

**Habitat Conservation Plan for
The Towns of Bay Roberts and Spaniard's Bay**

**Prepared by
The Eastern Habitat Joint Venture**



January 2008

Preface

During the first fifteen years of our program, EHJV in Newfoundland and Labrador has secured and influenced over 409,000 acres of critical wetland habitat in our province through land acquisition and stewardship agreements. In Newfoundland and Labrador some of the wetlands that are in greatest danger of being destroyed or degraded are those influenced by residential, commercial and industrial activities within the vicinity of municipalities. In this province, the primary focus of the Eastern Habitat Joint Venture is to conserve valuable waterfowl habitat (wetlands and associated upland) through Wetland Stewardship Agreements. The Towns of Bay Roberts and Spaniard's Bay were identified as having just such ecologically valuable, and unique, wetland habitats located within their boundaries.

The Wildlife Division approached Bay Roberts and Spaniard's Bay Town Councils, recommending a Stewardship Agreement to demonstrate community commitment to conservation and protection of wetlands. On June 6, 1997, the Towns of Bay Roberts and Spaniard's Bay became the first communities in the province to sign a *joint* Municipal Wetland Stewardship Agreement when Mayors Lewis Gosse (Spaniard's Bay) and Wilbur Sparks (Bay Roberts) and the Honourable Beaton Tulk signed an agreement pledging their commitment to wetland conservation for a specified Stewardship Zone. In accordance with this agreement, Bay Roberts and Spaniard's Bay will manage the wetlands with technical advice provided by the provincial Wildlife Division. The Wildlife Division has prepared this Habitat Conservation Plan for the Town so that negative or adverse impacts to wetland habitats within the Stewardship Zone can be minimized. With the signing of this plan, the Towns of Bay Roberts and Spaniard's Bay officially accept this Habitat Conservation Plan and agree to use it as a guide to govern activities within the designated Stewardship Zone.

THE HONOURABLE THE MINISTER OF ENVIRONMENT AND CONSERVATION



THE TOWN COUNCIL OF THE TOWN OF BAY ROBERTS



THE TOWN COUNCIL OF THE TOWN OF SPANIARD'S BAY



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Executive Summary

The number and diversity of North America's wildlife species has been declining - in some cases dramatically - over the latter half of the twentieth century. At least part of this decline can be directly attributed to the loss of natural habitats to urban, industrial and agricultural expansion. Wetlands have historically been among those areas most critically affected by human development. Through the North American Waterfowl Management Plan (NAWMP), Canada, the United States and Mexico have committed themselves to a long-term program of joint projects aimed at assuring the survival and increase of waterfowl populations and protecting the wetland habitats on which their survival depends. A total of 21 joint ventures have been established to achieve the objectives of the NAWMP. To date, over 13 million hectares of wetland area has been protected under the North American Waterfowl Management Plan through these regional joint ventures. The Province of Newfoundland and Labrador, through the Wildlife Division, became a partner of the Eastern Habitat Joint Venture (EHJV) in 1989.

Funding partnerships formed with the EHJV include Canadian federal and provincial governments, United States federal and state governments and non-profit organizations like Ducks Unlimited, Wildlife Habitat Canada and The Nature Conservancy of Canada.

During the first fifteen years of our program, EHJV in Newfoundland and Labrador has secured and influenced over 409,000 acres of critical wetland habitat in eastern Canada through land acquisition and stewardship agreements. In Newfoundland and Labrador some of the wetlands that are in greatest danger of being destroyed or degraded are those influenced by residential, commercial and industrial activities within the vicinity of municipalities. In this province, the primary focus of the Eastern Habitat Joint Venture is to conserve valuable waterfowl habitat (wetlands and associated upland) through Wetland Stewardship Agreements. The Towns of Bay Roberts and Spaniard's Bay were identified as having just such ecologically valuable, and unique, wetland habitats located within their boundaries.

The Towns of Bay Roberts and Spaniard's Bay (or the Towns) and the Government of Newfoundland and Labrador signed a Municipal Stewardship Agreement on June 6, 1997. In accordance with this joint Agreement, the Towns will manage the specified wetland habitats located within the Stewardship Zone, with sound technical advice from the EHJV. The EHJV has prepared this Habitat Conservation Plan, in consultation with the Towns, for use in their efforts to minimize negative or adverse impacts to sensitive wetland areas within the designated Stewardship Zone when making planning decisions.

This Habitat Conservation Plan provides the Towns of Bay Roberts and Spaniard's Bay with an inventory of wildlife species and habitat types present within the Shearstown estuary. This plan also indicates current land use activities in the area, and associated problems. In addition, this plan provides the Towns with recommendations for conservation, restoration, enhancement and educational opportunities for the Stewardship Zone and associated Management Units.

Introduction

Wetlands are unique ecosystems, often occurring at the edge of aquatic (water, fresh or salty) or terrestrial (upland) systems. They may be wet year-round, wet during certain seasons, or wet during part of the day. In addition to bogs and swamps, wetlands include tidal marshes, forested wetlands, fens, estuaries and shallow open water (less than two meters). Wetlands can contain fresh, brackish and salt water. Wetlands are some of the most biologically diverse and productive ecosystems in the world. They provide habitat for waterfowl, shorebirds, fish and numerous other plant and animal species. Though diverse, wetlands possess similar ecological characteristics that distinguish them from other upland or aquatic systems. These include unique hydrologic, substrate and biotic conditions.

Wetlands provide many social, economic and environmental benefits, including consumptive and nonconsumptive recreational activities such as hunting, fishing and bird-watching, the reduction of soil erosion and flood control. Wetlands are natural reservoirs capable of conserving and purifying precious water supplies, they serve as carbon sinks and aid in leaching contaminants and pollutants from associated upland areas.

Unfortunately, wetlands are often considered wastelands and have historically been among the areas most critically affected by human development. In recent years, however, numerous government agencies, corporations, private organizations and concerned individuals have come to realize that healthy wetlands are crucial for the environmental wellbeing of our planet. It was this realization that led to the recognition that loss of wetland habitat had a direct correlation with the decline of waterfowl populations. As a result, an historic agreement called the North American Waterfowl Management Plan (NAWMP) was signed in 1986. This agreement commits Canada, the United States of America and Mexico (since 1994) to a long-term program to help increase waterfowl numbers and protect the habitat on which their survival depends. Under the NAWMP a total of twenty-one joint ventures have been established to protect and manage important wetland habitats in a particular region for the benefit of waterfowl and other wetland related species. One such joint venture is the Eastern Habitat Joint Venture (EHJV). Its purpose is to conserve the waterfowl resources of the six eastern Canadian provinces by maintaining, restoring and enhancing the abundance and quality of wetlands. The Province of Newfoundland and Labrador, through the Wildlife Division became a partner in the Eastern Habitat Joint Venture in 1989. The primary focus of its program involves the conservation of valuable waterfowl habitat (wetlands) located within municipalities through the signing of Municipal Wetland Stewardship Agreements.

The Towns of Bay Roberts and Spaniard's Bay were identified as having critical wetland habitats within their municipal boundaries. Waterfowl "hot spots" were identified through preliminary field surveys and discussions with local residents, bird watchers and naturalists. Negotiations between the municipalities and the Eastern Habitat Joint Venture resulted in the signing of a joint Municipal Stewardship Agreement on June 6, 1997. In accordance with this joint agreement, the Towns of Bay Roberts and Spaniard's Bay will manage these wetlands with technical advice from the Eastern Habitat Joint Venture.

The Eastern Habitat Joint Venture has prepared this Habitat Conservation Plan in accordance to the terms of the signed agreement.

Plan Purpose: The Towns of Bay Roberts and Spaniard's Bay will use this Habitat Conservation Plan as a guide to govern activities and minimize negative impacts to wetlands and associated uplands within the areas designated for conservation and waterfowl production.

