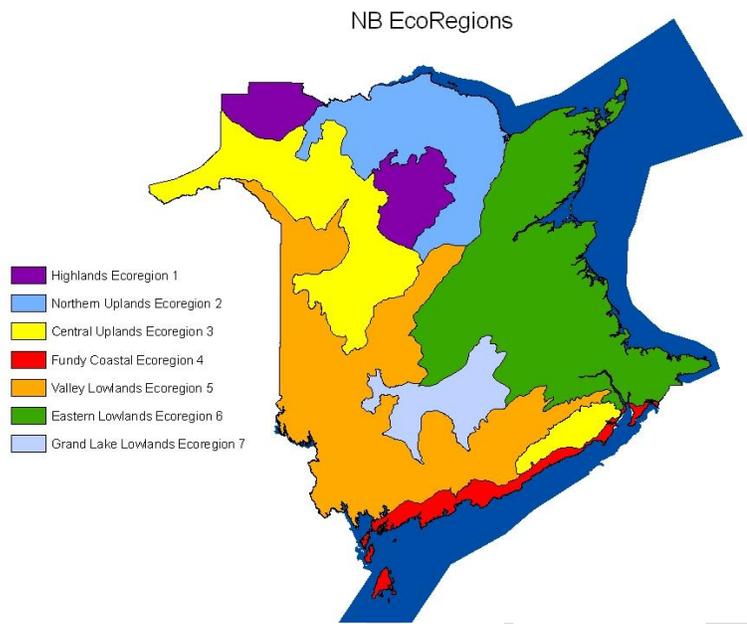


Figure 4 – NB Ecoregions

The conservation programs described in this plan will focus primarily on the eight ecodistricts (Figure 5) that contain much of the key waterfowl and migratory waterbird habitat that has been heavily influenced by humans and/or is currently being threatened (Table 8) (For more details see Appendix VI).

Key Program Areas (KPA) refers to the priority geographic and management areas under NAWMP. The EHJV Program in New Brunswick has two KPA’s – Inland and Coastal.

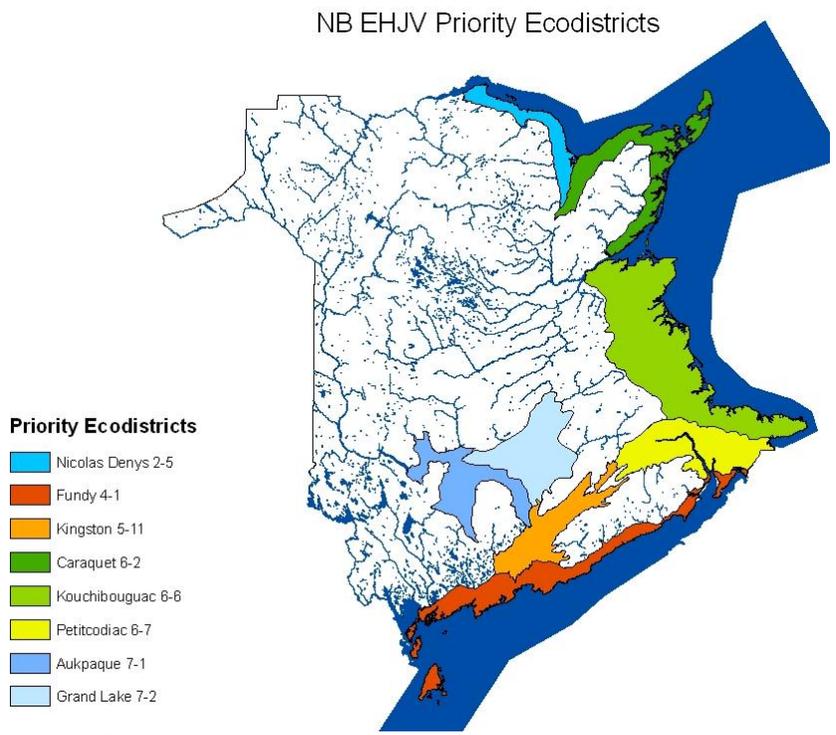


Figure 5 – NB-EHJV Priority Ecodistricts

Table 8 – Non-Forested Land-use Area (ha)

Ecodistrict	Agriculture	Dyked	Occupied	Road	Water	Wetland	Total
Nicolas Denys	8,497	52	9,332	1,856	741	2,788	23,268
Fundy	9,152	3,733	13,752	3,951	6,511	21,784	58,883
Kingston	25,599	0	9,695	2,631	18,836	6,505	63,265
Caraquet	15,030	8	11,784	2,734	2,067	27,802	59,426
Kouchibouquac	53,809	0	11,121	7,632	4,499	49,276	126,337
Petitcodiac	34,203	8,537	12,673	4,395	1,436	10,841	72,086
Aukpaque	17,710	0	13,263	2,379	13,364	17,223	63,939
Grand Lake	7,420	0	5,769	2,377	26,404	8,261	50,230
Total	171,422	12,330	87,390	27,955	73,858	144,481	517,435

4.2.1 – INLAND KPA

The Inland KPA includes all freshwater wetlands and associated habitats located in settled and forested areas. With Provincial policies and 3.1 million hectares of Crown forest land, wetlands and waterfowl production on forested lands is considered relatively secure. Because threats to wetlands in the province’s contiguous forest are relatively low, conservation efforts will focus primarily on the agricultural and settled landscapes.

The agricultural landscape of New Brunswick represents a mosaic of farmed land, small woodlots, rough cover and urban development. The Bay of Fundy dykelands and the Saint John River valley are included in this. Agricultural activity in NB peaked in 1921 with 36,655 farms and 553,631ha in agriculture. While urban expansion continues to encroach in these areas, land in crops increased by 21.7% since 1991, when land in agriculture had reached its lowest levels with just 122,250ha being actively used for agriculture. In May of 2006 the Census of Agriculture counted 2,776 farms in the province, an 8.5% decrease during the past five years. Even though the number of farms decreased, the area being farmed increased by 1.8% between 2001 and 2006 to 395,236ha in agriculture or approximately 5% of the province’s land base (2006 Agricultural Census). Farm production is primarily potato, dairy, poultry, hogs and beef, in addition to vegetables and fruit. Waterfowl use of these lands is primarily for breeding and staging.

Historically, extensive wetland loss occurred more frequently in some regions (dykelands – 12,332ha). Small-scale drainage and in-filling of agricultural wetlands still continues today through slower and the less obvious actions of sedimentation and eutrophication that change the functional value of agricultural wetlands for waterfowl and other wetland associated wildlife.

4.2.2 – COASTAL KPA

4.2.2.1 – Coastal Lands

The Coastal KPA includes coastal wetlands and islands (Table 9). New Brunswick has 5,501 km of coastal shoreline along the Bay of Fundy (39%), Northumberland Strait (36%) and Bay of Chaleur (25%). The provincial coast-line is a complex of salt marshes, estuaries,

tidal mud flats, islands, and saline ponds. In addition, breeding on inland fresh water marshes, many waterfowl require the food rich coastal habitats for staging, molting and wintering (e.g. common eider). Much of New Brunswick's population is settled along the coast, and high demand for property development in coastal areas threatens additional habitat loss. Urban, recreational and industrial development has impacted coastal habitats to varying degrees throughout the province. New Brunswick has 14,617ha of coastal marsh which is critical staging and wintering habitat for many of the waterfowl species in the province.

Table 9 – Wetland and Coastal features type by Ownership

Type	Conserved (ha)	Conserved %	Crown (ha)	Crown %	Private (ha)	Private %	Total
Aquatic bed	787	14	2633	48	2076	38	5496
Bog	7167	9	49739	60	25335	31	82241
Emergent Wetland	6779	19	10797	30	18494	51	36070
Fen	5926	9	44022	69	14048	22	63996
Forested Wetland	170	4	2628	56	1857	40	4655
Shrub	7618	5	93902	57	62054	38	163574
Salt Marsh	1969	14	3588	25	8702	61	14259
Beach	590	13	1719	39	2081	47	4390
Tidal Flat	386	2	21667	91	1816	8	23869
Rock out crop	59	2	2477	78	628	20	3164
Wetland	0	0	24	0	11774	100	11798
Total	31451	8	233196	56	148865	36	413512

4.2.2.2 – Coastal Islands

Excluding the larger islands of Miscou, Grand Manan, Campobello, and Deer, there are three hundred islands (totaling 8,243ha) along the province's coasts (NBDNR Wetland Inventory 2005). Seventy-seven of these islands are under the authority, in whole or in part of the provincial Crown (1,580ha). Fifty-nine (285ha) of these Crown islands contained some unassigned Crown land, nineteen of which had nesting colonies. The remaining 223 islands (5,904ha) are under private ownership. Fifty-one colonies are known to exist on these privately owned islands. Twenty-four (759ha) of the 300 islands assessed have already been set aside for conservation, ten that support nesting colonies.

4.3 – CONSERVATION PROGRAMS

The NB-EHJV will employ an array of habitat conservation programs to achieve habitat goals.

4.3.1 – Securement

Since 1989, the Partners of the NB-EHJV have acquired 438 parcels, totaling 9,587 ha in New Brunswick. Four hundred and three of these parcels fall within the priority ecodistricts (Table 10).

Table 10 – Secured parcels by Priority ecodistricts

Ecodistrict	# of Parcels	Hectares
Nicolas Denys 2-5	8	25
Fundy 4-1	141	2,601
Kingston 5-11	8	190
Caraquet 6-2	25	387
Kouchibouquac 6-6	17	74
Petitcodiac 6-7	48	723
Aukpaque 7-1	136	3,694
Grand Lake 7-2	20	620
Totals	403	8,314

4.3.1.1 Acquisition

Acquisition covers expenditures and accomplishments associated with the acquisition of land through the transfer of title and includes: crown land transfers, fee simple acquisition and land donation.

Crown Land Transfer: expenditures and accomplishments associated with securement activities where the title of a property is transferred from one federal or provincial Crown agency to another.

Fee Simple Acquisition: expenditures and accomplishments associated with securement activities where the landowner deeds all rights and responsibilities to the recipient for a sum of money.

Land Donation: expenditures and accomplishments associated with securement activities where the landowner voluntarily transfers a land title to the recipient without payment. Land donations can be outright gifts, reserved life estates or land donations by devise.

4.3.2 – Stewardship

Refers to the responsibility to manage one's land use practices and activities with proper regard to the surrounding environment and the rights of others. This activity employs a wide range of conservation activities that either promote or directly result in the sustainable use of land for the purpose of conserving wildlife and the habitats they depend on. Because of the absence of legal or binding land agreement of at least 10 –year duration, accomplishment acres are **not** tracked as "Securement" acres. Stewardship has two components:

1. **Extension:** This component of Stewardship includes activities, such as demonstration, education and communication, that promote adoption and maintenance of environmentally sustainable land use practices by landowners, land managers and conservation organizations.
2. **Influence:** This component of Stewardship includes direct actions taken by landowners, land managers or conservation agencies that protect or enhance wetland and upland habitats without legal or binding agreements. These direct actions result in applied land use changes.

The EHJV Partnership will continue to develop partnerships with agricultural producers, provincial agricultural extension staff, Environmental Farm Plan staff and agric-conservation clubs to develop new Best Management Practices (BMP) that conserve wetland habitats and support increasing breeding potential for NB waterfowl. A total of 8,000ha of farmland and woodlots will be assessed, identifying potential BMP's that could be implemented to enhance waterfowl habitat. These actions will contribute to maintaining the breeding pairs of American black duck, Mallard, green-winged teal, ring-necked duck and Canada goose currently using this habitat.

4.3.3 – Enhancement/Restoration

This activity is carried out on secured wetland and/or upland habitats to increase their carrying capacity for waterfowl populations and other wildlife. Enhancement also includes habitat restoration activities. Wetland restoration includes actions that restore habitat features (e.g. provide the “missing element” that relates to the key waterfowl vital rates) that has been lost or degraded, and creating new waterfowl habitats that serve as ecological equivalents to lost habitat.

Wetland restoration and enhancement are important techniques for increasing the waterfowl populations of key waterfowl species as it improves the abundance and productivity of brood rearing habitat. These activities directly increases duckling survival and should increase the number of breeding pairs settling in the landscape.

4.3.3.1 - Rural Wetland Restoration Program

The Rural Wetland Restoration Program will diversify the landscape throughout New Brunswick by putting more open water on the agricultural landscape. The restored wetlands are open water marshes approaching a hemi-marsh state. The focus of this program is rural non-farming landowners. This program involves restoring waterfowl habitat on small fresh water wetlands in the rural landscape. This involves the removal of vegetation and organic soil from densely vegetated wetlands or by placing of small earthen berm, to restore shallow open water wetlands. Many of the wetlands enhanced show signs of alteration through infilling or drainage ditches.

4.3.3.2 - Agricultural Biodiversity Program

The announcement of the Agricultural Policy Framework (APF) in 2003 included a greater focus on the environment and encourages the farming community to put in place practices that will lead to better quality air, soil, water and biodiversity. The APF features a cost-share arrangement whereby government and the farmer will contribute 65% of the direct costs to complete a project. The Program includes wetland restoration and constructed farm ponds-tertiary wetlands. These programs will result in restoration or enhancement of waterfowl habitat and will focus on improving duckling survival and breeding propensity (i.e. settling rates) for our key waterfowl species.

4.3.3.3 - Large Wetland Restoration:

The traditional wetland restoration program has involved restoring large wetlands within the productive agricultural areas using a pool of restoration techniques (i.e., water control structures and dykes). The resulting habitat is typically open marsh in a hemi-marsh state. These wetlands are important to all key waterfowl species in terms of increasing duckling

survival and is critical in highly developed agricultural settings where it is unrealistic to increase the wetland density to the desired level of 4 wetland ha/km².

4.3.3.4 - Municipal Large Wetland Restoration

There is growing public interest in restoring wetlands in proximity to urban and municipal centers. These projects typically involve restoration techniques similar to large wetland restorations and produce similar waterfowl benefits. However, they often have additional features such as interpretive trails and signage. These additional features elevate the importance of wetland restoration to the public. Funds for the additional interpretive features are raised outside the NAWMP.

4.3.3.5 - Beaver Management

Beavers are abundant and widely distributed in NB and provide important wildlife habitat. In settled areas conflicts between beavers and man can be frequent and substantive. This program will focus on beavers that are in conflict with human interests (i.e., flooding roads, agricultural lands, forest) and will be similar to the program laid out in the biodiversity section.

4.3.3.6 - Tidal Wetland Restoration

Tidal wetlands have been the most greatly impacted by human activity, as a result tidal wetland restoration can take many different forums. Tidal restoration can vary from the removal of an agricultural dyke to allow a piece of dykeland to revert to salt marsh or the blockage of man-made ditches on a salt marsh to re-create salt marsh pans. A removal of a causeway can change the vegetative community of a marsh both the upstream and downstream. By its very nature tidal marsh restoration work is expensive. The forecast rate of sea level rise (0.4m/century) will impact the future extent and distribution of tidal marsh and will need to be considered as part of all restoration and coastal securement activities.

4.3.3.7 - Nest Box Program

Over the past 15 years the NB-EHJV have installed approximately 2000 nest boxes for cavity nesting waterfowl. Occupancy rates of existing structures are as high as 70% dominated by common goldeneye, hooded merganser and wood duck. New Brunswick breeding population trends for common goldeneye are declining and the associated benefits from a nest box program extend to other species important to the flyway harvest (wood duck, hooded merganser). Many existing nest boxes are in a state of disrepair and require maintenance or replacement. A revisited nest box program will provide nest structures for cavity nesting waterfowl over the 5 year program.

4.3.3.8 – Intensive Wetland Management

Intensive management generally requires repeated efforts to attain and sustain habitat conditions. These actions improve habitat conditions for waterfowl beyond what would occur in the absence of management and are suited to areas where the overall carry capacity of the landscape has been reduced. Active management can reverse these trends.

Activities include: water level adjustment; repair and upgrading of water control structures or dykes; and physical manipulation of vegetation. Active management of wetlands will help ensure that waterfowl productivity is optimized.

4.4 – Management

This activity is conducted on secured wetland and/or upland habitats to manage and maintain their carrying capacity for migratory birds and other wildlife at optimal levels. Management actions maintain and increase waterfowl capacity of the landscape by maintaining the quality of existing habitat.