Plan Goals:

- (1) To protect those wetlands located within the Stewardship Zone and Management Units.
- (2) To maintain and/or increase wildlife use of those areas, particularly by waterfowl and other avian species.
- (3) To increase public awareness of the importance of wetland habitats.

Plan Objectives:

- (1) To present an assessment and inventory of the wetland habitats indicated.
- (2) To describe existing land use practices.
- (3) To suggest protection and enhancement strategies for the Stewardship Zone and Management Units.
- (4) To describe initiatives for education and awareness among the public in order to increase support and cooperation of the Town's citizens.

The productive wetland habitat located within the Stewardship Zone is termed an estuary, a transitional zone between a river and the ocean (Appendix A). Estuaries are typically semi-enclosed, coastal basins that receive water from both fresh water and salt water sources. Water conditions and levels are generally variable due to tidal influences. Shearstown Pond, Arnie's Pond and the innermost portion of Spaniard's Bay are all part of the **Shearstown Estuary** (Figure 1). While there are many locations in Newfoundland where rivers flow into the ocean, very few are true estuaries.

Estuaries are typically the most biologically productive environments of the oceans. They are usually relatively shallow and nutrient-rich from land runoff. Tidal action in an unaltered estuary typically maintains well-oxygenated waters within the estuary. The shallowness of an estuary permits high primary productivity through photosynthesis unless suspended sediments impede light penetration. Because estuaries, their bordering wetlands and associated upland areas represent some of the highest biologically productive areas of the oceans, many people are becoming increasingly aware of man's significant alteration of these fragile ecosystems. Estuaries are home to a great diversity of organisms with different life cycles. Some species are totally estuarine, some live in estuaries as juveniles, and others seasonally migrate in and out of estuaries. Hence, human influence on estuaries has the potential to affect the diversity of life in the open oceans as well as coastal organisms and productivity.

The Shearstown Estuary receives an inflow of both fresh water from the Shearstown River and salt water from Spaniard's Bay. The resulting mixture of fresh and salt water is termed brackish (partially salty). The salinity – degree of saltiness – of water in an estuary is highly variable with location and time.



Figure 1: Aerial photo of Shearstown Estuary (1995).

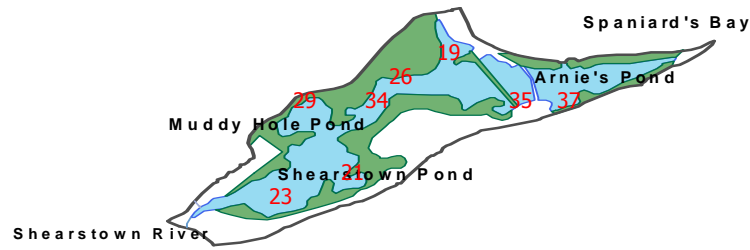
The mixing of fresh and salt water is highly dependent on tides, winds and the shape of the estuary itself. While salinity measurements vary considerably between tides in some parts of the estuary, other areas remain rather stable. This is demonstrated by salinity measurements taken in the Shearstown Estuary over a period of high and low tide (Figure 2).

Salinity within the confines of the estuary varies throughout the year due to changes in winds, tides and fresh water input from the local watershed. Excess salinity impacts plant germination, growth and production significantly within an estuary.

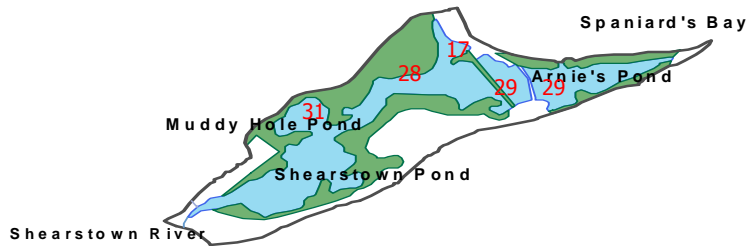
Large-scale infrastructure development (Conception Bay Highway and CN Railway) may have had some impact on the flushing rate of the Shearstown Estuary, or the estuary's natural ability to "clean itself" through currents and tidal influence. Estuaries are historically significant because large human populations, like the communities bordering the Shearstown Estuary, live next to them. Commerce, transportation and fishing have traditionally been important within and around the estuary. As a result, pollution and human alteration of these coastal environments has likely influenced the estuarine ecosystem of the area.

The Ecosystem of the Shearstown Estuary

The widely fluctuating environmental conditions that typify an estuary make it a challenging place for plants and animals to exist. Yet, estuaries remain very fertile and support large populations of species that *are* able to adapt to these stressful conditions. The water depths of the Shearstown Estuary are quite shallow, often less than one meter. Extensive beds of eel grass grow throughout the shallow regions of Arnie's Pond and Shearstown Pond. In areas with low salinity levels and shallow water depths, widgeon grass tends to form large mats over the mud substrate.



High Tide (10am, September 17, 1997)



Low Tide (3pm, September 17, 1997)

Figure 2: Salinity measurements taken in the Shearstown estuary on September 17, 1997 at both high tide (10 am) and low tide (3pm). Units expressed as parts per thousand (ppt). For reference, the salinity of Conception Bay is approximately 36 ppt.

Kelp is abundant throughout the estuary and is pushed toward the river by tidal action. Abundant populations of filter feeding invertebrates live among this aquatic vegetation. These include blue mussels and barnacles. Amphipods (small marine animals) can also be found swimming throughout the estuary.

A small run of Atlantic salmon occur within the Shearstown Estuary. Further study would be required to determine whether these fish leave to spawn elsewhere or whether they continue to spawn in areas that have historically been used in the Butlerville area.

The estuary also serves as migration, feeding and overwintering habitat for sea-run brook and brown trout. Other species present within the estuary include American eel and three-spine stickleback. Several fish species associated with marine environments such as flatfish and capelin occur at the mouth of the estuary. Estuaries are the nursery grounds for many marine invertebrates and vertebrates (Table 1).

Table 1: Aquatic animal species of the Shearstown Estuary.

Subphyla	Common Name	Scientific Name
Invertebrates	Barnacle	<i>Balanus sp.</i>
	Blue Mussel	<i>Mytilus edulis</i>
	Amphipod	
	Soft-shell Clam	<i>Mya arenaria</i>
	Periwinkle	<i>Littorina littorea</i>
Vertebrates	Atlantic Salmon	<i>Salmo salar</i>
	Brown Trout	<i>Salmo trutta</i>
	Brook Trout	<i>Salvelinus fontinalis</i>
	American Eel	<i>Anguilla rostrata</i>
	Capelin	<i>Mallotus villosus</i>
	Three-spine stickleback	<i>Gasterosteus aculeatus</i>
	Winter Flounder	<i>Pseudopleuronectes americanus</i>

Young fish can feed voraciously and grow rapidly under the relatively low predation pressures in estuaries.

The grassy regions along the shoreline of an estuary, frequently inundated by tidal waters, are termed salt marshes. Salt marshes have commonly been considered nothing more than a hindrance to human development. All too often they have been used for farmland, garbage dumps and infilled for urban development. Tides exert the main control on salt marshes, hence they are considered to be tide-stressed coastal environments. However, they are the most productive of all estuarine environments. They occur inside protective bays, lagoons and estuaries or behind barrier islands and sand spits and are an important part of the marine food chain in nearby coastal habitats. Within the Shearstown Estuary, the frequent tidal inundation of salt and brackish water restricts growth of many species of vegetation. However, several plant species such as black grass and glassworts have adapted to these conditions and are found along the highest regions of the shoreline where they are influenced by the highest tides. Beyond this tidal influence, plants in and around the estuary routinely experience salt spray and desiccation (drying out).

Table 2: Plant species of the Shearstown Estuary.

Habitat	Common Name	Scientific Name
Aquatic	Eelgrass	<i>Zostera marina</i>
	Widgeon grass	<i>Ruppia maritima</i>
Beach	Sea-rocket	<i>Cakile edentula</i>
	Oyster leaf	<i>Mertensia maritima</i>
	Yarrow	<i>Achillea millefolium</i>
	Butter and Eggs	<i>Linaria vulgaris</i>
	Climbing False	<i>Polygonum scandens</i>
	Buckwheat	
	Black Knapweed	<i>Centaurea nigra</i>
	Stinking Groundsel	<i>Senecio viscosus</i>
	Curled Dock	<i>Rumex crispus</i>
	Scotch Lovage	<i>Ligusticum scothicum</i>
	Seaside Plantain	<i>Plantago juncooides</i>
	Glasswort	<i>Salicornia europaea</i>
	Salt marsh/ Shoreline	Silverweed
White Spruce		<i>Picea glauca</i>
Salt marsh Sedge		<i>Carex plaeacea</i>
Black Grass		<i>Juncus gerardi</i>
Field Sow-Thistle		<i>Sonchus arvensis</i>
Vetchling		<i>Lathyrus palustris</i>
Orache		<i>Atriplex patula</i>
Spike rush		<i>Eleocharis sp.</i>
Scotch Lovage		<i>Ligusticum scothicum</i>
Seaside Plantain		<i>Plantago juncooides</i>
Glasswort		<i>Salicornia europaea</i>
Pasture Rose		<i>Rosa sp.</i>

Many plants, including sea rockets and sea mertensia, have evolved fleshy leaves and stems to deal with these conditions (Table 2). Most of the natural forest surrounding the Shearstown Estuary has been cleared for agricultural, residential and commercial development. Small mixed stands of trees exist around the estuary and are typical of the Boreal Shield Ecozone, and are important to many bird species.

A myriad of wildlife species inhabit the Shearstown Estuary throughout the year. From late fall to early spring, waterfowl converge along the shores of Spaniard's Bay and Arnie's Pond to feed on the abundant invertebrate populations. These flocks generally consist of American Black Duck. However, occasionally Green-winged Teal and Canada Geese are observed among the wintering waterfowl. Common Goldeneye and Greater Scaup regularly occur in the region, but tend to remain in the deeper areas of Spaniard's Bay (Appendix H).

Black-Headed gulls are also regularly observed in Arnie's Pond throughout the winter, with a flock of forty noted in early November 2005. Generally found in Eurasia and Iceland, these small seabirds are occurring more frequently in North America (Table 3).

Counts of over two hundred waterfowl are common throughout the winter months. With the onset of warmer spring temperatures, waterfowl quickly disperse from the estuary and move to inland waterways. Soon after this occurs, Ring-Billed Gulls and Common Terns congregate to nest on a small peninsula located in Shearstown Pond. In 1996, approximately thirty pairs of breeding Ring-Billed Gulls and fifteen pairs of Common Terns were found nesting in the colony. Young terns that are successfully raised in the colony remain in the estuary until early fall.

Green-Winged Teal and Northern Pintail are occasionally observed in the estuary during the summer and into fall, with a pair of each noted in early November 2005 in the area of Shearstown Pond, adjacent to the northern portion of the railway berm. Small numbers of Spotted Sandpipers also occur throughout the summer.

A number of migratory shorebirds stop to rest and feed at the Shearstown Estuary during their fall migration south from arctic and subarctic breeding grounds. Commonly observed species include Semipalmated Sandpipers, Semipalmated Plovers, Black-bellied Plovers and Ruddy Turnstones. Greater Yellowlegs are the most frequently observed shorebirds in the estuary and often form loose flocks of fifty or more birds. An assortment of shorebirds can be observed in the estuary from mid-August to mid-October (Appendix H).

Table 3: Avian species of the Shearstown Estuary.

Group	Common Name	Scientific Name
Waterfowl	American Black Duck	<i>Anas rubripes</i>
	Green-Winged Teal	<i>Anas crecca</i>
	Northern Pintail	<i>Anas acuta</i>
	Common Goldeneye	<i>Bucephala clangula</i>
	Bufflehead	<i>Bucephala albeola</i>
	Greater Scaup	<i>Aythya marila</i>
	Canada Goose	<i>Branta canadensis</i>
Seabird	Herring Gull	<i>Larus argentatus</i>
	Greater Black-Backed Gull	<i>Larus marinus</i>
	Ring-Billed Gull	<i>Larus delawarensis</i>
	Iceland Gull	<i>Larus glaucooides</i>
	Ivory Gull	<i>Pagophila eburnea</i>
	Black-Headed Gull	<i>Larus ridibundus</i>
	Common Tern	<i>Sterna hirundo</i>
Arctic Tern	<i>Sterna paradisaea</i>	
Shorebird	Greater Yellowlegs	<i>Tringa melanoleuca</i>
	Black-Bellied Plover	<i>Pluvialis squatarola</i>
	Semipalmated Plover	<i>Charadrius semipalmatus</i>
	Spotted Sandpiper	<i>Actitis macularia</i>
	Semipalmated Sandpiper	<i>Calidris pusilla</i>
Ruddy Turnstone	<i>Arenaria interpres</i>	
Songbird	Blue Jay	<i>Cyanocitta cristata</i>
	Black-Capped Chickadee	<i>Parus atricapillus</i>
	American Robin	<i>Turdus migratorius</i>
	Northern Junco	<i>Junco hyemalis</i>
Other	European Starling	<i>Sturnus vulgaris</i>
	Common Crow	<i>Corvus brachyrhynchos</i>
	Common Loon	<i>Gavia immer</i>
	Ruffed Grouse	<i>Bonasa umbellus</i>
Hawk	Osprey	<i>Pandion haliaetus</i>
	Merlin	<i>Falco columbarius</i>

Land and Resource Use*

A variety of current land and resource uses have been identified within the Stewardship Zone and surrounding area which have the potential to impact wetland quality.

•Residential Development

Ongoing residential development within the Stewardship Zone is largely restricted to the southern side of the estuary, near Shearstown.

•Commercial Development

Commercial development is concentrated along the Conception Bay Highway, at the inner portion of Spaniard's Bay. Much of this development has occurred on portions of the estuary that have been infilled. Commercial buildings have included gas stations, garages, an auto dealership and a lounge.

•Agricultural Use

Alluvial soils (sediment deposited by flowing water) deposited in the Shearstown River Valley support a significant agricultural base. Both commercial and private vegetable gardens are located along both shores of Shearstown Pond and are generally associated with residential housing.

•Fishing

The Shearstown Estuary has historically been a popular site for the recreational fishing of sea-run trout. Most fishing has been restricted to areas along the Conception Bay Highway and sections of the abandoned railway berm. A small run of Atlantic salmon are found within the estuary and are believed to have historically used portions of the Shearstown River (Butlerville area) for spawning, based on redd (spawning areas) counts from the 1960's (DFO). At present, it is unclear whether the small run of salmon found in the estuary spawn in the immediate area or elsewhere. A small eel fishery is also present within the estuary.

•Kelp Harvesting

Local residents often collect kelp washed ashore on the beaches of Spaniard's Bay. This kelp is used to improve soil in gardens for vegetable production.

*Since the development of the original habitat conservation plan, tropical Storm Chantel ravaged the Bay Roberts and Spaniard's Bay area. It is felt that the original recommendations for the estuary are still valid and that many can still be implemented in light of infrastructure-rebuilding in a post tropical storm ecosystem.

Threats to the Shearstown Estuary

A number of human-made problems have negatively impacted the wildlife habitat of the Shearstown Estuary. Without careful monitoring and commitment to the conservation of the sensitive areas within the estuary, the degradation of the habitat within and around the estuary may continue to occur.