There are a total of 9,777 ha of managed wetlands in NB. Of these, 3,752 ha are NAWMP projects. As projects age their productivity gradually declines as the interspersions of water within the vegetation decreases. A substantial part of these enhanced wetlands involve the construction of dykes and water control structures that require ongoing operation and maintenance. Some examples are: operation and maintenance of nesting structures as well as project inspections, repairs and maintenance to ensure that the wetlands secured under NAWMP are providing optimal wildlife habitat conditions.

4.5 – Policy Initiatives

This activity refers to work conducted to influence or modify the existing legislation, programs and policies of federal, provincial or municipal governments that affect land use directly or indirectly.

New Brunswick has a number of policies and regulations that affect activities in and around wetlands. These policies and regulations are administered through a number of government departments and include: the **Environmental Impact Assessment Regulation**, implemented in 1987, where any activity affecting a wetland greater than 2 hectares in size, requires an EIA registration. The **Federal Policy on Wetland Conservation** implemented in 1991, affects how wetlands are managed on federal lands. The **NB Wetland Conservation Policy** implemented in 2002, ensures no loss of Provincially Significant Wetland habitat and no net loss of wetland function for all other wetlands that are ≥ 1 ha in size. In 2003, the **Watercourse and Wetland Alteration Regulation** was changed to appropriately regulate any alteration in or within 30 metres of a wetland that is ≥ 1 ha in size or connected to a watercourse. The **NB Coastal Areas Protection Policy** was implemented in 2006, to protect coastal marshes and coastal features by restricting activities within the 30m buffer. In the **Submerged Land Policy**, the province is responsible for the management of approximately 2.1 million hectares of tidally-influenced submerged lands, as well as some inland, non-tidal, rivers and lakes.

Policy initiatives will continue to seek to address issues posing the greatest threat to wetlands. Provincial government staff and NGO partners will support provincial initiatives related to changing land use policy and regulations for the betterment of the province's waterfowl and wetland associated wildlife.

4.6 – Communication

Communication activities are specific to actions that reflect a public profile for the EHJV and its participants. This includes but is not confined to media announcements, publications, advertising, signage and special events. Communications efforts of the NB-EHJV will complement those outlined in the EHJV Communications and Work Plan. General objectives of EHJV communications are:

- To promote the EHJV collaboration while maintaining the profile and conservation integrity of the individual partners.
- To increase awareness, understanding, and support within targeted audiences for the work of the EHJV.
- To use existing EHJV resources and products for the maximum benefit of the collaboration.
- To develop new communications products and tools to support EHJV development.
- To facilitate sharing among EHJV partners of programs, products, ideas, and initiatives.

Communication activities will contribute to the achievement of the waterfowl population goals of the NB-EHJV by increasing public awareness of critical waterfowl conservation issues. Communication activities will promote the activities of the NB-EHJV and NAWMP.

4.7 – Evaluation

This activity is associated with the development and implementation of evaluation and research plans developed to assess progress towards NAWMP objectives. The NB-EHJV's evaluation plans will consist of assessments, monitoring (populations and habitats), directed studies, as well as socio-economic and biodiversity evaluations.

The NB-EHJV evaluation program will track progress towards provincial habitat objectives; monitor the impact of the conservation programs toward population goals; test the validity of assumptions made in setting the NB-EHJV objectives and evaluate potential management solutions. The NB-EHJV Steering Committee will assess the goals and objectives set out in the Implementation Plan on an annual basis. Assessment outcomes will be used to renew key waterfowl species lists, habitat goals and population objectives.

4.7.1 - Monitoring

The assessment of spatial and temporal adequacy of current waterfowl monitoring programs for key waterfowl species of the EHJV was discussed at the EHJV Science Workshop (July 18-19, 2006). Monitoring adequacy specific to the NB-EHJV Key Waterfowl Species is depicted in Table 11.

Table 11 - Assessment of spatial and Temporal adequacy of current waterfowl monitoring programs for key waterfowl species (adapted from: EHJV Science Workshop July 18-19, 2006)

Waterfowl Species	NB Key			Staging			Wintering		
	Breeding Monitoring *	Spatial **	Temporal ***	M *	S **	T ***	M *	S **	T ***
Black duck	Y	Y	Y				Regional	Incomplete	Y
Mallard	Y	N	Y				Picked up under black duck		
Ring-necked duck	Y	Y	Y						
Common eider	Regional	Incomplete	Y	N			N		
Canada goose – Resident	Regional	Incomplete	Y	N					
Canada goose – NAP	Y	Y	Y	Y	Y	Y	Regional	Incomplete	Y

*Is an EHJV wide monitoring program currently being delivered?

** Does the current monitoring program have adequate spatial coverage?

*** Is the current monitoring program occurring at the correct time of year?

4.7.2 - Wetland Compensation

Implementation of the NB Wetland Conservation Policy has led to the adoption of a mitigation sequence that calls for avoidance, minimization of impact, then compensation for wetland alteration or loss. Net gains in waterfowl habitat resulting from compensation will contribute to achieving the NB-EHJV waterfowl population and habitat goals, however, compensation projects will not involve NAWCA funds. Establishment of the wetland compensation process in NB provides an additional tool for tracking wetland habitat change over time. This is essential in evaluating the success of the wetland policy and the net change to wetlands across the province.

4.7.3 - Provincial Wetland Mapping

There has been considerable interest in the delineation and classification of wetlands and wet areas in New Brunswick. The basic need for setting clear policy, management objectives and operational guidelines require the development of inventories identifying the location, size and type of all wetlands across the province.

Currently in New Brunswick, wetlands are mapped through aerial photo interpretation as part of an integrated land classification. Wetlands are assigned attributes and classified based on the Canadian Wetlands Classification System. The New Brunswick's Wetland Inventory is updated yearly based on a 10-year photo cycle. Improved sensing techniques and quality control are regularly incorporated into the photo interpretation process to strengthen the accuracy of the provincial inventory.

Mapping of provincial wetlands is an essential tool in the identification and tracking of habitat change over time, in addition to assessing the effectiveness of existing policies and regulations. These tools will continue to be updated as an essential mechanism in the delineation of wetlands across the priority ecodistricts and for the tracking of habitat changes for priority waterfowl.

4.7.4 - NB Waterfowl Habitat matrix

In an effort to integrate the conservation goals of NABCI, the NB-EHJV partnership requires a biologically-based planning process that incorporates habitat requirements for all birds. This process requires a spatially-explicit, regional-scale conservation plan for the province. NBDNR has embarked on a multi-year project to develop habitat objectives for all wetland obligate bird species. To develop these objectives, habitat requirements for all bird species living in New Brunswick must be compiled. Species/habitat matrices will be developed to help summarize information and illustrate the typical habitat relationships by species.

New Brunswick is developing a waterfowl habitat matrix to assess breeding habitat availability for priority waterfowl in the province. This matrix is linked to the habitat classification of the wetland inventory and other GIS layers to provide an overview of breeding habitat availability for priority waterfowl species in the province. Wetland obligate species are defined as a species that requires a wetland during breeding (early pairing to fledgling) and/or as a primary source of food.

The matrix will focus on macro habitat but also considered bird distribution in the province based on confirmed and probable breeding evidence from the Maritimes Breeding Bird Atlas. Other sources include the Quebec Breeding Bird Atlas, the USFWS Gulf of Maine Watershed Habitat suitability models, and various other monitoring data in NB. A process of grouping species according to similar habitat requirements as indicated by common land classification characteristics will be conducted. Focus will be placed on habitat requirements during the breeding season although requirements for migrating and wintering birds may be as important or more so in consideration of objectives under the NB-EHJV implementation plan. In addition, initial estimates will not exclude geographic areas that can't be differentiated based on habitat attributes of the land classification tools.

Discussion and work is required to set population thresholds for waterfowl and wetland obligate birds for the province. Habitat availability assessments will help to ensure adequate habitat is available at appropriate geographical scales through time. These efforts will ensure the long term maintenance of viable populations of waterfowl and wetland obligate birds in New Brunswick.

4.7.5 - Eastern Canada Waterfowl Survey

The Eastern Canada Waterfowl Survey is currently the only annual breeding waterfowl monitoring program delivered in New Brunswick and is used as the basis for developing provincial population estimates and EHJV population objectives in New Brunswick. This survey is delivered by Environment Canada's Canadian Wildlife Service in late April through early May. The survey is based on a 40-plot rotating sample in which specified subsets of 25 km² plots are flown in each year. The 40 plot sample framework is divided into 4 rotation groups with two of the rotation groups visited in each year. The survey then repeats this 4 year cycle. Total waterfowl breeding pairs and birds are estimated for each year, as are annual trends in abundance.

Additional analysis of the land classification and wetland habitat characteristics within the IBP plots in NB in comparison to the provincial landscape will provide greater inference in estimating waterfowl populations. The most recent provincial wetlands inventory will

provide current estimates of wetland habitat availability and the baseline to monitor trends over time. Both aspects are essential in future evaluations of EHJV program. The stratification of IBP plots will also provide refined population estimates and objectives to guide future EHJV program planning.

4.7.6 - Black Duck Wintering Survey

Given evidence that American black ducks may have extended their winter range northward over the past decade or more, aerial surveys to document abundance and distribution of wintering black ducks are being undertaken as resources permit. At present, this survey program is not envisioned to be conducted annually; however periodic surveys will provide an indication of trends in black duck use of coastal areas over time.

4.7.7 - Directed Studies

Directed studies are designed to expand the EHJV's knowledge of waterfowl, their habitats and their use of various habitat types. Directed study projects are intended to be specific in nature and test the assumptions on which the conservation programs for this plan has been established. Directed studies assist in adaptive management, often leading to modifications of operational standards or program restructuring based on new knowledge. The EHJV Technical and Steering Committees are responsible for identifying and establishing directed study priorities. All directed study projects will go through review by the EHJV Science Support Team.

4.8 – Coordination

This activity is carried out by JV Chairs, JV Coordinators, Program Managers and their support staff which are not directly attributed to an on-the-ground deliverable. Examples include: JV Board meetings; national and international meetings, program development, reporting, etc

5.0 – IMPLEMENTATION TARGETS

NB-EHJV habitat conservation programs consist of securement, restoration/enhancement, policy and management activities. These activities will be focused in priority landscapes. The mix of program reflects the need to secure habitat in the face of continuing habitat loss while restoring habitat to close the waterfowl deficits. The mix of activities also reflects the priorities of the individual EHJV partners.

Table 12 - NB-EHJV Habitat Conservation Program Targets for Inland KPA

Securement	Wetland (ha)	Upland (ha)	Total (ha)	Cost/ha	Total Costs
Fee Simple	300	150	450	\$250	\$112,500
Agreement	120	30	150	\$100	\$15,000
Total Securement	420	180	600		\$127,500
Restoration/Enhancement					
	# of Projects	Restored (ha)	Cost/ha	Total Costs	
Rural Wetland Restoration	100	150	\$6,681	\$1,002,150	
Agriculture Biodiversity	25	50	\$3,967	\$198,350	
Large Wetland Restoration	15	300	\$6,681	\$2,004,300	
Municipal Wetland Restoration	3	20	\$6,681	\$133,620	
Beaver Pond	25	100	\$1,112	\$111,200	
Intensive Wetland Management		700	\$207	\$144,900	
Nest Box Program	200/yr	1000	\$150	\$150,000	
Management Program		12,370		\$710,440	
Total Restoration/Enhancement	168	1,320		\$4,454,960	
Totals					\$4,582,460

Table 13 – NB-EHJV Habitat Conservation Program Targets for Coastal KPA

Coastal Securement	Wetland (ha)	Upland (ha)	Total (ha)	Cost/ha	Total Costs
Fee Simple	550	935	1485	\$1,470	\$2,182,950
Agreement	160	40	200	\$100	\$20,000
Coastal Islands					
Fee Simple		106	106	\$7,920	\$934,920
Agreement		40	40	\$100	\$4,000
Designation		285	285	\$150	\$57,000
Total Securement	710	1406	2116		\$3,198,870
Restoration/Enhancement					
	# of Projects	Restored (ha)	Cost/ha	Total Costs	
Management Program		1,531		\$389,560	
Salt Marsh Restoration	5	60	\$3,607	\$216,420	
Total Restoration/Enhancement		60		\$605,980	
Total					3,804,850

5.1 - Summary of wetland restoration impact on breeding waterfowl

Wetland restoration activities will result in 1,380ha of restored wetlands over 5 years. The waterfowl response to these restored wetlands will accumulate as the program is deployed across the landscape (Table 14). Based on these waterfowl response estimates, restored wetlands will support an additional 1105 breeding pairs, or approximately 15% of the total waterfowl deficit of 7600 large dabbling ducks (Section 3.0). In absence of a waterfowl productivity model which relates the additional brood production to waterfowl population responses it is difficult to estimate the extent of required future restoration activities beyond this plan. An estimate of 8,112 additional hectares beyond the achievements of this plan

(1380ha + 8,112ha = 9,492ha) maybe required to achieve the habitat goals of the NB-EHJV to reach population objectives for large dabbling ducks (Appendix VII).

We recommend that waterfowl productivity models are developed to help understand the waterfowl population response to conservation actions.

Table 14 - Anticipated waterfowl increases in pairs and broods from wetland restoration programs. Cumulative production represents the compounded broods produced assuming that 20% of the restored hectares occur each year.

Program	Projects	Restored Ha	Production in 2010		Cumulative Production
			Pairs	Broods	Broods
Rural Wetland Restoration	100	150	293	103	306
Agriculture Biodiversity	25	50	98	33	147
Large wetland restoration	15	300	300	285	855
Municipal wetland restoration	3	20	20	19	59
Beaver pond	25	100	50	50	150
Salt Marsh restoration	5	60	12	12	36
Intensive Wetland Management		700	332	332	995
Nest Box Program	200/yr				700
Total	173	1380	1105	833	2548

6.0 RESOURCE NEEDS

Table 15 - Resource needs (\$ & staff)

Securement	hectares	Costs	Waterfowl Benefits
Fee Simple	2,041	\$3,230,370	Breeding, Staging, Wintering
Agreements	390	\$39,000	Breeding
Designation	285	\$57,000	Staging, Wintering
Total Securement	2,716	\$3,326,370	
Extension		\$500,000	Breeding, Staging, Wintering
Enhancement			
Rural Wetland Restoration	150	\$1,002,150	Breeding
Ag. Biodiversity	50	\$198,350	Breeding
Large Wetland Restoration	300	\$2,004,300	Breeding
Municipal Wetland Restoration	20	\$133,620	Breeding
Beaver Pond	100	\$111,200	Breeding
Salt Marsh Restoration	60	\$216,420	Breeding
Intensive Wetland Management	700	\$144,900	Breeding
Nest Box Program	(1000 boxes)	\$150,000	Breeding
Total Enhancement	1,380	\$3,960,940	
Management	13,901	\$1,001,090	
Communications		\$75,000	
Policy		\$150,000	
Coordination		\$550,000	
Evaluation		\$200,000	
TOTAL		\$9,763,400	

The NB-EHJV partners estimate that a resource deficit of approximately \$2.5 Million will occur if NB-EHJV funding levels are not increased from historic levels achieved over the past five years (Table 16). The largest deficits would occur in Enhancement (\$2,954,606) and Securement (\$612,153) with a 73 percent increase for funding to Management. The projected deficit will significantly reduce the delivery of activities outlined in this plan.

Table 16 - Resource difference based on Past 5 yr Expenditures and Projected 5 yr Resource Need

NB-EHJV Activity	Expenditure 2002-2007*	Projected Expenditure 2007-2012	Difference
Securement	\$2,714,217	\$3,326,370	(\$612,153)
Stewardship	\$451,440	\$500,000	(\$48,560)
Enhancement	\$1,006,334	\$3,960,940	(\$2,954,606)
Management	\$578,181	\$1,001,090	(\$422,909)
Communication	\$97,166	\$75,000	\$22,166
Evaluation	\$298,337	\$200,000	\$98,337
Policy	\$1,031,272	\$150,000	\$881,272
Coordination	\$1,174,889	\$550,000	\$624,889
TOTAL	\$7,351,836	9,763,400	(\$2,411,564)

*Data from the National Tracking System (NTS)

Note: Numbers in (brackets) represent 5 year forecast resource deficits based on actual partner expenditures over the past 5 years.

7.0 - EHJV IMPLMENTATION PROCESS AND RELATIONSHIPS

7.1 Governances

The following information was adopted from EHJV Structure and Function in Relation to NAWMP – April 1996

The NB-EHJV Steering Committee (Section 7.3) holds the governance responsibility for the EHJV in New Brunswick. Membership is composed of one representative (or alternate) from each funding partner plus the NB-EHJV Coordinator and EHJV Regional Coordinator. The Manager of the NBDNR of Habitat Program Chairs the NB-EHJV Steering Committee. The NB-EHJV Steering Committee oversees the planning and implementation of NB-EHJV initiatives by:

- Determining overall strategic direction for the program.
- Reviewing and approving all plans associated with the program and ensuring that strategic, long term, and annual work plans are established.
- Ensuring that all projects are properly screened and approved by the relevant regulatory processes and/or agencies.
- Establishing annual expenditure plans, negotiating cost sharing arrangements and overseeing financial arrangements.
- Developing legal arrangements for implementation.
- Providing accounting to all partners on actual expenditures for input into the National Tracking System.

- Ensuring that an appropriate implementation structure and process is in place for each approved project.
- Ensuring that appropriate evaluation activities are implemented in accordance with the EHJV evaluation plan.
- Providing direction to the NB-EHJV Technical Committee and Coordinator.
- Implementing the policies, procedures and directions of the EHJV Management Board with the required documentation of plans, project evaluations, expenditures, etc.
- Developing communication strategies and plans.
- Ensuring that all partners receive full recognition for their contributions
- Promoting the EHJV program provincially, nationally, and internationally as appropriate.

The NB-EHJV Technical Committee (Section 7.3) is responsible for the development of technical aspects of the NB-EHJV and the implementation of approved projects. Membership is composed of one representative (or alternate) from each funding partner plus the NB-EHJV Coordinator. The Coordinator Chairs the NB-EHJV Technical Committee. Specific responsibilities of the committee include:

- Input into development of implementation plans.
- Develop, review and recommend project proposals under approved programs.
- Participate in evaluation and planning as required.
- Advise and/or form a Project Management Committee to implement various projects as required.

The EHJV Science Support Team is responsible for coordination of the priority research, directed studies and evaluation projects associated with strengthening the biological foundation of the EHJV program.

7.2 - Administration

Administration of the NB-EHJV is the responsibility of the NB-EHJV Coordinator in close association with all partners. The duties of the NB-EHJV Coordinator are:

- Secretary to the NB-EHJV Steering and Technical Committees.
- Chair to the NB-EHJV Technical Committee.
- Coordinate the development of provincial project proposals.
- Coordinate the development of implementation plans.
- Promote the EHJV within the provincial government.
- Solicit new partners.
- Coordinate the delivery of the EHJV Program.
- Database Manager for the Nation Tracking System.
- Facilitate the development of project management committees as required.

7.3 - COMMITTEES

NB Steering Committees

NB-EHJV Steering Committee (2006 membership)

Organization	Member	e-mail	Telephone
Environment Canada	Keith McAloney	keith.mcaloney@ec.gc.ca	(506) 364-5013
Ducks Unlimited Canada	Deanne Meadus	d_meadus@ducks.ca	(902) 667-8726
Nature Conservancy of Canada	John Foley	John.Foley@natureconservancy.ca	(506) 450-6010
Nature Trust New Brunswick	Margo Sheppard	ntnb@nbnet.nb.ca	(506) 457-2398
NB Dept of Agriculture & Aquaculture	Carole Denis	Carole.denis@gnb.ca	(506) 453-3430
NB Dept Natural Resources	Steve Gordon*	Steve.gordon@gnb.ca	(506) 453-2440
NB-EHJV Coordinator	Todd Byers	Todd.Byers@gnb.ca	(506) 453-2440
EHJV Coordinator	Vacant		

* Committee Chair

NB Technical Committees

NB-EHJV Technical Committee (2006 membership)

Organization	Member	e-mail	Telephone
Environment Canada	Colin Mackinnon	colin.mackinnon@ec.gc.ca	(506) 364-5039
Ducks Unlimited Canada	Joe Harvey	j_harvey@ducks.ca	(506) 458-8848
Nature Conservancy of Canada	Denise Roy	denise.roy@natureconservancy.ca	(506) 450-6010
Nature Trust New Brunswick	Margo Sheppard	ntnb@nbnet.nb.ca	(506) 457-2398
NB Dept of Agriculture & Aquaculture	Carole Denis	Carole.denis@gnb.ca	(506) 453-3430
NB EHJV Coordinator	Todd Byers*	Todd.Byers@gnb.ca	(506) 453-2440
EHJV Coordinator	Vacant		

* Committee Chair

7.4 - Relationships to Other Joint Ventures

The activities outlined in this implementation plan link directly with the goals of the Black Duck Joint Venture by enhancing American black duck populations through conservation of wetland and associated upland habitat.

The activities in this implementation plan also complement the goals of the Sea Duck Joint Venture by conserving coastal island habitats for common eider.

The activities links with the goals of the Atlantic Coast Joint Venture by conserving habitat for waterfowl including American black duck, mallard, green-winged teal, blue-winged teal, Canada goose and mallard in the Atlantic Flyway.

8.0 - GENERAL ASSUMPTIONS & GUIDING PRINCIPLES

- Duckling survival is a primary limiting factor for NB-EHJV key waterfowl species.
- The availability of food (invertebrates) is limiting due to a lack of adequate open water marsh in the agricultural landscape.
- Nest success is not limiting for NB-EHJV key waterfowl species.

- Non-breeding season survival is an important factor in population dynamics and influences habitat occupancy and we assume it will remain constant.
- Waterfowl densities in the agricultural landscape are greater than in the forest landscape.
- Waterfowl habitat in the forest landscape is currently stable.
- The relationship between habitat conditions and waterfowl populations in the Maritimes requires further information.
- Restoring small wetlands in the periphery of large wetlands is assumed to increase the overall carrying capacity of the landscape.
- Habitat objectives for key species are assumed to reflect and accommodate the needs of other waterfowl species within NB.
- The availability of waste grain and legumes from agricultural activities is assumed to meet the energetic needs of fall staging waterfowl.
- Anthropogenic factors may be influencing access to sea ducks and coastal waterfowl.
- Climate change may contribute to larger populations of wintering waterfowl along New Brunswick's coast.

NB-EHJV conservation activities overlap the agricultural sectors interest (e.g. water quality and riparian health).

Habitat securement priorities for the NB-EHJV include:

- Coastal Islands for breeding colonial nesting waterfowl and wintering Harlequin ducks.
- Coastal wetlands for staging and wintering waterfowl.
- Fresh water wetlands in key breeding habitats for priority waterfowl.
- Private land stewardship is recognized as having positive effects on wetland habitat and waterfowl population.
- Maintaining existing managed wetlands is a priority for the NB-EHJV.
- Evaluation is an important component of the NB-EHJV Program - partners and funding for evaluation need to be identified during project planning.

9.0 - REFERENCES:

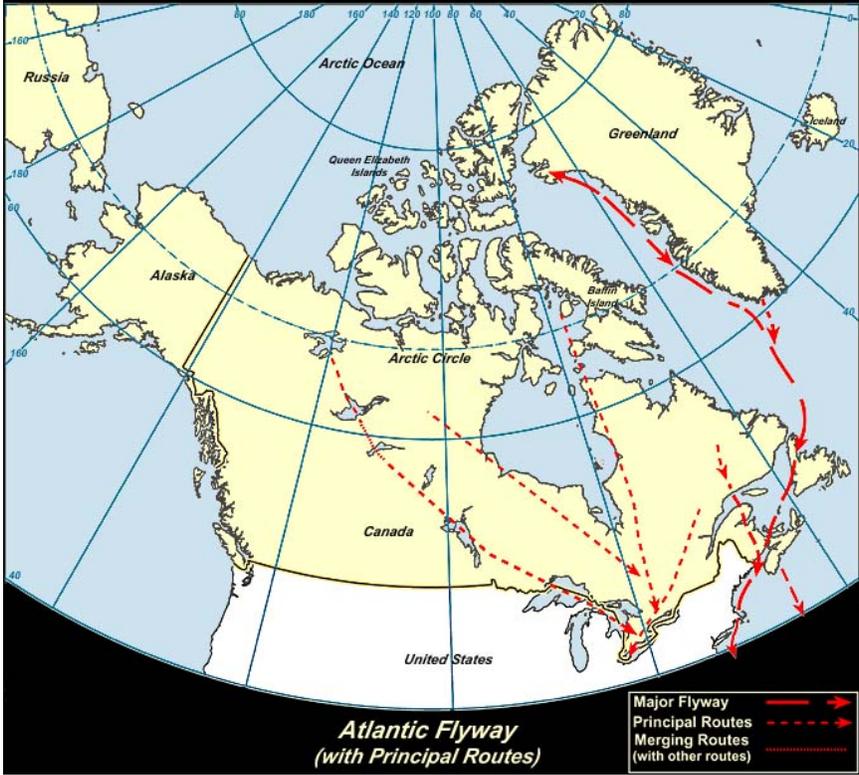
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10.0 - APPENDICES

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10.1 - APPENDIX I – Atlantic Flyway

New Brunswick is located in the maritime zone of Atlantic Canada, along the coastal edge of the Atlantic flyway



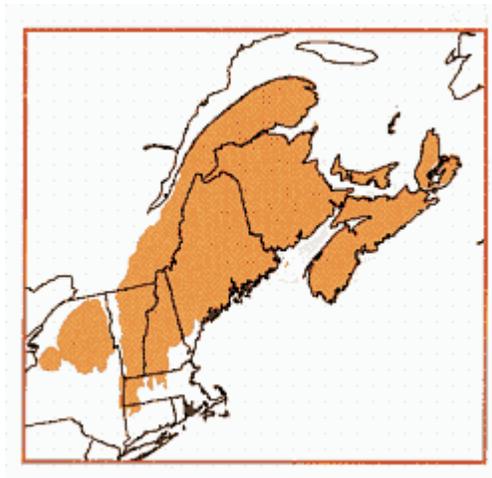
Atlantic Flyway Routes from <http://www.birdnature.com/upperatlantic.html>

10.2 - APPENDIX II – Bird Conservation Regions and Waterfowl Conservation Regions

The following information came from the North American Bird Conservation Initiative web site at <http://www.bsc-eoc.org/international/bcrCanada.html>

Bird Conservation Regions (BCRs) are part of the North American Bird Conservation Initiative (NABCI). BCRs are ecologically defined units that provide a consistent spatial framework for bird conservation across North American landscapes. BCRs are being used to help assign "conservation priority" scores for bird species. Each BCR, regardless of internal political boundaries, has its own unique list of "priority" species. Species contained on a given BCR list are ranked by conservation importance according to a standardized set of criteria determined by partners from Mexico, the United States and Canada.

New Brunswick is located within BCR 14 -Atlantic Northern Forest. In Canada BCR 14 follows South of the St Lawrence seaway from Quebec City northeast to include New Brunswick, PEI, and Nova Scotia.



BCR 14 map from NABCI website at <http://www.bsceoc.org/international/bcrCanada.html>

BCR 14 Atlantic Northern Forest: The nutrient-poor soils of northernmost New England and the Adirondack Mountains support spruce-fir forests on more northerly and higher sites and northern hardwoods elsewhere. Virtually all of the world's Bicknell's Thrush breed on mountain tops in this region. Other important forest birds include the Canada Warbler and Bay-breasted Warbler. Coastal wetlands are inhabited by Nelson's Sharp-tailed Sparrow; rocky intertidal areas are important for wintering Purple Sandpipers; and muddy intertidal habitats are critical as Semipalmated Sandpiper staging sites. Common Eiders and Black Guillemots breed in coastal habitats, while leach's Storm-Petrels, gulls, terns and the southernmost populations of many breeding alcids nest on offshore islands. Beaver ponds and shores of undisturbed lakes and ponds provide excellent waterfowl breeding habitat, particularly for American Black Duck, Hooded and Common Mergansers, and Common Goldeneye. The Hudson and Connecticut River valleys are important corridors for Brant, Green-winged Teal, and other waterfowl

migrating from New England and Quebec. Because inland wetlands freeze, coastal wetlands are used extensively by dabbling ducks, sea ducks, and geese during winter and migration.

Waterfowl Conservation Regions (WCR 14)

The following information was adopted from the NAWMP 2004 Implementation Framework.

The North American Waterfowl Management Plan Science Support Team (NSST) modified the existing Bird Conservation Regions (see above) to better reflect the abundance and diversity of waterfowl across North America. These “Waterfowl Conservation Regions” (WCRs) are the NAWMP’s geographic units for prioritization at the regional scale. Waterfowl conservation regions cover the continent. New Brunswick is located in **WCR 14 - Atlantic Northern Forest**.

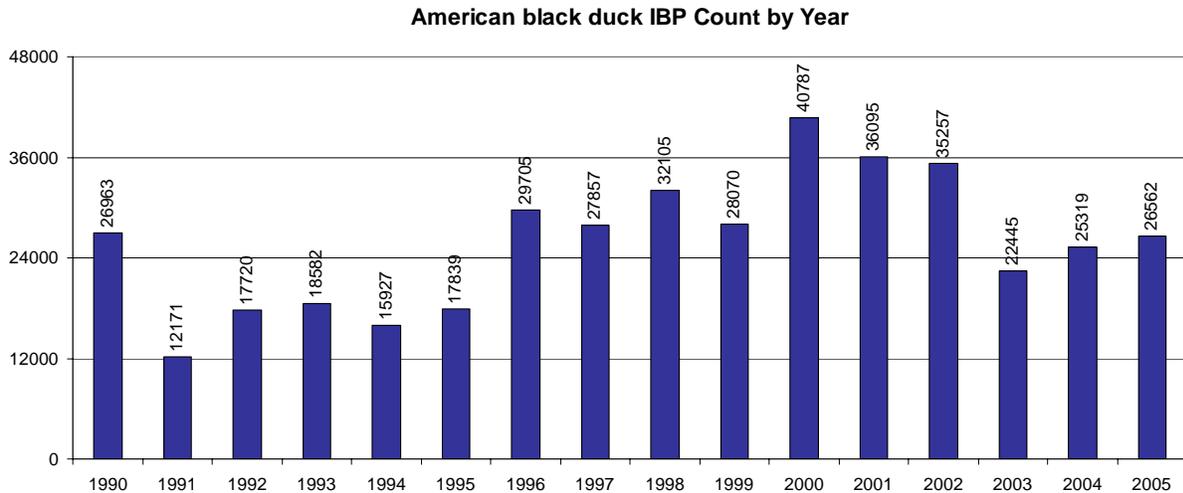
APPENDIX III - NEW BRUNSWICK WATERFOWL

Breeding Waterfowl

American black duck

The American **black duck** is an important species within the province and in eastern Canada which has experienced significant population declines since the 1960s. Over the past 15 years the annual breeding population estimates for black duck in NB ranged from 12,171 to 40,787 indicated breeding pairs (IBP). The average IBP over this period was 25,838 IBP, with peak numbers occurring in 2000. Despite a research focus on black duck, uncertainty remains with respect to the exact cause of this population decline. Current science points to several possibilities including over-harvesting, a possible decrease in hen breeding condition due to changes in habitat and inter-specific competition for quality habitat with mallards. Although additional research is required, the protection of the existing habitat base is crucial as a first step in maintaining existing populations.

GOAL: The 10-year breeding population goal for American black duck in NB is 37,000 IBP.