•Litter

As early as 1974 (Porter, et al) habitat surveys of the Shearstown estuary have noted staggering amounts of litter being dumped into the water system by local residents. This behaviour has, no doubt, contributed to the degraded nature of local fish and wildlife habitat. An assortment of litter has been found in and around the estuary including automobile parts, toys, garden waste, bicycles and doghouses. In November 2005, eight years after a large clean-up effort and several less publicized annual clean-ups by local school groups, litter in the form of take-out food containers, bags of household waste, miscellaneous bottles and even a small camp-sized oven could be found both in and around the estuary. The most heavily littered area was noted to be the Muddy Hole Road area where regular traffic is not common and dumping can go on without much notice. One other area where a small brook enters into the estuary at a location away from the Conception Bay Highway was noted to be filled with litter ranging from a car tire to take-out containers and miscellaneous other items. Where the Muddy Hole Road area has been the target of clean-up efforts, locals (personal comm., 2006) indicate that the location of the small garbage-laden brook running from Goose Pond, at the south end of the estuary, has never been the focus of a clean-up.

•InFilling

During the last several decades, large quantities of soil and other material have been dumped along the shoreline of the Conception Bay Highway to allow for an expansion of commercial development. To a lesser extent quantities of soil, rock and asphalt have been deposited along the shorelines of both Arnie's Pond and in the Muddy Hole Road area. These activities can create serious problems related to questionable fill quality, location of fill placement and introduction of suspended sediments into the water system. Subject to permit, any amount of infilling or introduction of materials that can adversely alter, disrupt or destroy fish habitat goes against the Habitat Protection and Pollution Prevention Policy of the Fisheries Act (Section 35 (1)) and is considered an offence.

Many areas, in particular shorelines, are susceptible to in-filling. Shorelines are among the most important wildlife habitats of any water body with higher light levels associated with shallow water permitting the growth of aquatic vegetation.

This vegetation provides important food and shelter to an abundance of invertebrate populations within the estuary. These invertebrates, in turn, serve as a critical element in the food web of the estuary providing food for populations of fish, waterfowl and shorebirds. Infilling destroys this habitat and lowers the overall productivity of the estuary.

Soil and rock are, often, not the only material used to infill a water body. Many people see this as an opportunity to dispose of other waste materials such as asphalt, car parts and a variety of household garbage. Unfortunately, this can result in the introduction of dangerous compounds like fuels, heavy metals and chemicals into the water system of the estuary mainly through the leeching of compounds into the soil and water bodies associated with the estuary. According to the Water Resources Act, "Placing, depositing or discharging into shore water zones any raw sewage, refuse, municipal and industrial wastes, fuel or fuel containers, pesticides, herbicides or other chemicals or their containers, or any other material which impairs or has the potential to impair the water quality of the shore water zones" is not permitted.

•Removal of Shoreline Vegetation

Shoreline vegetation plays a critical role in the maintenance of wetland integrity. Shoreline trees, shrubs and herbaceous plants provide food, nesting sites, shelter and concealment for numerous species of wildlife. Untouched edges serve as a buffer along wetland-associated upland areas and are closely linked to recruitment (new individuals surviving to enter the larger population) of waterfowl. Overhanging trees provide shade and prevent an increase in water temperature beyond the tolerable range of many estuary inhabitants (i.e. coldwater fish). Shoreline plants are also a source of organic detritus (i.e. dead leaves, decaying branches) that enter the water system, decompose and become the base of the aquatic food web. Insects (at various life stages) that fall from overhanging trees provide an added dietary component for fish. Vegetated buffers are critical to songbird and bat populations, which serve to reduce flying insect populations.

The presence of shoreline vegetation with well-developed root systems is essential to prevent shoreline erosion and increase soil stability. This, in turn, reduces the movement of silt and other suspended sediment into the estuary (i.e. Muddy Hole Road). Buffer zones, or riparian habitat, of untouched vegetation along a shoreline significantly reduces the amount of hazardous material, such as fertilizers and pesticides, entering the water system.

Property owners should be reminded that a buffer zone is defined by the Dept. of Environment and Conservation as a "zone of land that is in its natural state and that is intended to separate developed areas from bodies of water to provide basic

protection of water resources" and that it is taken to be 15 metres as measured from the high water mark.

In addition, developments leading to the removal of vegetative cover or removal of soil or organic cover of wetlands that may lead to unmitigable adverse water quality or water quantity or hydrologic impact are not permitted according to Policy 5.5.1 of the Department of Environment and Conservation Water Resources Act.

•Water Quality

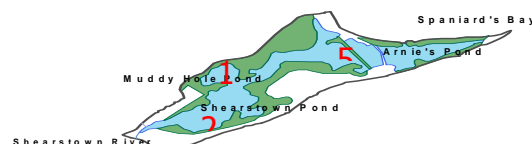
By nature, estuaries are nutrient rich environments. River drainage assures an abundance of nutrients from the chemical weathering of rocks on land. As well, tidal flow continually suspends nutrients and organic detritus from the bottom substrate. The Shearstown Estuary receives additional nutrients from a number of sources. The Conception Bay Highway and Canadian National Railway berm may have influenced water circulation in the estuary since the time of placement.

Human sewage has, historically, entered the estuary through storm drains, septic fields and overflows from ageing and overburdened municipal sewer systems. Untreated or partially-treated domestic waste can mean a significant source of nutrients being added to the estuary. Waste from aquatic and terrestrial animals are constantly contributing to the nutrient load of the estuary. To a lesser extent, chemical and natural fertilizers applied to agricultural areas along the shoreline enter the water system through runoff during rains and spring thaw (left unimpeded by scant shoreline vegetation). When increased levels of sediments, sewage or fertilizers are introduced to a water body, the overall nutrient load of the body of water increases and can result in a phenomenon known as eutrophication or "nutrient pollution." Left unchecked, increased nutrient load could lead to this scenario within the Shearstown Estuary in the future.

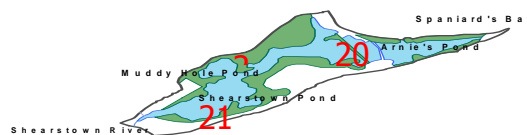
Moderate increases in certain nutrients may trigger algal blooms and result in extensive mats of some species of algae. Algal blooms are generally unsightly, smelly and result in significant lowering of available oxygen levels in a water system. Algal blooms are capable of blocking sunlight from other aquatic plants, attract flies and create an increased odour. While the algae engage in photosynthesis (which produces oxygen) they also engage in respiration and dead algal cells decompose releasing other nutrients into a water body so that the overall amount of oxygen within a water system is reduced. Algal blooms are a normal response to elevated amounts of nutrients within an estuary, but can lead to eutrophication in aging estuaries where siltation is also a problem.

A baseline water quality test (summarized in Appendix B) and several measurements of *Escherichia coli*, or *E.coli*, levels (Figure 3) were collected at

locations within the Shearstown estuary in 1997 and 2005. Based on the latest data provided in the Canadian Environmental Quality Guidelines, and with interpretation by the watershed management specialist of the Water Resources Management Division (Dept. of Environment and Conservation), all measurable parameters were found to be typical for the Shearstown Estuary, and within acceptable limits for a marine habitat in the North Atlantic (Dawe: personal comm., 2006). The levels of *E.coli* within this marine ecosystem are deemed well within the normal range and are likely being introduced by wastewater from municipal sewage systems, other warm blooded mammals occupying the landscape, and/or household waste being dumped into the estuary that may contain mammalian sources of bathroom/other waste. It is unlikely that the *E.coli* within the estuary would mix with local groundwater or water supply, unless there are a significant number of groundwater wells near the estuary pumping water out of the ground. Locals should be reminded that while working within any body of water where *E.coli* is present, it is always recommended that plastic/latex gloves be worn as a precautionary measure (Dawe: personal comm., 2006). Individuals engaged in the recreational fishery within the estuary are reminded that most food borne illnesses, according to the provincial veterinarian with the Animal Health Division of the Dept. of Natural Resources, regardless of the source, are generally controllable by cooking (Whitney: personal comm., 2005). Anglers are advised to completely gut and cook all fish and eel intended for consumption taken from the estuary or to simply engage in catch and release angling. Regular testing of mollusks may be warranted by the Canadian Food Inspection Agency and may require placement of additional signage by DFO indicating that filter-feeding species not be consumed by the public. If at all questionable, it is advised that locals contact their nearest DFO office with queries.