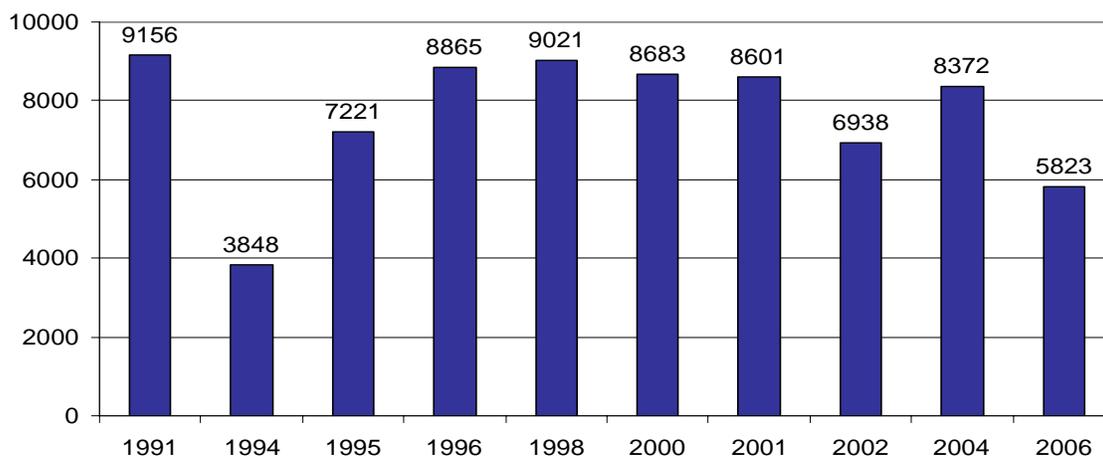


Common eider

Since 1991 the annual breeding population estimates for common eider in NB ranged from 3,848 to 9,156 IBP. The average IBP over that same period is 7,653. Conservation efforts focusing on securement of coastal islands will help maintain breeding potential for this species.

GOAL: The 10-year breeding population goal for common eider in NB is 10,000 IBP.

Common eider IBP Count by Year

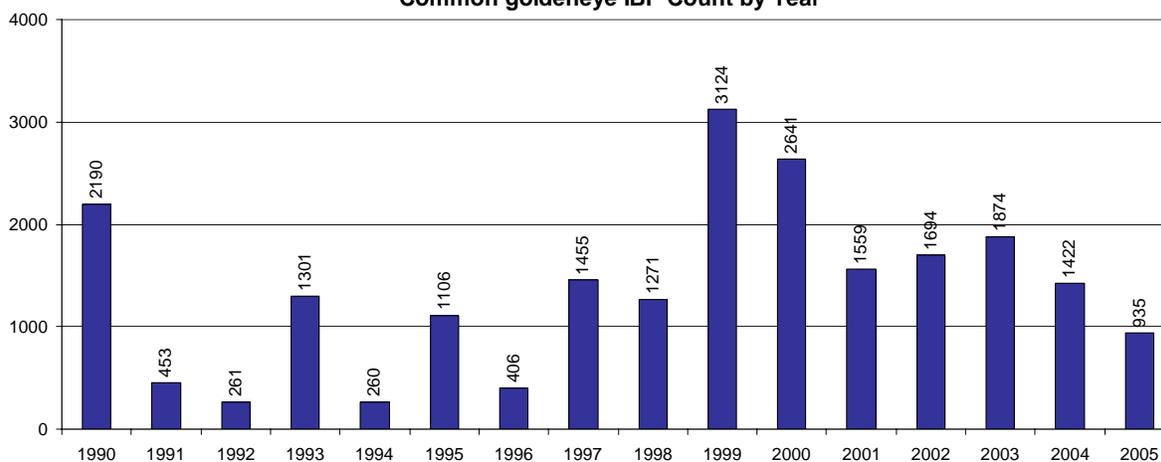


Common goldeneye

The common goldeneye is a hardy species that will over-winter along New Brunswick's coasts. The annual breeding population estimates for common goldeneye in the province ranged from 260 to 3,124 IBP over the past 15 years. The average number recorded in the IBP survey for that time was 1,372 with the highest number being recorded in 1999. Conservation programs that deal with forest management and cavity nesting sites in the forested landscape will benefit this species. Additional research is needed to determine the value of nest box programs targeted at increasing goldeneye hen success in landscapes where natural nesting cavities are limiting.

GOAL: A 10-year breeding population goal for common goldeneye in New Brunswick is 2,000.

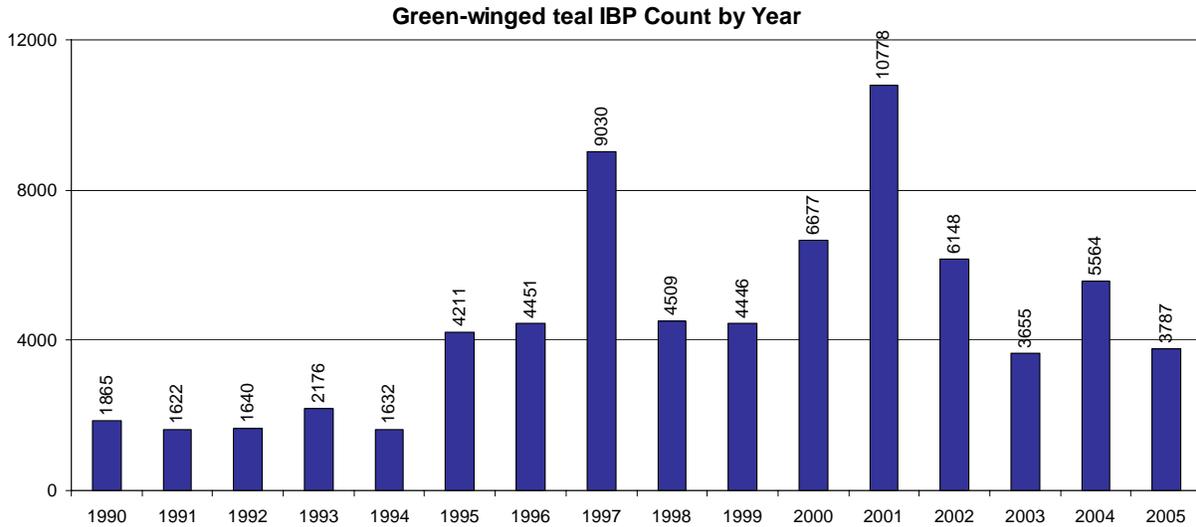
Common goldeneye IBP Count by Year



Green-winged teal

Over the past 15 years, the annual breeding population estimates for green-winged teal in NB ranged from 1,622 to 10,778 IBP. The average number recorded in the IBP survey for that time was 4,512 with the highest number being recorded in 2000.

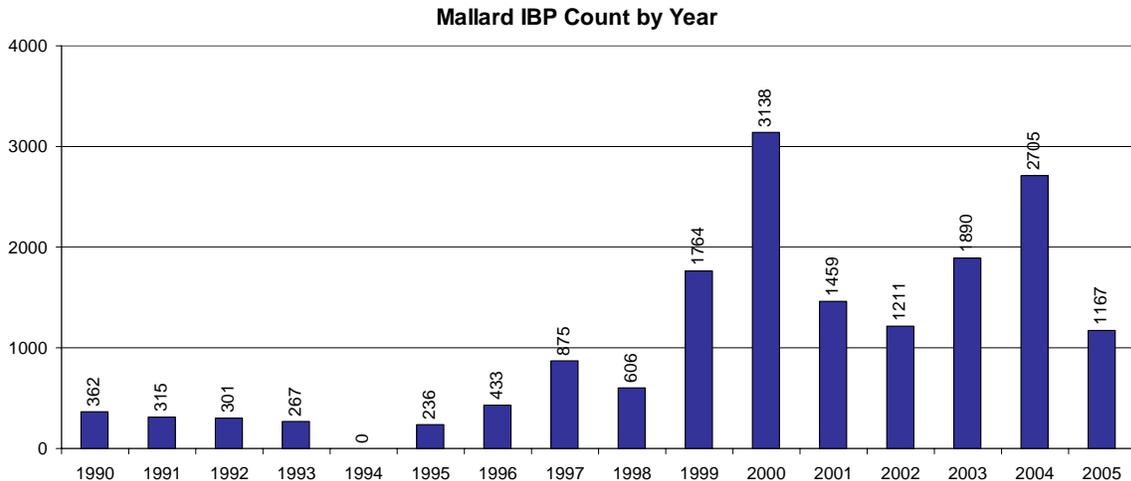
GOAL: A 10-year breeding population goal for green-winged teal in NB is 7,000 IBP.



Mallard

Over the past 15 years, the annual breeding population estimates for **mallard** in New Brunswick ranged from 0 to 3,138 indicated breeding pairs (IBP). The provincial trend is increasing with peak numbers occurring in 2000. Conservation activities for black duck are also expected to influence populations of mallards in NB.

GOAL: A 10-year breeding population goal for mallards in NB is 2,500 IBP.

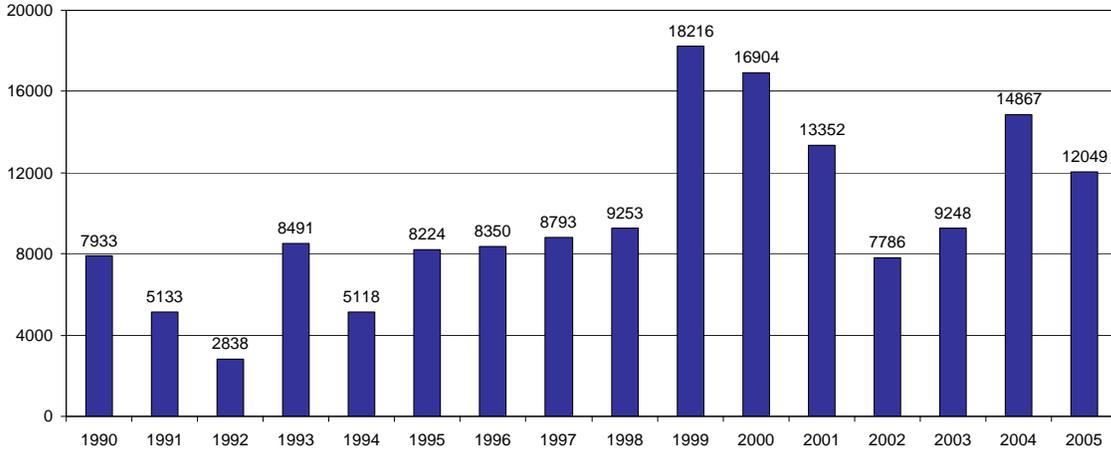


Ring-necked Duck

The annual breeding population estimates for **ring-necked ducks** in New Brunswick ranged from 2,838 to 18,216 IBP over the past 15 years. The general provincial trend is slightly increasing over this period. Activities that maintain and improve managed wetlands will play a role in reaching the population goal set for ring-necked duck.

GOAL: A 10-year breeding population goal for ring-necked duck in New Brunswick is 16,000.

Ring-necked duck IBP Count by Year

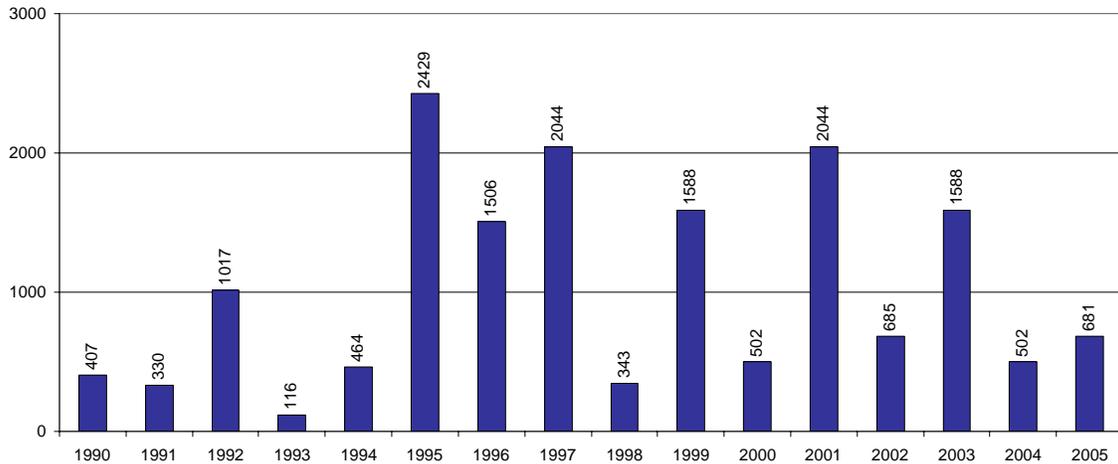


Wood Duck

The annual breeding population estimates for wood ducks in New Brunswick ranged from 330 to 2,429 IBP over the past 15 years. Forest management practices that influence cavity nesting sites in forested wetlands and a nest box program will play a key role in achieving the population goal for wood duck.

GOAL: A 10-year breeding population goal for wood duck in New Brunswick is 2,100.

Wood duck IBP Count by Year



10.4 - APPENDIX IV - Staging & Wintering Waterfowl

Staging Waterfowl

The availability of high-energy food resources from agricultural activities is a key factor for staging waterfowl such as black ducks, mallards and Canada geese. Access to aquatic food resources is important for species that do not feed in agricultural fields, like ring-necked ducks and green-winged teal. Wetland drainage within the agricultural landscape has likely degraded habitat conditions for staging waterfowl. However, given the mobility of most species and the proximity of agricultural areas to coastal environments, this degradation is likely buffered to some degree by the availability of coastal and estuarine habitats. These coastal and estuarine habitats are also important to migrating sea ducks such as common eiders, black scoters and long-tailed ducks. Aquaculture activities are increasing human waterfowl interactions in the coastal environment. However, the overall impact of these interactions on migrating and wintering waterfowl is unknown.

There is limited information on the staging value of managed wetlands in Atlantic Canada. However, results of staging surveys of restored wetlands are summarized in Table 12. A value of 6 staging waterfowl/ha was used as the average production from the projects along the St. John River was 6.1 staging waterfowl/ha when the 2 projects that were closed to hunting were eliminated. Table 13 demonstrates that managed wetlands are used heavily by several of NB's key waterfowl species particularly black ducks. Waterfowl usage of restored wetlands typically peaks towards the end of September prior to the opening of the hunting season.

The existing inventory of 8220 ha of restored wetlands in NB stages approximately 50,000 waterfowl. The placement of these restored wetlands in proximity to agricultural areas likely enhances an individual's ability to access key agricultural food resources. While the wetland restoration activities primarily provide breeding benefits, the restoration of an additional 1,380 ha of wetlands within the agricultural landscape is expected to increase the capacity of the landscape to support an additional 8,400 staging dabbling ducks.

Table 12 - Average ($\bar{x} \pm \text{stdev}$) waterfowl staging densities on restored wetlands

Study	# restored wetlands	Wetland ha restored	Date	Ave. staging birds/ha
St. John River*	12	620	Late Sept	9.3
			Early Nov	6.4
Musquash*	4	155	Late Sept	3.8
Aulac**	2	37	Late Sept	102 \pm 64

* Two projects that were closed to hunting, average was 6.1 waterfowl/ha when the wetlands closed to hunting were eliminated.

** Project closed to hunting. Three years of surveys.

Table 13 - Key waterfowl species as a proportion of survey totals

Study	Black duck (%)	Mallard (%)	Green-winged teal (%)	Ring-necked duck (%)
St. John River	58.5	12.5	7.5	-
Musquash	44.1	0.2	36.9	2.6
Aulac	45.8	9.5	4.4	2.5

Staging waterfowl surveys are conducted sporadically in New Brunswick (Figures 7&8). New monitoring techniques will be identified and developed for species and/or landscapes that are not well represented in the current surveys. Updated population objectives will be established for these species after the data from the new surveys is analyzed.

The NB-EHJV set habitat objectives for staging waterfowl to maintain those habitats required to support the current use by the Atlantic populations of black scoter, black duck, green-winged teal, common goldeneye and Canada goose (NAP), and subsequent increases associated with breeding waterfowl objectives (Tables 14-17). Due to the extent of historical losses of coastal wetland, salt marsh restoration and securement remain priorities for staging waterfowl in NB. Priority areas for action were established in the NB Coastal Securement Strategy.