Fecal coliform measurements taken on September 23, 1997



Fecal coliform measurements taken on November 01, 2005

Figure 3: Fecal coliform measurements taken in three locations within Shearstown Estuary. Expressed as number of colony forming units (CFU) per one hundred milliliters of water. Ranges of 20-400CFU/100mL are considered acceptable in a marine ecosystem, according to Canadian Environmental Quality Guidelines. Note that coliform values fluctuate throughout the year and could be higher or lower than numbers shown depending on seasonal environmental conditions.

Standard municipal water quality testing would typically indicate whether any sort of problem is occurring in the drinking water of communities surrounding the estuary. Further testing of particular parameters within the estuary ecosystem could be done at intervals throughout August month (the most likely time to encounter problematic parameters), but are not expected to reveal any water quality issues that would not be typical for this unique type of estuarine habitat. Subsequent testing, however, may aid in identifying specific elevations in nutrients that may be contributing to algal blooms and would be an important component of a community monitoring system.

Many shoreline areas (roads, agricultural zones, in-filled sites) along the estuary are without adequate vegetative ground cover. The erosion of exposed soils during rain and spring thaw results in the movement of silt, or fine-grained sediment, into the water. Silt can adversely affect fish through abrasion of gill membranes, as well as impair feeding due to an increase in "turbidity" or cloudiness within the water body, which affects visual feeders like salmon and trout. As silt settles and becomes deposited on the bottom substrate, it clogs small spaces between gravel particles. This could impede the flow of oxygenated water to, and the removal of waste products from, developing fish eggs deposited into gravel. This can cause suffocation of developing eggs, resulting in mortality and the potential for gravel redds (spawning sites) to be unsuitable for future deposition of eggs. Silt deposited between boulders and gravel particles diminishes critical habitat for juvenile fish. In addition, the habitat for many small invertebrates is also destroyed lessening the production of animals found at the base of the estuary food web. For example, siltation at locations along the Muddy Hole Road area has suffocated much of the widgeon grass present in the shallow shoreline margins, has made revegetation efforts increasingly difficult, and has decreased the availability of a quality food source to species of waterfowl.

•Vehicle Use of the Barrier Beach

Many of the specialized and unique plants that grow along the barrier beach at Arnie's Pond thrive in the vigorous marine conditions. Unfortunately, vehicular traffic on the beach is killing the vegetation necessary to sustain the natural integrity of the beach habitat and its unique ecosystem characteristics.

•Possible impediments to water circulation

The natural tidal flow and water exchange between Spaniard's Bay and Shearstown Pond has likely been affected by human development. The construction of the Conception Bay Highway and a railway berm may have contributed to restricted water circulation within the estuary. Reduced water circulation may be influencing water quality in portions of the estuarine waters.

Conservation Strategy for the Shearstown Estuary

A number of conservation strategies are recommended to prevent further degradation of the wetland and wildlife habitat of the Shearstown Estuary.

Stewardship Zone and Management Units

Through the signing of a joint Municipal Stewardship Agreement, one hundred and ninety-five (195) acres of wetland and associated uplands have been designated as a Stewardship Zone. Included in this zone are two smaller Management Units constituting one hundred and thirty-five (135) acres which been established and been identified as important wetland area.



Figure 4: Bay Roberts and Spaniard's Bay joint Stewardship Zone with Management Units indicated as aquatic and terrestrial.

Within each Management Unit, many forms of development are prohibited. These include residential and commercial development, road and wharf construction, waste disposal (dumping) and infilling. Wetland restoration and enhancement projects, as well as wetland educational facilities and structures (i.e. blinds, viewing platforms), will be permitted within these Management Units with the consultation of EHJV staff. Continued agricultural use should be permitted with careful monitoring and the implementation of an awareness campaign whereby agricultural users within the Management Units would be made aware of the potential effects of pesticide/herbicide use and misuse (i.e. educational brochures). Buffered edges, composed of native herbaceous plants and shrubs, should be strongly recommended and the critical nature of riparian habitat be made known to all land users whose property extends to areas adjacent to the estuary and its associated water bodies.

In the next revision of each Town's Municipal Plans, the areas deemed Management Units should be re-zoned as "conservation areas" to afford additional protection.

Within the remainder of the Stewardship Zone, outside of the Management Units, development may continue with a stewardship ethic in mind and with a 30 day review period by EHJV staff. The Towns are encouraged to consider potential implications to wetland health before appropriate permits are issued and are asked to notify EHJV staff during the decision making or planning process. Conservation goals may be satisfied by building certain restrictions directly into the development permit process and should indicate that no development is permitted within a designated Management Unit.

The staff of the Eastern Habitat Joint Venture will be available when there are any planned development projects within the Stewardship Zone and requests that they be notified when developments are planned, so that a 30 day review of projects can occur and so that informed, environmentally-based development decisions may be made.

-Vehicle Access to the Barrier Beach

In sensitive ecosystems such as barrier beaches, indiscriminate use of motor vehicles creates much environmental damage. Given the potential for significant damage to sensitive plant communities and to critical shorebird nesting and resting areas by vehicular traffic, all use of the barrier beach by motorized vehicles should be prohibited, and would fall under the authority of each Town's municipal act. Large boulders or concrete barriers could be placed at the eastern end of the beach to deter further vehicle use. Conservation-oriented signage could be placed in appropriate public areas around the barrier beach location explaining the negative effects on wildlife and wildlife habitat that occurs when unrestricted use of ATV's and other motorized vehicles are permitted to occur in sensitive areas.

Barrier beaches serve as a form of refuge for wildlife and tend to protect coastal areas from storm surges. They should be protected from development and environmental abuses. Barrier beaches suffer from severe storm flooding and erosion; human impact amplifies the negative effects of storms on these fragile coastal environments. Barrier beaches are dynamic, sensitive wildlife habitat that should not be misused.

Options exist for maintaining the integrity of sensitive barrier beach areas and estuaries while permitting access to members of the public interested in viewing the flora/fauna of these areas. Viewing towers (Appendix C) have been a successful tool in fostering public awareness and facilitating viewing of highly sensitive estuarine areas. These towers provide incredible viewing possibilities due to their vertical height and the relatively flat nature of estuarine and barrier beach areas.

The placement of a viewing tower, in conjunction with the recommended boulders or concrete barriers and appropriate signage at the eastern end of the barrier beach, would sufficiently block access to the beach by motorized vehicles, would raise public awareness, would integrate nature viewing possibilities and would work effectively with proposed changes to shoreline areas around the Arnie's Pond walking trail.

It may be advised that both Towns post signage relating to prohibitions or restrictions on ATV use and dumping at access points to the barrier beach. Such signage would fall under the direct authority of the Towns themselves and wording would need to reflect this.

•Hunting

Signage may be advised to deter illegal discharge of firearms within areas of the Shearstown Estuary and fall under the Wildlife Act (Regulation 111 (1)). This would only be necessary if the Towns feel that this is, in fact, a significant issue around dwellings, educational facilities or sporting areas.

Areas where shooting is not permitted include those within 1000m of a school, playground or athletic field or areas that are within 300 m of a dwelling. Much of the area comprising the Shearstown Estuary falls under protection of the Wild Life Act. Appropriate signage may be developed through consultation with Wildlife Division staff and would need to have the section of the NL Wildlife Act from which the regulation has been quoted - pertaining to the illegal discharge of a firearm - clearly identified (Appendix D). Placement of no-shooting signs should be left up to the discretion of conservation officers from within the local area.