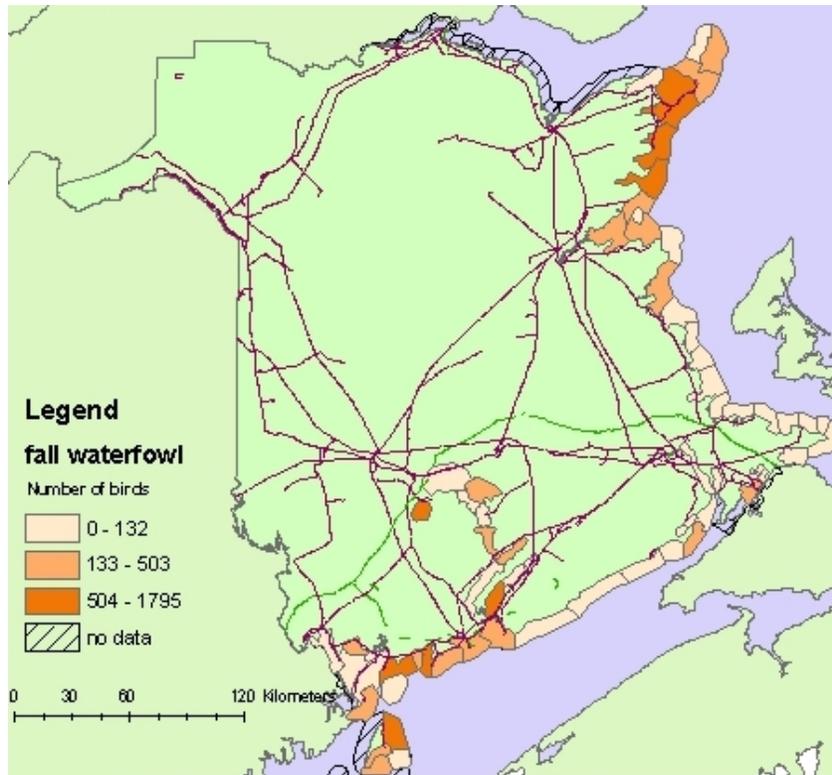


Figure 7 – Fall Waterfowl Relative Abundance
 (Cumulative Total of most recent Coastal Waterbird Survey Block data, 1974-2003)

Table 14 - Cumulative Total of most recent Coastal Waterbird Survey Block data (CWSBD) by region

Zone	Survey Period	Cumulative number of ducks*
Gulf of St. Lawrence	1977-2000	8,565
Bay of Fundy	1966-1985	8,360
Total	combined	16,925

* Represents the sum of the most recent survey data for each coastal block during fall migration (Aug.-Nov.) for the survey period 1977-2003.

Table 15 – Mean Waterfowl abundance by region (Fall) (CWSBD)

Zone	Survey Period (n)	Mean estimate**
Gulf of St. Lawrence	2003-2006 (4)	17,450
Bay of Fundy	2003-2006 (0)	No recent data
Total		

** Represents the mean estimate of survey data (all waterfowl) during fall migration (Aug.-Nov.) for the survey period 2003-2006. (n) Indicates number of surveys.

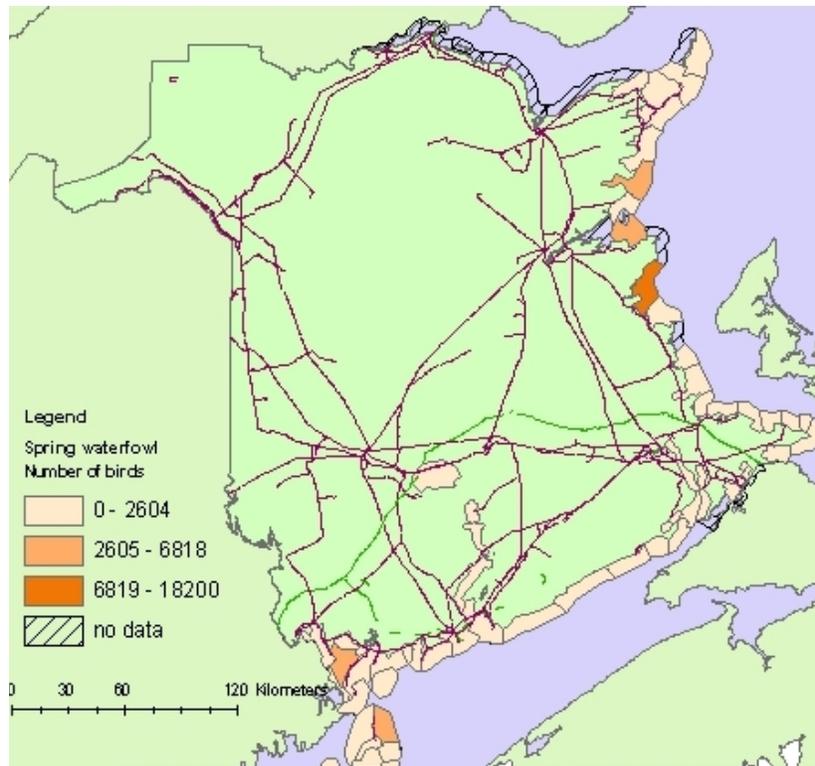


Figure 8 – Spring Waterfowl Relative Abundance
(Cumulative Total of most recent Coastal Waterbird Survey Block data, 1970-2003)

Table 16 - Cumulative Total of most recent Coastal Waterbird Survey Block data (CWSBD) by region

Zone	Survey Period	Cumulative number of ducks*
Gulf of St. Lawrence	1975-1999	42,874
Bay of Fundy	1970-2003	23,413
Total	combined	66,287

* Represents the sum of the most recent survey data for each coastal block during spring migration (Mar.-Apr.) for the survey period 1977-2003.

Table 17- Mean Waterfowl abundance by region (Spring) (CWSBD)

Zone	Survey Period (n)	Mean estimate**
Gulf of St. Lawrence	2003-2006 (4)	69,840
Bay of Fundy	2003-2006 (10)	7,653
Total		77,493

** Represents the mean estimate of survey data (all waterfowl) during spring migration (Mar.-Apr.) for the survey period 2003-2006.

(n) Indicates number of surveys.

Wintering Waterfowl

Wintering objectives were developed for black duck and common eider based on population estimates from coastal waterbird survey block data (2003-2007) (Figure 9). Recent increasing trends of wintering waterfowl, and subsequent increases due to breeding waterfowl objectives in NB (Tables 18&19). The NB-EHJV set habitat objectives for wintering eastern harlequin duck to support those population objectives outlined under SARA.

The availability of waste grain and legumes from agricultural activities is assumed to meet the energetic needs of most key staging waterfowl. Late winter and spring nutrition and survival may limit some species, particularly black ducks, scaup, scoters and eiders that rely little if at all on agricultural landscapes. There are no regional studies comparing food availability and quality for either agricultural or coastal landscapes. Work in Southern Ontario suggests that fall foods exceed the needs of waterfowl but spring foods may have been inadequate (Barney and Petrie 2006). For field feeding waterfowl we assume that the interspersed fresh water wetlands and coastal habitats is sufficient to meet their needs. We assume the same for diving ducks as well, but are less certain about this assumption. For sea ducks and coastal waterfowl we assume that the current mix of habitat and food resources is sufficient to meet their needs. Anthropogenic factors however, may be influencing access to these resources.

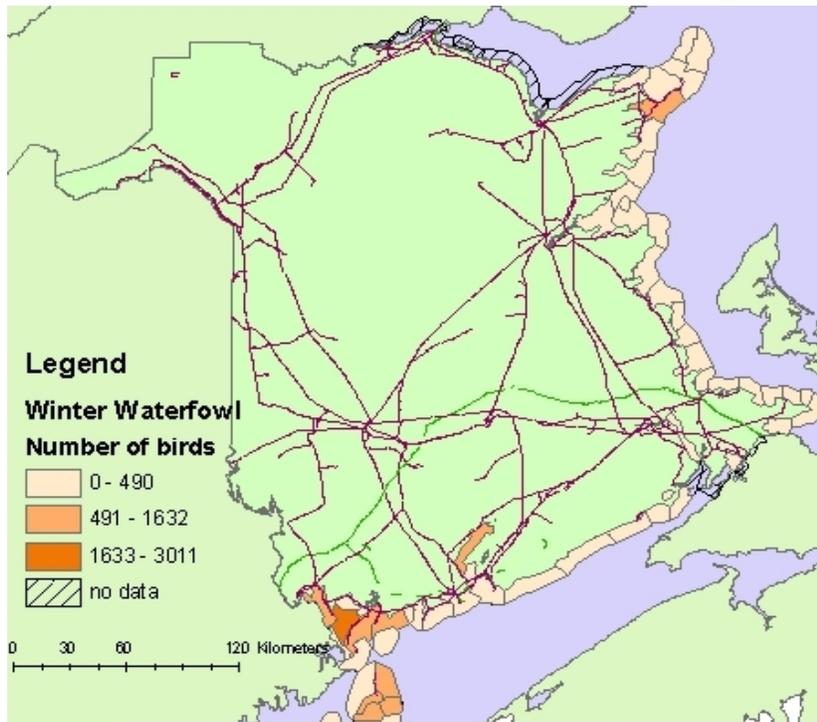


Figure 9 – Winter Waterfowl Relative Abundance
 (Cumulative Total of most recent Coastal Waterbird Survey Block data, 1974-2003)

Table 18 - Cumulative Total of most recent Coastal Waterbird Survey Block data (CWSBD) by region

Zone	Survey Period	Cumulative number of ducks*
Gulf of St. Lawrence	1980-2001	2,235
Bay of Fundy	1974-2003	13,295
Total	combined	15,530

* Represents the sum of the most recent survey data for each coastal block during winter (Dec.-Feb.) for the survey period 1977-2003.

Table 19 – Mean Waterfowl abundance by region (Winter) (CWSBD)

Zone	Survey Period (n)	Mean estimate**
Gulf of St. Lawrence	2003-2006 (1)	4,962
Bay of Fundy	2003-2006 (7)	34,101
Total		39,063

** Represents the mean estimate of combined survey data (all waterfowl) during winter (Mar.-Apr.) for the survey period 2003-2006.

(n) Indicates number of surveys.

Energy needs per individual

Estimates of energy needs during staging and winter are estimated based on body mass and calculation of Basal Metabolic Rate (Aschoff and Pohl 1970) (Table 20). Wintering energy needs are slightly higher than for staging so rates were adjusted. Staging and wintering needs are expressed in terms of daily energy requirements (DER).

Table 20 - Estimate basal metabolic rate (BMR) & daily energy requirement (DER) of key species for staging & migration.

Species	Body Mass (kg)*	BMR (kcal/day)**	DER staging (kcal/day)***	DER winter (kcal/day)***
Black Duck	1.25	87	290	400
Mallard	1.25	86	290	400
Lesser Scaup	0.85	65	156	299
Ring-necked Duck	0.78	61	146	281
Common Eider	2.0	122	292	561
Black Scoter	1.15	80	192	368
Long-tailed Ducks	0.82	63	151	290
Canada Geese (NAP)	4.0	203	487	934

* body mass based on adult males from Bellrose 1980.

** BMR = $73.5(\text{mass})^{0.734}$ mass in kg (Aschoff and Pohl 1970).

*** DER staging = 2.4BMR and DER winter = 4.6BMR.

Energy available per unit area.

A key information need is the evaluation of energy available to staging and wintering waterfowl using both the agricultural and coastal environments. From this we could assess if deficits exist and develop responsive conservation programs. This could also serve as a means of focusing retention activities and demonstrating waterfowl consequences of these programs.

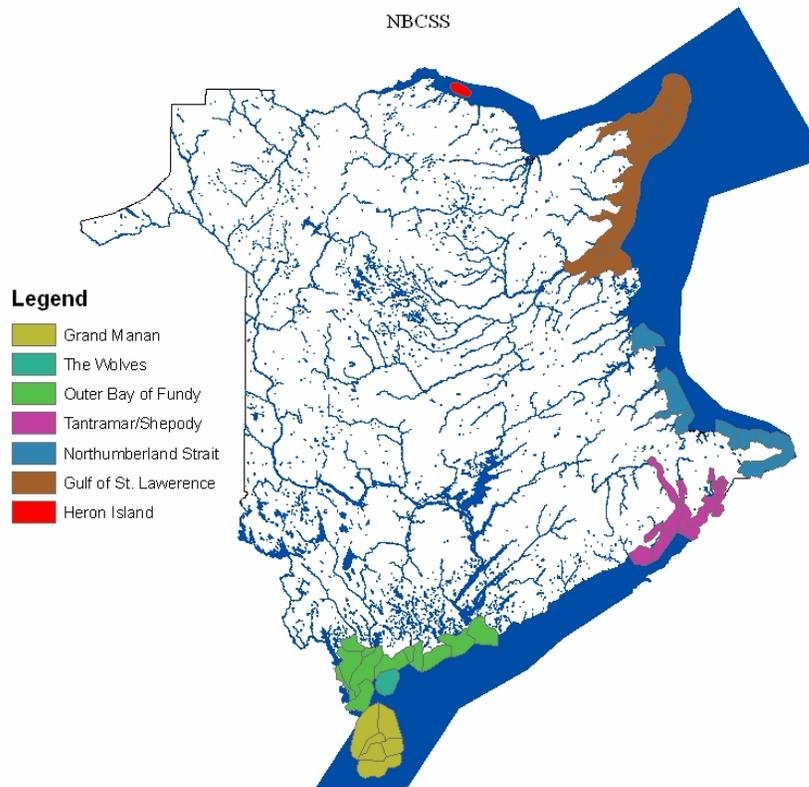
10.5 - APPENDIX V - Coastal Securement Strategy

In 2002, the NB-EHJV required a strategy to optimize future securement efforts of coastal lands, considering distribution of coastal resources, current conservation land holdings, and threats to coastal areas. Seven priority regions were pre-determined as being the most important coastal areas in NB for wetlands and coastal wildlife.

The purpose of the New Brunswick Coastal Securement Strategy (NBCSS) was to provide a comprehensive compilation of Geographic Information System (GIS) data on the habitat features, wildlife resources, special designation areas, and previous securement activities within seven coastal areas in NB. The NBCSS was to assist the NB-EHJV in establishing priorities and focus future coastal securement activities within and among these seven priority areas.

The regions in the outer Bay of Fundy area (Grand Manan, The Wolves, Outer Bay of Fundy) generally appear to be the most important with respect to waterfowl. Some securement has occurred but threats are high but off-shore (i.e., land securement may have minimal effect in reducing these threats).

The Gulf of St. Lawrence region is very rich in coastal habitat and wildlife, including waterfowl. However, past securement activities have been minimal and very concentrated. On-shore and off-shore threats exist at high levels.



Priority Areas - NB Coastal Securement Strategy

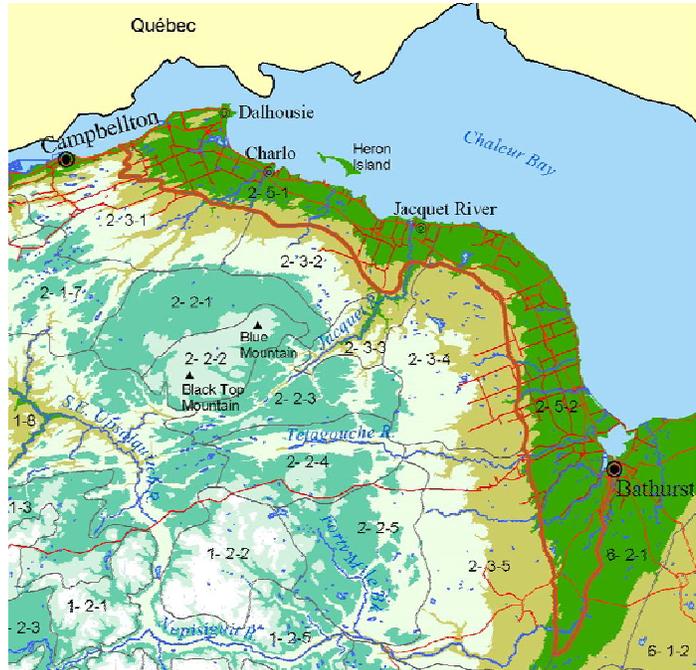
The Northumberland Strait region contains important coastal habitat and wildlife. Little securement has occurred in the past. On-shore threats are high.

The Shepody/Tantramar region encompasses vast amounts of coastal wildlife habitat and records extremely high numbers of shorebirds each year. This region also contains by far the most secured lands and specially designated areas. Heron Island is an important waterfowl staging area and has been secured as Provincial Park land.

10.6 - APPENDIX VI – NB-EHJV Priority Ecodistrict Descriptions

10.6.1. - Nicolas Denys Ecodistrict 2.5

Nicolas Denys ecodistrict is a narrow, gently sloping strip of land that lies along the coast of Chaleur Bay. It stretches from the Dalhousie Peninsula southward to the Nepisiguit River mouth, at which point the river itself becomes the boundary. The Nicholas Denys Ecodistrict is part of the Northern Uplands Ecoregion and is 92,443 ha in size with an average elevation of 350 m.