Enhancement and Restoration Strategy for the Shearstown Estuary

Several wetland enhancement techniques are recommended to improve the integrity of the estuary and promote wildlife use.

Litter Removal

It is strongly recommended that community interest groups and individual residents work cooperatively to remove the large quantity of litter in and around all portions of the Shearstown Estuary on a regular basis, while making certain to avoid those times of year (May to August) when waterfowl may be disturbed during breeding, staging or brood rearing periods. Residents are reminded to include the southwesternmost sections of the estuary where the Shearstown River and a small brook (running from Goose Pond) enter the estuary in cleanup efforts, as this residential area was noted to be garbage-laden in November 2005.

Shoreline Enhancement

The revegetation of the Shearstown Estuary shoreline is essential for an improvement in the overall condition of the estuary. It is recommended that a selection of native trees, shrubs and herbaceous plants be placed along all shoreline regions presently lacking in vegetation with sizeable root systems. Special attention should be paid to the largely unvegetated edges of the railway berm (which would provide much needed seclusion for the estuary and an important food supply for waterfowl) and along the banks of Arnie's Pond which would benefit from seeding or transplants. Landowners along all parts of the estuary should be encouraged to allow their shoreline properties (ideally several metres from the high water mark) to "grow wild" and act as natural buffer areas. Particular emphasis should also be placed on agricultural fields, road sides and in-filled sites. Brochures may be appropriate to remind landowners of the value of maintaining buffers and may be funded, in part, by programs associated with EHJV. Shoreline regions along the Shearstown River that have been cleared of trees should be replanted with riparian vegetation, including native willow and alder species and could be an initiative incorporated into the regular science curriculum of local schools.

Planting Aquatic Vegetation

A number of aquatic plant species have the ability to remove large quantities of pollutants from water. These plants improve water condition by "uptaking" excessive amounts of nitrogen, phosphorous and carbon – substances associated with the occurrence of algal blooms – by storing them in plant tissues. Many "classic" beneficial plant species have limited distribution in Newfoundland, are absent from the Shearstown Estuary and should not be introduced to the sensitive ecosystem of the estuary without consideration of the potential consequences, including the possibility of invasive plants out-competing native plant species.

Often, the natural balance within an ecosystem can be changed when new species are introduced. The relationships that develop between plants and animals may also change within a particular habitat. Introduced species are referred to as "exotic" species if they are not native to an area. Competition naturally exists between organisms within an ecosystem but the introduction of exotic, or nonnative, species can alter the balance within the ecosystem and have negative effects upon the natural populations within the region and the ecosystem as a whole. Exotic plants can become invasive and push out native species.

The Shearstown Estuary may benefit from the addition of increased numbers of broad-leaved cattail (*Typha latifolia*) plants, although their success in highly saline conditions is questionable and any transplants would have to come from stock native to the Island portion of the province. Broad-leaved cattail plants would have to be placed in locations around the estuary where they would receive a

significant inflow of fresh water. Additional transplants may be advised in areas of the estuary where previous transplants have had some success.

Certain species of willow (*Salix discolor*) and alder (*Alnus crispa*) are native to the Island of Newfoundland, are found in areas of the Avalon Peninsula, and are renowned for their hardiness, their ability to withstand tidal inundation and their extensive network of roots. Their ability to uptake excess nutrients from the water column would make these native species an important addition to the shoreline around the Shearstown Estuary. In addition to bank stabilizing properties and nutrient uptake characteristics, willow and alder buds and shoots are an important food source for small mammals like muskrat and snowshoe hare, and bird species like Ruffed Grouse and Grosbeaks.

In terms of wetland plants that would be of dietary importance to waterfowl populations, three-square bulrush (*Scirpus americanus*), Salt Water Cord Grass (*Spartina alterniflora*), Wild Rye (*Elymus virginicus*) and Blue-joint Grass (*Calamagrostis canadensis*) are all native to the island portion of Newfoundland and would all supply food to a number of estuary inhabitants. Tall stands of established Cord Grass and Wild Rye also offer a great deal of shade and cover to waterfowl and may lower water temperature to prevent algal blooms from occurring.

In terms of bank or shoreline stabilizing properties Blue-joint Grass and Dune Grass (*Ammophila breviligulata*) may be appropriate choices for areas along the railway berm, portions of shoreline adjacent to Muddy Hole Road and Arnie's Pond. Once established these grasses would provide a great deal of cover and concealment to waterfowl species of the estuary. Low growing native shrubs may be interspersed with either grass species and planted along the railway berm to enhance the desired effect of seclusion. These plants would also help to increase soil stability and minimize the likelihood of siltation into the larger water body.

Improved Water Circulation

An improvement in water quality within Shearstown Pond might be achieved by increasing water exchange with Spaniard's Bay by removing portions of the current railway berm and replacing with large culverts. In many areas of Atlantic Canada, funds have been accessed through salmon habitat restoration programs to make changes to tidal barriers for the purpose of enhancing salmon habitat and for, concurrently, enhancing a water body's ability to "flush" itself. Any work planned in and around the estuary that may affect water quality or hydrologic function and characteristics would require special permits and timing for the projects would be of the utmost importance.

No restoration projects should occur during the occupation of the seabird nesting colony from May to August. Should the Towns jointly decide that removing tidal barriers is of priority, appropriate permits would have to be attained through the Crown Land Division and DFO before any work is initiated.

The Conception Bay Highway may have also altered the estuary's ability to circulate water. However, any steps taken to improve this situation would be costly and beyond the scope of the Eastern Habitat Joint Venture. However, if at any time there is to be significant upgrading of this highway, it is recommended that the appropriate officials investigate the possibility of increasing the length of the bridge to increase estuarine water circulation.

Road Construction at Muddy Hole

In its present state, sections of Shearstown Pond are located directly on the edge of Muddy Hole Road. As such, siltation from the unpaved and badly degraded road surface has significantly affected the water and habitat quality in this region. This section of road is frequently submerged by estuarine waters during periods of extreme high water and during heavy rains. This section of road also allows direct access to the greater Shearstown Pond, a popular dumping site for waste materials. At present, it is uncertain which municipality has the responsibility for maintaining all portions of Muddy Hole Road.

It is strongly advised that the Towns consider shifting the current location of Muddy Hole Road at least two meters back from the shoreline. Once relocated, the height of the road should be increased to eliminate future flooding problems. The road changes would require careful planning and the use of silt fences or landscaping fabric to prevent movement of road building materials into the water system. Any construction scheduled to occur in/around the estuary would have to follow strict environmental guidelines and would require appropriate permits and the following of appropriate precautions. Ideally, the planting of a mixed willow/alder riparian edge would occur at the same time as road improvement. Planting of the riparian edge could occur with the road in its present location, although the success of shrub growth would be affected by subsequent disturbance by road crews and local traffic. It is advised that any grading of Muddy Hole Road occur outside of critical waterfowl nesting and brood-rearing times and that an attempt be made to coordinate roadwork with revegetation efforts for the area.

Osprey Platform

Ospreys are fish eating raptors that are frequently observed hunting in the Shearstown estuary. Unfortunately, populations of these birds plummeted in North America during the 1950's and 1960's due to the wide spread use of

pesticides and other pollutants which have a tendency to bioaccumulate in birds of prey, like the osprey. For many osprey populations, bioaccumulation results in frequent reproductive failures. With the banning of many pesticides in the early 1970's, many osprey populations have made a comeback.

Osprey prefer to nest on tall, often dead, trees on the shoreline of lakes and bays that are at least 2 metres deep but make nests in a multitude of locations (i.e. telephone poles, communication towers, etc.) as long as the area is wide open with an adequate food supply. Preferred natural sites are scarce due to timber harvesting and shoreline developments.