Nicolas Denys Ecodistrict averages only 10 kilometres wide and is the most subdued of all ecodistricts in the Northern Uplands. Its rock formations are similar to those of other ecodistricts, but the topographically is much less dramatic

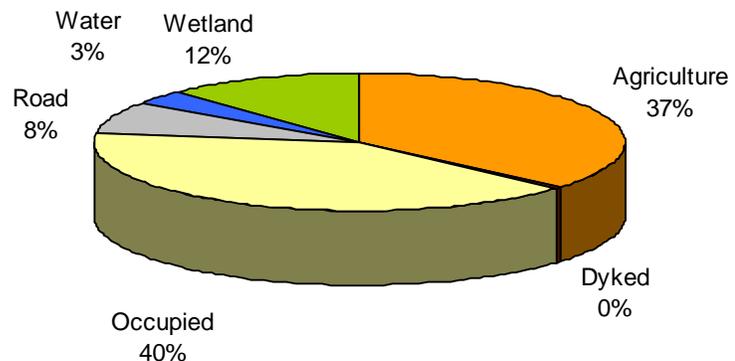
than elsewhere in the region. Elevations range from sea level or low coastal cliffs at Chaleur Bay up to a maximum height of perhaps 150 meters on the western boundary.

Many of the larger rivers have their origins elsewhere, but pass quietly through this ecodistrict before discharging into a series of bird-endowed estuaries. Lakes in the area are extremely few as the climate is relatively dry and cool, with temperature extremes that are moderated by Chaleur Bay.

Soils of moderate to good fertility can be found throughout the area. Terrain underlain by volcanic rock that weathers slowly to yield acidic soils of very low fertility. Well-drained soils support forests of spruce, balsam fir and white pine.

Archaeologists have found abundant evidence of early aboriginal activity along the shoreline and the lower Nepisiguit River dating back at least 4000 years. Despite pre-1500s visits from European fishermen and explorers, the first non-aboriginal settlement did not arise until the 1600s.

**Nicolas Denys ecodistrict (92,443 ha)
23,268 ha - 25% Non-Forest**



Fishing, fur trading, farming, shipbuilding and sawmills supported the area throughout the 1700s and 1800s, with Dalhousie and later Bathurst as the major economic centers. Both towns entered a new industrial era in the 1920s with the construction of pulp and paper mills. The mills have been upgraded several times and are still active. The Elmtree limestone quarry located south of Madran is also an active mining operation. The mine opened in the 1950s and operates in conjunction with the lead smelter at Belledune, another major regional employer. NB Power Thermal Generating Station is also located in Belledune and is a major employer in the region.

Agriculture occurs in about 10 per cent of the ecodistrict, mainly along the coast, and consists of pasture crop and grain production.

The long history of human settlement has reduced the ecodistrict's formerly extensive coniferous forest cover to small patches of coniferous forests scattered in a predominantly mixed forest. One characteristic feature here is the estuaries, tidal flats and salt marshes that have developed where its rivers meet Chaleur Bay in a confluence of salt and fresh water. The Nicolas Denys ecodistrict contains 406ha of salt marsh, 165ha of peatlands and 2,087ha of fresh water wetlands. The coastal features are extensive with 726ha of tidal flat and 196ha of beach and dune.

These diverse and vulnerable sites contain many unusual or rare species of flora and fauna. The Maritime Ringlet butterfly (*Coenonympha inornata nipisiquit*) is found in only a handful of locales in the world outside Nicolas Denys Ecodistrict. Local salt marshes also host the more common Salt-marsh Copper, another endemic species.

Eel River Cove is a local birding spot allowing visitors in nesting season to watch freshwater birds in the cove, and then turn seaward for a different view: small craggy islands which, up close, are raucous with seabirds, osprey and great blue heron.

Chaleur Bay is a critical site for spring migrating black scoter, with 80% of the Atlantic population stopping here on route to their breeding grounds. In addition, the largest concentration of wintering Barrow's goldeneye occurs within this ecodistrict.

10.6.2 -Fundy Coastal Ecodistrict 4.1

Fundy Coastal Ecodistrict is the sole ecodistrict in the like named ecoregion. It covers 226,450 hectares and comprises the southern coastline of New Brunswick along the Bay of Fundy from east Passamaquoddy Bay to Shepody Bay. It also encompasses the Western Isles including Campobello, Deer and Grand Manan islands with an average elevation of 104 meters.

The landscape here is as varied as its geological scope. It ranges from flat-lying salt marshes to high cliffs and from the gently rolling hills to rugged, highly dissected shorelines. Relief generally fluctuates between 30 and 80 meters.

The climate is strongly influenced by the Bay of Fundy's cold marine waters that create moisture-laden air masses yielding abundant precipitation and persistent fog. The bay also moderates local temperatures to produce relatively cool summers and mild winters.



The diverse geology has led to an equally diverse collection of soil types. The most common soils along the coast are those derived from granite, gabbros and volcanic rocks that for the most part are acidic.

Fundy Coastal Ecodistrict spans the traditional territories of the Micmac, Maliseet and Passamaquoddy people. Artifacts have been found here that date back to 4000 years before present.

The coast and islands possessed an immensely productive intertidal and tidal zone replete with sea urchins, mollusks, seabirds and seals.

In the early 1600s, the lower Saint John River valley became one of the first areas in New Brunswick to be permanently settled by European immigrants. Except for the rugged terrain between Salmon River and West River, much of south coast became inhabited by people who earned their living as farmers, fishermen or - less commonly - as loggers. Then as today, agriculture consisted primarily of mixed farming and occurred on areas of soil derived from sedimentary rock.

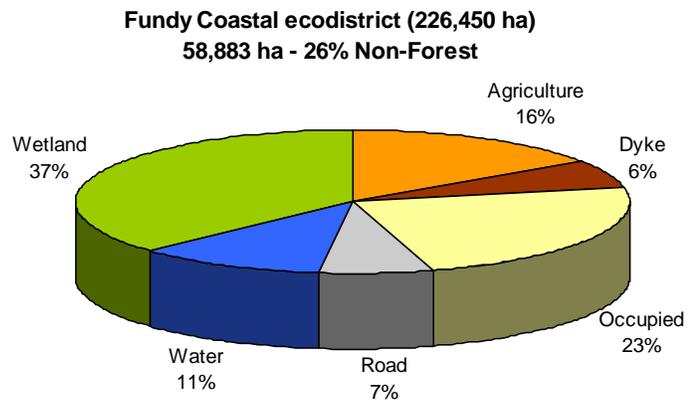
A full range of economic minerals have been discovered and developed along the Fundy Coast since the early 1800s. The only currently active producer is a limestone quarry at Rothesay.

Saint John has been the major settlement in the ecodistrict since before its incorporation in 1785. Over the last two centuries, it has played many roles: Loyalist stronghold, shipbuilding centre, railway hub, seaport and, today, industrial centre with pulp mills, an oil refinery and many other commercial activities.

The cool wet climate has created a forest composition with many boreal elements, except for the prominence of red spruce. The few tolerant hardwood stands contain mostly yellow birch with lesser quantities of sugar maple and beech and treeless bogs are also scattered throughout the ecodistrict.

The Fundy Coastal Ecodistrict contains Fundy National Park, two conservation areas, one ecological reserve, four nature preserves, three bird sanctuaries and a nature park - a reflection of its ecological and biodiversity significance.

Loch Alva Ecological Reserve protects an old red spruce stand. It lies along the lake shore: an undisturbed, solemn acreage of trees that were seedlings when the first Loyalists set foot in New Brunswick, and that give a sense of what coniferous forests must have been like before the 1800s. Loch Alva is one of the deepest lakes in the province and supports both landlocked salmon, and lake trout.



The nature preserves at Cape Enrage Marsh and Saints Rest Marsh both protect representative salt marshes. The latter site is crucial for migrating waterfowl and shorebirds and, together with the adjoining Irving Nature Park on Taylors Island, has the greatest recorded diversity of bird life in New Brunswick; almost two-thirds of the province's known bird species have been seen here. Manawagonish Island Nature Preserve near Saints Rest Marsh also is an important refuge and nesting site for ducks, seabirds, cormorants and gulls.

The remaining reserves include two offshore protected areas (Robert M. Stewart Nature Preserve and Machias Seal Island Migratory Bird Sanctuary) plus the Shepody National Wildlife Area and Mary's Point Ramsar Site. Mary's Point is famous across North America as a stopover point for migratory shorebirds, especially for the hundreds of thousands of semipalmated sandpipers that congregate to feed on mud shrimp. New Brunswick's offshore islands have tremendous seabird (and floral) significance. Machias Seal Island has the only known nesting site in the province for arctic tern, Atlantic puffin and razorbill, and supports the largest puffin colony west of Newfoundland. The Wolves contain one of the greatest concentrations of wintering harlequin ducks in New Brunswick a COSEWIC listed species of Special Concern.

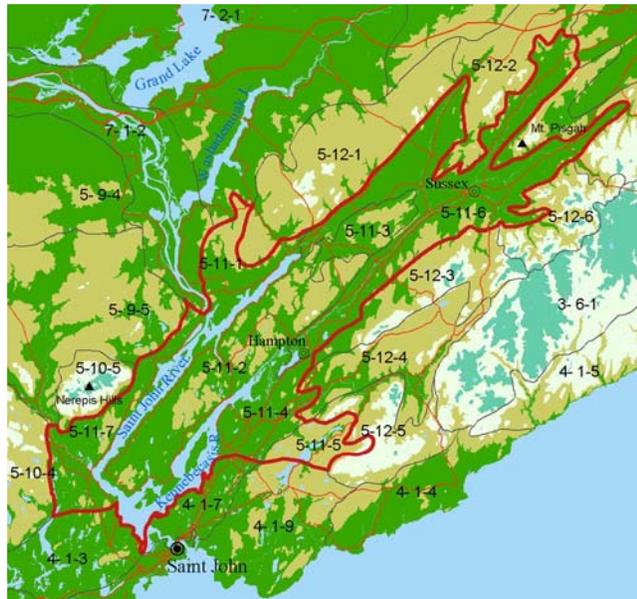
The Fundy coast ecodistrict contains 9,428 ha of freshwater wetlands, 6,860 ha of peatlands and 2,675 ha of coastal wetlands. Coastal waters within this ecodistrict remain ice-free during staging and wintering periods due to the tidal amplitude. The Fundy tidal coastline and associated coastal marshes provide habitat for American black ducks, common eiders and Harlequin ducks.

10.6.3 - Kingston Ecodistrict 5.11

Kingston Ecodistrict is situated in southern New Brunswick in the lower Saint John River valley. It straddles the Kingston Peninsula plus the valleys of Kennebecasis Bay,

Kennebecasis River, Belleisle Bay and Long Reach. It is part of the Valley Lowland ecoregion and covers an area of 164,814 ha with an average overall elevation of 92 m.

The landscape is dominated by the Kennebecasis and Belleisle reaches of Saint John River which, together, defines the perimeter of the Kingston Peninsula.



The Kennebecasis Reach begins at the Kennebecasis Bay, and then narrows into Kennebecasis River, which in turn splits into three rivers - Millstream, Smith Creek and Upper Kennebecasis River - that drain three eastern lobes of the ecodistrict. The northern reach originates as Long Reach, then angles around Shampers Bluff to become Belleisle Bay.

The Kennebecasis and Belleisle valleys are a scenic delight of perched hills, valleys, cliff faces and swift streams. Their geology of resistant volcanic rock interbedded with less resistant sediments makes for a dramatic landscape that owes much to differential erosion. The highest elevation of 220 meters occurs at Raymond Mountain north of Bloomfield.

The northeast segment around Sussex has a lower relief that is more rolling than rugged, with its gentle hills and fertile alluvial interval soils it sustains one of the most intensively farmed regions of the province.

The region has a relatively dry and warm climate that becomes even warmer as one moves north away from the Bay of Fundy and towards upper reaches of the Kennebecasis.

Kingston ecodistrict lies within traditional Maliseet territory. Archaeologists have uncovered evidence of habitation dating back at least 3500 years. Important aboriginal settlements were located where marshes and rivers provided abundant fish, waterfowl, game and other food sources.

The Kennebecasis River valley received its first European immigrants in the 1600s and, within a century, was densely populated. Unlike other ecodistricts where early settlements seldom ventured beyond the banks of waterways, villages in the Kennebecasis Valley formed one long eastward chain that almost met the string of villages flanking the Petitcodiac River.

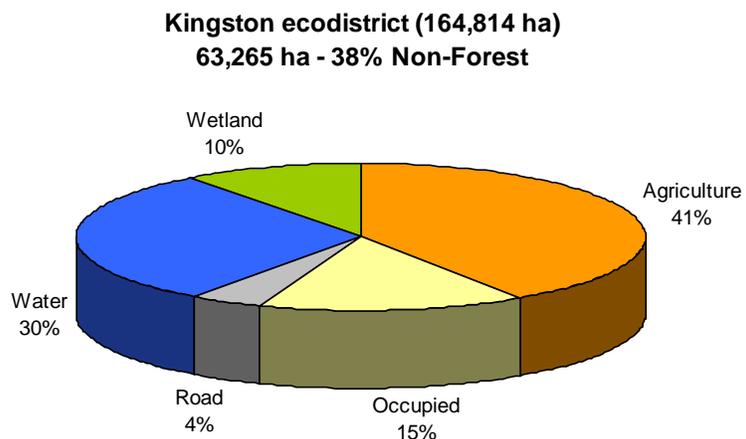
The landscape was cleared and farmed so early and intensively that a visitor to Sussex in the 1850s was able to praise its ‘air of a civilized, old settled region’. The valley became transected by one of the first provincial railroads between Saint John and Shediac. Sussex-made cheese and butter became famous across Canada, and was flavoured for a time with salt extracted from the Sussex salt springs.

Commercial logging began in the late 1700s. The great majority of all forest lands in the area today are privately owned by non-industrial woodlot owners.

Nearly 60 per cent of the land area supports intolerant hardwood stands, active or inactive agricultural fields, a consequence of nearly three centuries of concentrated human activity. The dominant softwood cover of white spruce and balsam fir with some red spruce is most apparent where fields have been abandoned for many decades.

Tolerant hardwood stands composed of beech, sugar maple, red maple and yellow birch with some red spruce occupy hilltops along the few uncleared river slopes and ridgetops. White ash and ironwood with some oak often accompany these stands and become the dominant overstory species in a few dry, ridgetop locations.

Perhaps the most exotic flora are those associated with the Sussex salt springs. The sea formerly occupied Kennebecasis Valley in early post-glacial times, but receded during subsequent post-glacial uplift. Near Sussex, the saline soil environment has been preserved by localized salt springs, which today support several species with a saline affinity: Toad Rush, Chickenclaws or Glasswort, and Coastal Salt Grass.



With 6,443 ha of freshwater wetland habitat the Kingston Ecodistrict features a number of significant bird habitats. The NBEHJV secured Grassy Island near Oak Point on the Saint John River as a nesting site for a recently established breeding population of greater scaup. It was also the first confirmed breeding site for Wilson’s phalarope in the Maritimes. Common tern and assorted gulls (*Larus* spp.) also nest here.

The Hampton marsh complex extends from Darlings Island to Bloomfield along the Kennebecasis River, and is one of the most species-diverse wetlands in the province. Wetlands in the Kingston ecodistrict provide the greatest proportion of brood rearing habitat per wetland area of regions located in the Saint John River floodplain (Connor & Gabor 2006).¹

10.6.3 - Caraquet Ecodistrict 6.2

The Caraquet ecodistrict is a crescent of land averaging 10 kilometres wide that rims the Acadian Peninsula coastline. It belongs to the Eastern Lowlands ecoregion, beginning at the mouth of the Nepisiguit River and curving around Miscou Island to end at the mouth of the Miramichi River. It is 200,166 ha in size with an average elevation of 53m.

The Caraquet ecodistrict can be divided into three distinct zones. The smallest zone parallels the western border and Nepisiguit River, its terrain achieving an elevation of perhaps 100 metres, and its streams and rivers draining into the Nepisiguit.



The second zone has a low, gently sloping appearance with coastal cliffs measuring perhaps 30 meters high. Its rivers flow towards Chaleur Bay and the beaches are subtly coloured by crumbling sandstone cliffs.

The third, and largest, landscape zone has a coastline linked by an almost continuous chain of sand dunes, sand spits, protected bays and salt marshes, severed only by estuaries of the rivers merging into the Gulf of St. Lawrence.