In many parts of Canada, the installation of artificial nest structures by concerned citizens and community groups have facilitated the comeback of the osprey. Osprey nest structures have been installed at several sites in Newfoundland, including the Memorial University Botanical Gardens in St. John's, the Stephenville Crossing area and in Winterland. Many people take great pleasure in watching these majestic birds raise their family and fish the shallow waters of nearby lakes and bays.

Osprey nesting platforms may be an appropriate addition to certain locations within the Shearstown Estuary. Careful consideration must be made for food availability and of natural predators of osprey young common in the Bay Roberts/Spaniard's Bay areas (i.e. Gulls, Crows, Bald Eagles and Ravens).

It may be advisable to install a single osprey platform at a carefully chosen location to determine whether the ecosystem of the Shearstown Estuary could sustain a single, monogamous, breeding pair of osprey with subsequent platforms planned accordingly. In conjunction with an observation tower, area residents could potentially enjoy a "bird's eye view" of osprey daily life high atop an artificial nesting structure. Artificial nesting platforms should be located in areas with minimal human use and where human impact would be least.

Involvement of schools, youth groups and community organizations in the construction/maintenance/observation of the nesting structure could instill a sense of pride and awareness that would go far in fostering a community stewardship ethic (Appendix E for potential osprey platform locations and instructions).

Island Construction

A number of birds, such as terns and waterfowl, nest and loaf on islands due to a reduced risk of predation from land-based predators. Unfortunately, there are presently no islands located within the Shearstown Estuary. The only breeding colony of terns and gulls are located on a small peninsula that can be easily accessed by humans, domestic cats and dogs during low tides.

Many of the wildlife species present within the estuary may benefit from the construction of artificial islands. These structures can be constructed simply from wooden cribs (Tamarack Larch would be an appropriate choice for building material), measuring approximately four square meters that have been filled with rock and soil. The islands must be positioned so that they are higher than the highest water mark. Hardy shrubs and herbaceous plants (i.e. alder, willow) must be planted on the islands to provide cover and to prevent occupancy from gulls. Care must be taken to prevent the use of toxic construction materials (i.e. treated wood, contaminated soils) and disturbance to plant and animal communities. One must also consider the potential for increased predation on certain avian species that may use the constructed islands. One must consider the potential necessity for annual removal and reinstallation of islands in response to ice conditions within the estuary and tide/current influence.

Other forms of artificial islands exist and involve the planting of native marine plant species into landscaping fabric, which is then fixed to floating structures made of plastic piping or empty gabion baskets. This type of floating island requires careful placement in areas that do not have widely fluctuating salinity levels and require placement such that disturbance would be minimal during the period in which roots are establishing. Floating islands may be beneficial in terms of oxygenating the water column, as algal blooms would not "smother" the highly perched plants. The floating plants should, ideally, continue photosynthesizing despite the presence of algae, and may be of benefit in "taking up" some of the excess nutrients in the estuary effectively deterring algae growth (Appendix F for possible island locations and instructions). These floating islands would also, likely, require annual removal and reinstallation.

Education Strategy for the Shearstown Estuary

Public education is essential in the development of a greater sense of wetland stewardship among the residents of Bay Roberts and Spaniard's Bay. For this reason, a number of educational strategies are recommended for the region.

Project Wild

Project Wild is an educational program conducted by the Newfoundland and Labrador Wildlife Division and is aimed at youth from kindergarten to grade six. Its goal is to develop awareness, knowledge, skills and commitment resulting in informed decisions, responsible behavior and constructive actions concerning wildlife and the environment upon which all life depends. Project Wild is not just "wildlife" education. It is a broad environmental education program focusing on wildlife. In Project Wildlife, wildlife is used as a tool that naturally captures student interest and as a symbol for the fragility of the environment.

Project Wild staff can provide an invaluable tool in educating the youth of Bay Roberts and Spaniard's Bay about the value of the Shearstown estuary. Staff of the Wildlife Division can arrange a workshop for local elementary school teachers so that they may become familiar with the program and the associated educational material. Knowledge and skills acquired by the teachers during the workshop can then be applied to the classroom setting.

Waterscapes

This activity guide is produced by the Eastern Habitat Joint Venture and is a guide for helping youth appreciate and understand wetlands within Newfoundland and Labrador. The guide is complete with lesson plans, case studies and outreach projects intended to work on a conceptual framework to guide teachers and students through an understanding of basic ecology and to direct experience with wetlands and stewardship. The guide is provided free of charge to stewardship communities and is formatted for use with learners in grades 4-8. The activity guide is currently being revised and updated.

Backyard Habitat for Canada's Wildlife

This habitat awareness initiative is made available by the Canadian Wildlife Federation and is administered in conjunction with Salmonier Nature Park. This program enables the average towns person to become an active participant in helping wildlife and in enhancing habitat for wildlife use.

Backyard Habitat for Canada's Wildlife is a program that offers immediate, specific and inexpensive suggestions on how to make life better for wildlife in a particular habitat. EHJV staff, along with Salmonier Nature Park, can arrange an informative presentation on how local people can actively contribute to the protection of the natural heritage of their own communities and their own properties.

Greenwing Program

This conservation awareness program targets grade four students, who have been identified as being most ready to receive and consider conservation messages. The Greenwing program is initiated by the "adoption" of a fourth grade class by local businesses or individuals. Members are then given a wealth of items ranging from t-shirts and lunch bags, encouraging a conservation-minded approach to daily life, and educational magazines revealing the wonders of wetlands, wildlife species and natural areas. Greenwing events are also available to any Greenwing members, where conservation minded adults (i.e. potentially EHJV staff members) host project days or educational field trips with support from Ducks Unlimited Canada. Greenwing members who attend a Greenwing event typically leave an event with a greater sense of conservation awareness, and a parting item like a birdhouse or birdfeeder.

Signs

It is recommended that appropriate signage be placed at locations around the estuary to indicate that the region is a wetland conservation site and that the communities jointly support conservation objectives. Signs can be placed at sites where human developments are having the greatest negative impact on wetland health (i.e. road sides, commercial development sites) and may raise awareness of the area in and around the estuary as a Stewardship Zone. Signs would be placed in consultation with local land and business owners.

Shearstown Nature Trail and Interpretive Site

The abundant wildlife and scenic views of the Shearstown Estuary offer a great opportunity for the development of walking trails and natural interpretive sites. Much of the infrastructure already exists (i.e. abandoned rail bed) and can be easily linked to other nearby trail developments (i.e. Mad Point trail system).

The very nature of the estuary's location brings it an enormous amount of attention (both positive and negative). EHJV staff is able to supply the Towns with details on potential viewing platforms (Appendix G) and "bird blinds" that could be placed along certain portions of trail systems and roads so that concentrated access to the viewing potential around the estuary could be controlled. With additional revegetation projects implemented in the most sensitive and conspicuous locations around the estuary, the estuary could attain a level of seclusion that would make it an even greater attraction for avian and wildlife species and potentially increase wildlife viewing opportunities. The fact that the Shearstown Estuary is a prime location for winter bird sighting provides a unique opportunity for local businesses to bring winter bird-watchers into the area and increase tourist visitations. The goal for this unique stewardship area should be, in EHJV's opinion, to draw utilitarian attention away from the Management Units and retain the integrity of this incredible ecosystem.

Care must be taken during any trail construction so as not to degrade the quality of habitat within the estuary. Construction activity is not recommended from May to August due to the possibility of disturbance to nesting sea birds and waterfowl. Trail maintenance will be required and should be the responsibility of the Towns, schools or community interest groups (i.e. Baccalieu Trail Heritage Corporation, Shearstown Lions Club). Before any trails are decided upon, consideration should be given to the balance of benefits versus disturbance that would result from further installation of trail systems or trail segments.