The cool, dry climate of the Caraquet Ecodistrict resembles that of the adjacent ecodistrict, but its summer wind velocity is nearly twice the speed of the inland breezes. Prolonged exposure to the buffeting onshore winds has stunted and damaged many coastal trees, an effect which gradually diminishes inland.

The ecodistrict borders approximates the boundaries of soils derived from marine sediments. These range from fine-textured soil, derived from red mudstone, to coarse-textured soils, associated with grey sandstone. These marine soils are suitable for agriculture if well-drained.

For at least 4,000 years, the Micmac had settlements at the mouths of the Tabusintac, Tracadie, and Pokemouche Rivers where they fished the rivers, gathered shellfish, and hunted seabirds and sea mammals. In approximately 1725, French immigrants formed a permanent settlement at Caraquet. They subsequently were joined by Acadians returning from exile in the 1760s and, later, by people from Québec.

The various communities that evolved along the coast relied upon fishing, farming, and logging for their livelihood. Between the late 1700s and about 1930, extensive coastal

quarries use to dot this ecodistrict to make grindstones for markets across eastern North America, and also to provide building stone for the area's many stone churches.

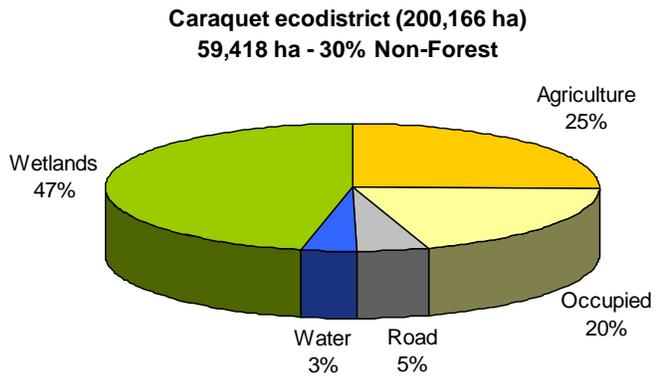
The local economy today depends heavily upon its natural resources, including the fisheries. Peat harvesting takes place on nearly two dozen coastal bogs. As well, east of Bathurst, a quartz-rich quarry is operated for use in a variety of industrial applications. Mixed farming occurs patchily along the coast and is dominated by pasture, forage, and grain production, with significant areas of blueberry harvesting.

The long history of settlement and forest disturbance has resulted in a dominant forest of intolerant hardwood species such as red maple, trembling aspen, and grey birch. Predominantly coastal, the Caraquet ecodistrict has given rise to 5,268 ha of salt marsh, 788 ha in dunes, beaches and spits that offer refuge to several species of rare or endangered plants, birds and butterflies.

One of the more outstanding sites is Miscou Island's northeast shoreline, which has the widest dune system in eastern Canada. It displays a range of ecological succession with shoreline grasses grading into areas with wild iris and sweet gale, through to inland areas where stunted white spruce anchors the soil against ceaseless winds. Miscou is host to two rare annual asters.

As the Caraquet Ecodistrict extends into the Gulf of St. Lawrence, in the form of Lameque and Miscou Islands, intercepting many migratory bird species with its array of peatlands (14,562 ha) and freshwater wetlands (4,669 ha).

Rare birds seen here include the endangered piping plover. Tabusintac Gully is an important breeding ground for piping plover, terns, and other shore birds. The largest black-crowned night heron colony in the Maritimes lives further south near Inkerman, at a site that also harbours great blue heron.



The area's biodiversity and its rare species have led to the establishment of the Tabusintac Ecological Reserve, south of Sheila, and two Eastern Habitat Joint Ventures sites - one near Rivière du Nord on Caraquet Bay, and the other at Daly Point in Bathurst Harbour.

10.6.5 - Kouchibouguac Ecodistrict 6.6

The Kouchibouguac Ecodistrict is part of the Eastern Lowlands ecoregion and encompasses the eastern coastline of the province reaching from Miramichi Bay to Cape

Tormentine. It covers 518,929 ha with an average elevation of 58 m and is a landscape dominated by river estuaries, sand dunes, and peat bogs.

The elevation of this flat, low ecodistrict is less than 60 metres near the coast, and then gently rises upward to the west until achieving a maximum of 90 metres along the border. The terrain is divided by sprawling river valleys so shallow that the riverbank seldom reaches 25 metres above the watercourse.

River estuaries are a dominant feature of the landscape, penetrating up to 30 kilometres inland from the Northumberland Strait. Those associated with the Richibucto, Cocagne and Buctouche Rivers are particularly invasive, and reflect, in part, the degree of coastal land subsidence that has occurred since the last glacial retreat. The rivers were historically rich in salmon and other fish species.



Barrier beaches also are characteristic of the area; the most dramatic appear at Kouchibouguac National Park and the Buctouche Dunes. Peatlands occur throughout the terrain and in places actually abut against the seacoast where they are being eroded by waves from rising sea levels. The bogs, like the dunes and estuaries, provide varied and valuable habitat for plants and animals. The area has one of the warmest and driest climates in New Brunswick, and a growing season that is exceeded only by that of the Central Lowlands.

Forest productivity is restricted by poor drainage and marine exposures. The more fine-textured soils, can be well suited to farming. Most local soils have resulted from a combination of marine deposits near the coastline and glacial tills further inland.

For about 3,000 years before European contact, the Micmac people relied on the area's plentiful marine resources throughout much of the year, moving inland only for brief winter hunting expeditions. The Northumberland coastline was one of the earliest areas in the province to be inhabited by non-aboriginals. Lumbering proceeded vigorously in the area, as its rivers provided easy access for loggers and adequate transport for felled timber.

By the 1850s, the villages of Shediac, Bouctouche, Cocagne, and Richibucto were well established with 31 sawmills, shipbuilding factories, and an active agricultural industry.

The 1860 completion of the European and North American Railway between Saint John and Shediac connected the region to larger markets in Saint John and other centres.

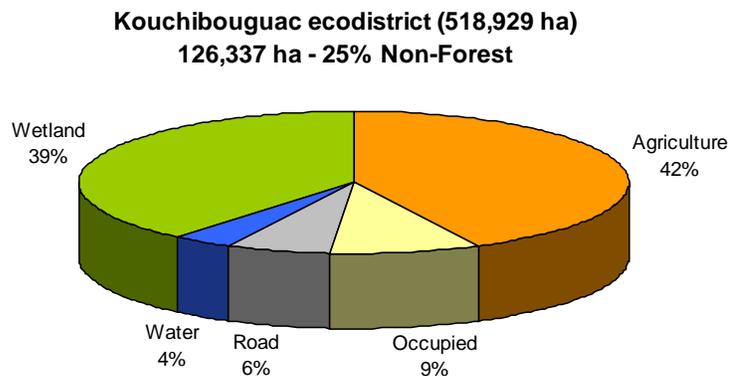
Today, lumbering and agriculture remain important contributors to the local economy, along with tourism, fishing, and peat harvesting. Agricultural activities occur on about nine per cent of the land area. They consist mainly of mixed farming, with beef cattle dominating over pasture, forage, grain, and horticultural crop production.

Mining once played a significance role here, partly because of coal mines but mainly because of the Smith sandstone quarry near Shediac. The operation opened around 1810 and, for the next 140 years, produced dimension stone and grindstones for markets across eastern Canada. Even today, the quarry yields the occasional dimension stone block for heritage restoration purposes.

Three hundred years of settlement in this ecodistrict have resulted in widespread early successional hardwood forests with trembling aspen, red maple, and white birch. Later successional forests consist primarily of coniferous stands and mixed forests. Forest fragmentation by human settlement has tended to inhibit fire in much of the area.

Two protected natural areas have been designated in this ecodistrict: Kouchibouguac National Park, in the north, and the Cape Jourimain National Wildlife Area, in the south. In addition, the Bouctouche Dunes have become an area managed for the co-existence of tourism and conservation.

All three areas are remarkable for their diversity of unusual plants. Among other species, Cape Jourimain contains a saltmarsh aster and Green’s rush both of which are very rare. The Gulf of St. Lawrence Aster occurs at both Kouchibouguac and the “Dune de Buctouche”. However, it is in the realm of bird habitat that these protected areas - and, indeed, the entire coastline - achieve world recognition. The Kouchibouguac ecodistrict contains 3,931 ha of coastal marsh with 1,570 ha of beach and dune. The area is no less important for its freshwater resources, containing 32,272 ha and 17,090 ha of peatland and freshwater wetland respectively. The dunes at Kouchibouguac National Park and Buctouche are sites of high frequency of nesting by piping plover. This shorebird and its habitat are recognized as nationally endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). In addition, large numbers of waterfowl, seabirds, and shorebirds use Cape Jourimain, the Richibucto estuary, Kouchibouguac, Buctouche Bar, and other locations along this coast as staging areas for seasonal migrations.



The Kouchibouguac ecodistricts as well as the Caraquet ecodistrict support concentrations of staging waterfowl during spring and fall migration. Species include American black duck, NAP geese, green winged teal, common goldeneye in addition to other sea duck species.

10.6.6 - Petitcodiac Ecodistrict 6.7

The Petitcodiac ecodistrict is a low-lying, gently rolling area with ridges and valleys that encompass the broad Petitcodiac River basin. The Petitcodiac ecodistrict covers 218,075 hectares, with an average elevation of 83 meters and is part of the Eastern Lowlands ecoregion.



As the name implies, the Petitcodiac River dominates the landscape of this ecodistrict beginning in the boggy plateau of an adjoining ecodistrict and flowing southward to pour into a huge river estuary and Shepody Bay.

To the east, the Memramcook and Tantramar Rivers also arise in wetlands before flowing south through estuaries into Shepody Bay. The combined effects of these rivers define two peninsulas of land that jut into Chignecto Bay to create Shepody Bay on the west and Chignecto Bay on the east.

The area's climate is transitional between the warm, dry ecodistricts of the Eastern Lowlands and the cool, wet Fundy Coast ecoregion. Elevations here generally are less than 75 metres, except at a few locations where elevations reach approximately 165 metres.

Relatively rich soils occur as alluvial material and as tidal deposits, which line the Petitcodiac and Memramcook Rivers and have proven to be valuable agricultural lands.

The Petitcodiac ecodistrict lies within a traditional Micmac territory intersecting a main portage route between the Bay of Fundy and Gulf of St. Lawrence, possessing multiple resources such as shellfish, waterfowl, seabirds, wild rice, and sweet grass. The first non-aboriginal inhabitants were Acadian families, who settled the area in the 1600s and built dykes to drain the marshes, creating some of the most fertile farmland in the New World. They also constructed the first dry dock in Canada at the confluence of the Aulac and La Coupe Rivers.

By the 1860s, The Bend (later called Moncton) and Sackville had become centres of agriculture, shipbuilding, stove foundries, and education. Sackville and especially Moncton evolved into major railway centres after completion of the Intercolonial Railway in the 1870s.

The Petitcodiac Ecodistrict consistently had among the lowest lumber exports in the province throughout the first half of the 19th century. This appears to have been a result of occupational diversity, including shipbuilding, rather than a lack of timber.

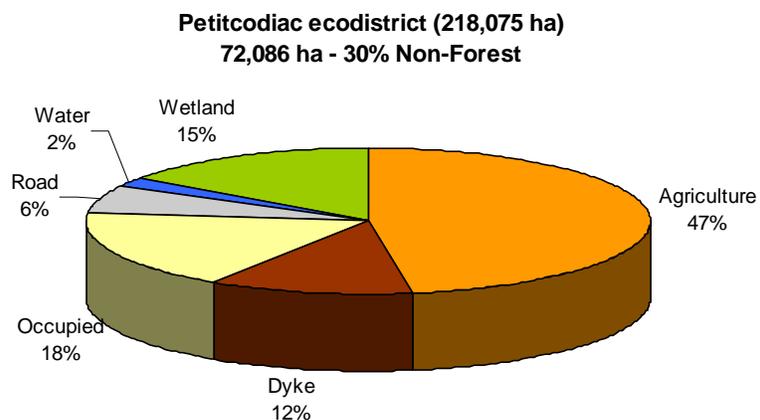
Gypsum and grindstone quarries were the mainstay mining occupations with gypsum quarries and local grindstone quarries operating steadily since the late 1700s - but people also worked deposits of building stone, coal, manganese, oil shale, copper, barite, and lead.

Mining in the ecodistrict essentially ceased in 1982 with closure of the gypsum quarries, but farming remains economically important. Agriculture occurs on 17 per cent of the total land area and is predominantly mixed farming, with crop production supplemented by dairy and beef operations. Pasture and hay are the most common crops, followed by alfalfa, oats, and other grains. Moncton remains the major economic centre, emerging as the second largest city in the province.

Red spruce dominates the forest here, with black spruce growing in scattered patches in the vicinity of peat bogs and in the coastal marsh with cedar occurring in bogs and over limestone and gypsum bedrock. The high frequency of disturbed sites dominated by aspen stands reveals the degree of historical and recent human disturbance along the Petitcodiac River.

6,000 ha of freshwater wetlands, 2,979 ha of peatlands and 1,934 ha of coastal wetlands provide valuable habitat for many species of waterfowl and other birds. Two areas of particular significance are the Tantramar Marshes and the Shepody Bay Ramsar site.

The Tantramar Marshes are a tidal area covering some 10,000 ha near Sackville. Their maroon and buff-coloured grasses echo the red and grey soils beneath and encompasses Ram Pasture and Coles Island Marsh at the Tantramar River mouth, the Sackville Waterfowl Park in east Sackville, and the Upper Tantramar Marsh farther north. Bird-watchers visit the area each year for the Sackville Waterfowl Festival, eager for views of willet, rail, American bittern, shorebirds, and waterfowl. The Upper Marsh is one of New



Brunswick's few confirmed nesting sites for marsh wren and Virginia rail. These marshes also provide extensive breeding habitat for American black duck, green winged teal, mallard, and ring necked ducks.

One of the more exotic features in the ecodistrict is a bog in the Upper Tantramar Marshes. It contains springs and pools so rich in copper that coniferous seedlings die before reaching a height of 10 cm. Specialized mosses and algae, however, seem to thrive around the seepage areas. This copper-bearing bog apparently is unique in the world.

The Shepody Bay Ramsar site is a wetland of international significance, covering much of Shepody Bay and adjoins the Mary's Point Ramsar site, located in the adjacent ecodistrict. Together, the two sites constitute the Shepody Bay Western Hemispheric Shorebird Reserve (WHSRN), an area famous for huge flocks of semipalmated sandpipers, semipalmated plovers, and other shorebirds.

10.6.7 - Aukpaque Ecodistrict 7.1

The Aukpaque ecodistrict is part of the Grand Lake ecoregion and lies in south-central New Brunswick. It encompasses much of the broad, low-lying valleys of the Saint John and Oromocto Rivers covering 168,552 ha with an average elevation of 67 m.



The lower Saint John River flows southeastward through the terrain, flanked by lushly vegetated floodplains. The river overflows annually, laying alluvial debris over older sediments that were deposited 10,000 to 12,000 years ago by glacial Lake Acadia that was formed by an ice dam near present-day Saint John.

The river constantly reworks its riverine and old lacustrine sediments into a shifting chain of alluvial islands that stretches from Upper Shores Island, in the north, to Spoon Island, in the south. These islands are a defining feature of the landscape and, in summer, are dotted with community pasture lands.

Several major rivers enter the Saint John in this region, most notably the Naskwaak, Mactaquac, Keswick, and Oromocto Rivers. The Oromocto displays a series of glacially-derived ponds, marshes and bogs that constitute the Oromocto River Wetland Complex. The Oromocto River Wetland Complex represents important habitat for resident and migrating waterfowl, as well as for aquatic mammals. Washademoak Lake, farther south,

is actually the widened lower reach of the Canaan River, which arises in swampland far to the east in the Castaway Ecodistrict.

Elevations east of Fredericton tend to be less than 100 metres, whereas those west of the city are somewhat higher. Relief is generally low, except in the west where steep river valleys incise the upland surface by up to 150 metres. Isolated plugs and stocks of igneous rock also provide some topographic variety.

The Aukpaque Ecodistrict has a relatively warm and dry climate. The huge volumes of water in the river basins act as a heat reservoir and extend the frost-free season beyond what it would be otherwise.

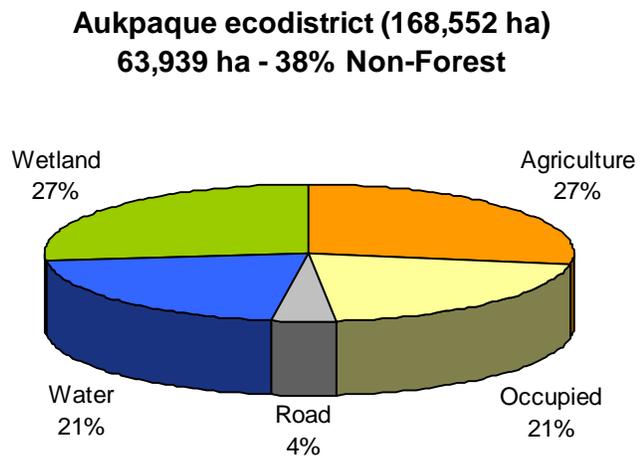
The floodplains of the Saint John River east of the Mactaquac Dam and along portions of the Keswick and the Oromocto River valleys possess thick beds of alluvial sand and gravel, overlain by silt or fine sand. Spring floods that deposit nutrient-rich sediment over the floodplain replenish the intervale zone annually. Where cleared for agriculture, these combined soils sustain fruit, vegetable, poultry, and livestock production.

The Aukpaque Ecodistrict lies within traditional Maliseet territory with many encampments existed along the Saint John River. The French made their first attempts to inhabit the lower Saint John River valley during the mid-1600s, and, in 1695, constructed the province's first sawmill at the mouth of the Nashwaak River.

By the mid-1800s, because of the rich intervale lands, warm climate and natural resources the valley became one of the most heavily settled areas in the province, with residents relying mainly on farming and logging. Many people in the Hampstead area also worked at the local granite quarries.

Sand and gravel deposits and crushed rock quarries are worked to fulfill the ecodistrict's increasing demand for highway and building aggregate. Agriculture also is an important land use activity, especially in the Keswick and Saint John River valleys, where farm operations provide fruits, vegetables, meat, and dairy products for the larger Fredericton market.

The original forest has been altered dramatically by agriculture on the intervalles, and by forest harvesting and clearing for settlement and agriculture along valley slopes and peripheral flatlands. Stands of red maple, white birch, grey birch, balsam fir, and trembling aspen are typical of these disturbed areas.



The ecodistrict boasts 15,624 ha of freshwater wetland and 1,134 ha of peatland along with many alluvial islands associated with the Saint John and Oromocto Rivers, represent significant habitat for waterfowl, shorebirds, gulls, osprey, and black tern. The largest and most crucial wetland is Grand Lake Meadows, which is used heavily by inland waterfowl during spring migration, and sees several breeding species of ducks each summer.

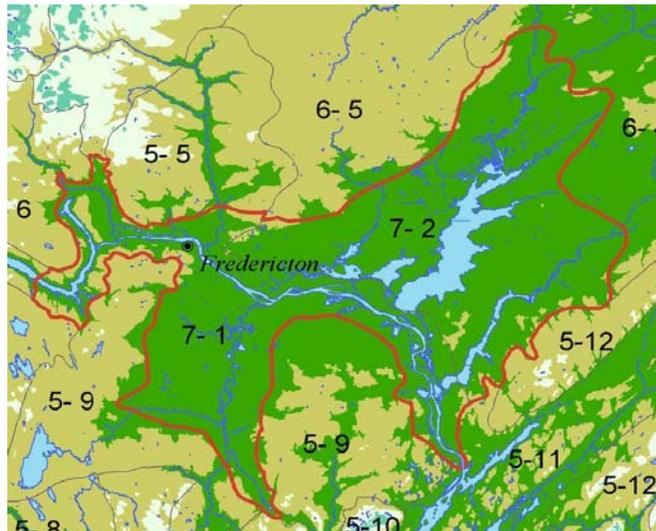
The wetlands and floodplain islands possess a rich floral diversity, a function, in part, of their repeated flooding, rich soils, and moderated climate.

Downriver is the annually flooded Hyla Park Nature Preserve, which shelters clammy hedge-hyssop and purple milkwort. In addition to its population of rare plants and uncommon birds, Hyla Park is home to three species of salamanders, plus seven species of toads and frogs, including a disjunct population of the eastern gray tree frog. This is the most northeasterly known habitat for the eastern gray tree frog in North America and is Canada's first park set aside to conserve amphibian species. Sandbars along this lower portion of the Saint John River and its tributaries harbour one of only a few known Canadian populations of yellow lampmussel.

10.6.8 - Grand Lake Ecodistrict 7.2

The Grand Lake Ecodistrict is part of the similarly named ecoregion. It is found in south-central New Brunswick forming a flat, low-lying basin area that encloses the waters of Grand Lake and the major coalfields of New Brunswick. It covers 209,388 ha with an average elevation of 66m.

The landscape presents a gently sloping basin filled with Grand Lake, Washademoak Lake, and their feeder streams. Elevations are less than 120 metres at the ecodistrict perimeter and drop gradually inwards toward Grand Lake.



The lakes and their associated waterways course roughly northeasterly, following the prevailing structural grain of bedrock. Only in the extreme south of the ecodistrict, does the landscape begin to undulate upwards in anticipation of the higher plateau beyond the border. Otherwise, relief seldom exceeds 30 metres, except where streams have managed to erode the soft bedrock surface. The rivers here tend to meander across the countryside before flowing into Grand Lake.

The Grand Lake Ecodistrict is moderately dry and has the warmest climate in the province. The large volumes of water in Grand Lake and the adjacent lower Saint John River act as a heat reservoir to prolong the frost-free period.

The red, moderately fertile soils occur over much of the ecodistrict supporting crops of vegetables and small fruits. However, the land's lack of relief and the soil's fine texture combine to impede drainage, which limits the growth rate of overlying vegetation.

The Grand Lake Ecodistrict lies within traditional Maliseet territory and was used regularly before the arrival of Europeans. It possessed marshes, lakes and rivers with abundant fish, waterfowl, wild rice and other food sources, and formed a major native portage routes between the Saint John River, the Miramichi River, and the Northumberland Coast.

The earliest Europeans arrived in the ecodistrict sometime in the middle to late 1600s and, over time, settled the shores of Grand Lake, Washademoak Lake, the Jemseg River, and other places that were favourable for farming. Logging and fishing were the other primary occupations. In addition, shipbuilding took place in Cumberland Bay and Douglas Harbour, and at Cambridge Narrows.

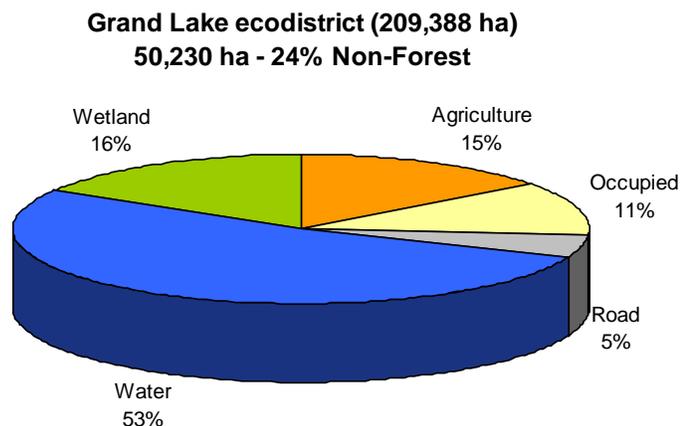
The distinctive socioeconomic factor of this ecodistrict, however, is not logging, but coal mining. The first coal shipment left for Boston in 1639 and spelled the modest beginnings of what has become almost 300 years of continuous coal removal.

Large-scale production began after the railroads reached the coalfields in the late 1800s and early 1900s. Although coal was excavated all along the north shore of Grand Lake, the largest operations lay near Minto. Coal removal still occurs to a limited degree, but it appears coal mining in New Brunswick faces an uncertain future. Mixed farming takes place today on the better soils.

The ecodistrict has a large number of tree species. Mixed stands of red spruce and hemlock, with red maple, white birch and trembling aspen, form the most common forest cover, and are associated with the better-drained upland soils. Hemlock also occurs in more diverse forest communities.

The ecodistrict's unusually warm climate has encouraged the growth of tree species usually associated with more southerly regions. The resultant oak, green ash, butternut, and silver maple are especially prevalent on rich Interval soils.

In addition to its diversity of tree species, the Grand Lake ecodistrict encompasses the variety of habitat



features associated with shoreline and lowlands. The area's most outstanding feature, however, is its 6,975 ha of freshwater wetlands that contain crucial habitat for breeding ducks and migratory waterfowl. Over 250 bird species have been sighted in these marshes, along with 35 of the roughly 55 species of terrestrial mammals in the province. Aukpaque and Grand Lake ecodistricts both provide extensive waterfowl habitat during breeding and staging for a number of species including American black duck, American wigeon, wood duck, mallard and common goldeneye.

Grand Lake also is a prime birding spot for many uncommon species, including black tern. Grand Lake Meadows, west of the lake, straddles both this and the adjoining Aukpaque ecodistrict and represents one of the most important bird habitat areas in the Maritimes. They are used heavily by inland waterfowl during spring migration and host several breeding species of waterfowl each year.

10.7 - Appendix VII - Predicted waterfowl response NB-EHJV Program.

A) Existing Waterfowl Studies.

Estimating the predicted waterfowl response resulting from the implementation of conservation programs is necessary in the evaluation of program benefits and monitoring the progress towards waterfowl goals. Predicted waterfowl outcomes were based on the best available information and sources are included below, some of which are taken from other provincial EHJV implementation plan summaries. Additional data will be incorporated into estimates of waterfowl response, population estimates and subsequent population objectives as completed as part of NB EHJV program evaluation.

1) Ontario Waterfowl Production Study. DUC 1980.

This study evaluated both pair and brood use on 12 selected DUC wetland restoration projects. The 12 projects were assigned a wetland type based on habitat characteristics. The study includes all waterfowl species. For wetlands that have been directly secured or protected by provincial policies and no subsequent management activities are to be implemented, the CWS Southern Ontario Breeding Waterfowl Survey and the MES study plots provide the best estimate of waterfowl pair values. CWS found an average of 0.3 IBP/ wetland hectare across all plots in the two years sampled. MES IBP / wetland hectare ranged from 0.2 to 0.4 in the Portland and Cambridge study sites respectively. The Webster Waterfowl Study also included pair surveys on unmanaged wetlands, but a significantly higher 2.4 IBP / wetland hectare may be a reflection of the study site and/or the close proximity of adjacent restored basins. An estimate of 0.3 IBP / wetland hectare seems appropriate for secured wetlands across Ontario.

2) Webster Waterfowl Study. DUC 1999.

The adaptive management study was undertaken for one season to evaluate the waterfowl productivity in various wetland management treatment types on the same landscape and compare these to adjacent reference or control wetlands. The study includes both ducks and geese. The lack of pairs on excavated wetland treatments was hypothesized to be a result of the lack of adequate time for the ponds to naturalize following construction.

For wetlands that have been enhanced or restored directly or through extension efforts, the Ontario Waterfowl Production Study and the Webster Waterfowl Study both provide insight into the predicted IBP value of these types of habitats. The more recent Webster Waterfowl Production Study is more reflective of the value of smaller restored or enhanced wetland basins while the older Ontario Waterfowl Production Study effectively evaluated wetland productivity based on wetland size and type. An average for the typical small wetland program that is currently being delivered to address pair habitat limitations from both these studies would predict a value of 3.6 IBP / wetland hectare.

Wetland Treatment	IBP/ha
1. impoundment	4.6
2. excavation	0.0
3. control (no management)	2.4

3) Mallard Ecology Study. DUC 1999-2003.

The MES evaluated waterfowl vital rates on four different study sites across southern Ontario. Pair surveys were rigorously designed road transects and these were conducted at optimal points in the breeding season. Surveys were compiled on a square kilometre basis rather than on a wetland basis.

Study Site	Wetlands/ km2	IBP /km2	Wetland size (ha)	IBP/ha
Cambridge				
a) High wetland density	8	6.4	2.0	0.4
b) Low wetland density	1.6	1.2	2.0	0.4
Portland	2.7	1.9	4.0	0.2

4) Quebec EHJV Implementation Plan. 1 IBP/ha managed wetland

5) Nelson, J.W. and R.T. Clay. 1985. Completed Projects Evaluation 1984 Progress Report- Floodplain and Inland New Brunswick Biomes. 92 pp.

Biome	(IBP/ha)	1984 (5 sites)
Floodplain managed (5)	0.27+-0.03	176 ha
Inland managed (5)	0.33+-0.02	185.1 ha

6) Nelson, J.W. 1988. Completed Project Evaluation Floodplain New Brunswick. Ducks Unlimited Canada. 40 pp.

Biome	(IBP/ha)	(5 sites)	Survey year
Floodplain managed (5)	0.27+-0.03	176 ha	1984
Floodplain managed (5)	0.51+-0.10	168.7 ha	1985

7) Canadian Wildlife Service Indicated Breeding Pair Survey Data- New Brunswick, 2006.

CWS IBP survey	IBP/km ²	IBP/ha Wetland	IBP/ha suitable Wetland
	0.87+-0.25	0.17	0.52

8) Pollard, J.B. 1995. Impact of Atlantic Dykeland Wetland Restoration on Regional Waterfowl Populations. Progress Report. 15 pp.

	IBP/km ²
Pre-restoration	0.338
Post-restoration	0.644

9) Stevens, C.E., T.S. Gabor, and A.W. Diamond. 2003. Use of Restored Small Wetlands by Breeding Waterfowl in Prince Edward Island, Canada. Restoration Ecology. 11 (1), pp.3-12.

	(IBP/ha)	(broods/ha)
Restored Small Marsh	1.95	0.68
Control Small Marsh	0.5	0.09

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10) Mean densities of Black Duck Pairs by focus area in New Brunswick, 1985-89. (Parker, CWS)

Focus Area	Number of Plots	Black Duck Pairs (IBP/25 km ²)	Black Duck Pairs (IBP/100 km ²)	Black Duck Pairs (IBP/ km ²)
Coastal	2	4.9	19.6	0.196
River Valley	4	10.6	42.4	0.424
Interior	33	4.4	17.6	0.176
Dykeland	2	11.0	44.0	0.44

11) Focus area summary of CWS IBP survey (mean IBP/100km²) 1990-1995. (Bateman, Hicks, Gilliland, CWS)

Focus Area	Number of Plots	Black Duck Pairs	Total Duck Pairs	Total Duck Pairs (IBP/ km ²)
Northumberland Plain	6	13.0	26.0	0.26
Coastal	6	20.0	32.0	0.32
River Valley	8	17.0	33.0	0.33
Interior	28	8.0	16.0	0.16
Newfoundland*	6	7.1	30.0	0.30
Labrador*	19	7.1	25.4	0.25
Dykeland**	1	15.9	33.8	0.34

* Surveys timed for Black Ducks, numbers for other species inflated by migrating pairs.

** Pollard 1996, 1991, 1992 pre-restoration data.

12) Comparison of IBP and brood use of large restored wetlands in forested and agricultural landscapes. Margaret Haworth-Brockman and Bob Clay (1988) Completed Project Evaluation: Maritimes Inland NB and Floodplain NB.

Landscape	# Projects	# survey years	(Pairs/ha ±SE)	(Broods/ha ±SE)
Agriculture	22	40	1.00 ± 0.82	0.95 ± 1.1
Forest	10	17	0.34 ± 0.18	0.36 ± 0.27

13) Waterfowl brood density (#/ha) on impoundments (5) and seasonally flooded wetlands (5) on the Saint John River floodplain, NB, (1997 and 1998). (Connor and Gabor, 2000)

Landscape	1997	1998
Floodplain managed	0.53	0.39
Floodplain control	0.15	0.035

B) Predicted Waterfowl Outcomes

New Brunswick -Wetland Type IBP/hectare

Wetland Type	IBP/ha
1. agricultural small marsh	2.0
2. inland managed wetland	0.34
3. floodplain managed	0.6
4. dykeland managed	1.0

C) NB EHJV Waterfowl Outcomes

Table 14 in the NB EHJV Implementation plan provides partner habitat goals for a five-year period. Predicting the waterfowl response of the various conservation programs can be based on the monitoring data described above.