Monitoring Program

Placement of any structure or trail system around the estuary should be followed by a careful community-based monitoring program in which the effects of the placement could be measured as positive or negative, desired or undesired. It is advised, that the Towns and local community interest groups carefully monitor all areas within the Stewardship Zone and, particularly, within the Management Units of the Bay Roberts/Spaniard's Bay areas. Many of these monitoring programs could be incorporated into portions of the regular school curriculum or into the objectives of local natural heritage organizations. Such monitoring may include measurements on water quality or waterfowl and passerine surveys to assess the changes occurring within the wetland long term. Data collection can provide information on changes that are occurring within the wetland area and can indicate problems or progress towards a desired goal. Monitoring can also provide data on whether a site is developing in a way that is conducive to achieving a community's goal. Regular monitoring can also be a way to flag potential problem areas (i.e. early indicators of water quality issues).

Plan Benefits

The implementation of this Plan will have a number of positive impacts on both the residents of Bay Roberts and Spaniard's Bay, and local wildlife populations.

Benefits for People

The strategies outlined in this Plan can provide many long term recreational and "quality-of-life" benefits for local residents. The Shearstown Estuary is ideally suited to a variety of consumptive and non-consumptive recreational activities, including fishing, hiking, photography and bird-watching. The Towns may wish to use these opportunities to increase tourism to the region. In developing recreational and tourism opportunities, careful consideration for the wildlife populations must be included in the planning process. Otherwise, human activities may result in negative impacts to the very resource that is providing the attraction.

Surely the most important benefit that people receive from stewardship is the opportunity to increase their knowledge of wetlands and nature in general. Programs such as "Project Wild" foster an increased environmental ethic in youth and adults alike. Many of the enhancement and restoration strategies outlined in this Plan can be easily conducted by local community interest groups, thereby allowing "hands on" involvement in conservation efforts.

Benefits for Wildlife

Throughout the latter half of this century, many of North America's wildlife populations had been steadily declining. Much of this decline can be attributed directly to the loss of essential natural habitats to urban, industrial and agricultural expansion. Through the implementation of conservation programs, such as the Eastern Habitat Joint Venture, many populations have stabilized and even increased within recent years. However some species, such as the Newfoundland population of Black Duck (CWS, 2004), have continued to show unstable numbers. The conservation of regionally important wetlands, like the Shearstown Estuary, will play a significant role in maintaining and increasing populations of waterfowl, shorebirds, fish, salt marsh plants and numerous other wildlife species. This will also improve the area's ability to become a nesting and spring/fall staging area.

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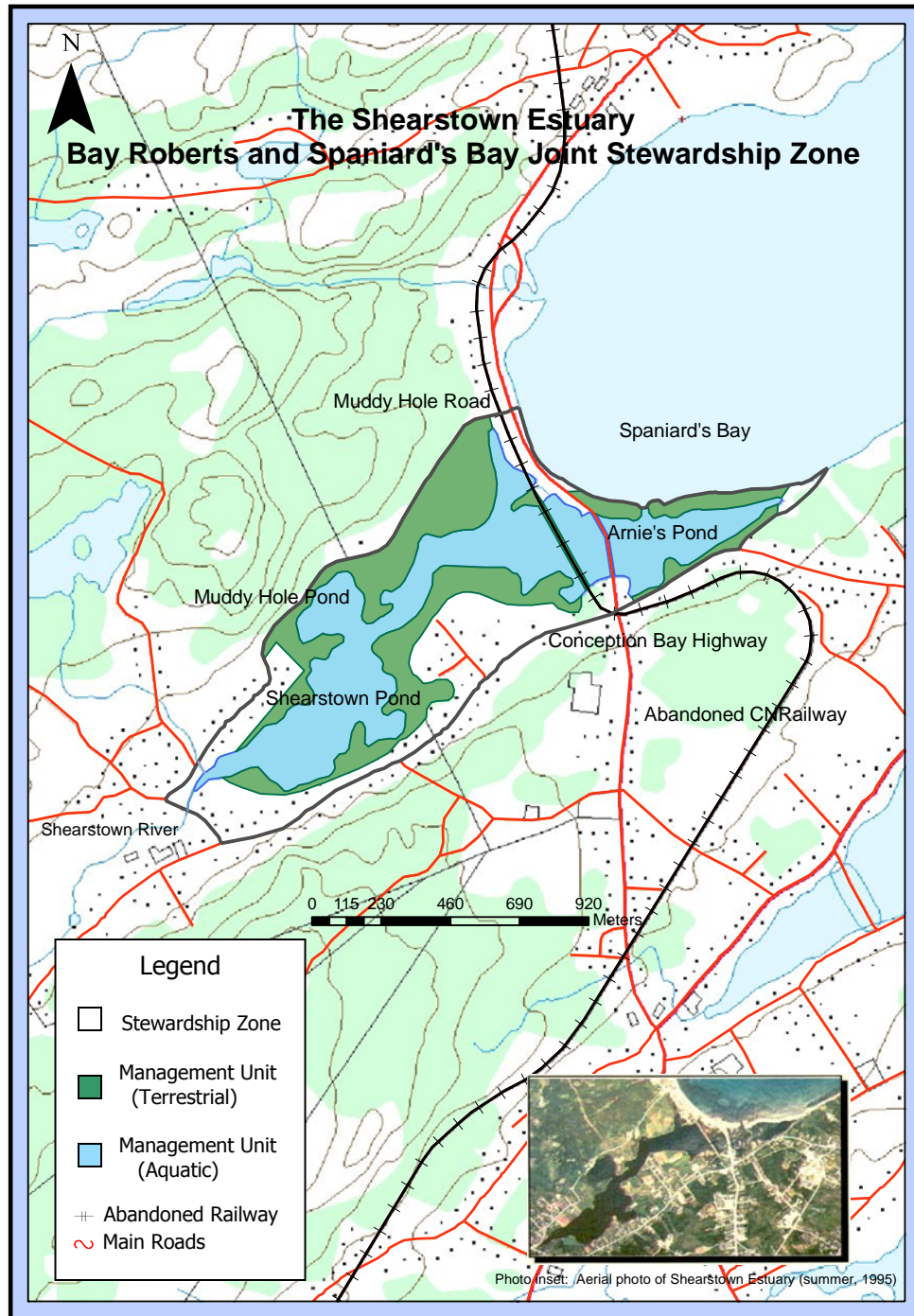
The Fisheries Act (regulations). Department of Fisheries and Oceans. Accessed on December 01, 2006 at http://www.dfo-mpo.gc.ca/communic/policy/dnload_e.htm

The Water Resources Act. Department of Environment and Conservation. Accessed on December 01, 2006 at <http://www.env.gov.nl.ca/Env/env/waterres/Policies/PolicyList.asp>

The Wild Life Act (regulations). Department of Environment and Conservation. Accessed on December 15, 2006 at <http://www.hoa.gov.nl.ca/hoa/regulations/rc961156.htm#107>

APPENDIX A:

Shearstown Estuary



Appendix B
Baseline Water Quality Test

Baseline water quality results for location within Shearstown Estuary with acceptable levels indicated where available*			
Parameter	Units	Value	Typical values for a marine system**
Total Alkalinity (as CaCO ₃)	mg/L	40	
Dissolved Chloride	mg/L	6300	
Colour	TCU	9	
Total Organic Carbon (C)	mg/L	0.9	
pH	pH	7.16	7.0-8.7
Reactive Silica (SiO ₂)	mg/L	3.4	
Dissolved Sulphate (SO ₄)	mg/L	760	
Turbidity		0.5	
Conductivity	uS/cm	19000	
Calculated Total Dissolved Solids	mg/L	11300	
Cation Sum	me/L	201	
Dissolved Hardness (CaCO ₃)	mg/L	2100	
Ion Balance (% difference)	%	2.05	
Total Boron	uG/L	1300	
Total Manganese	uG/L	21	
Total Strontium	uG/L	2400	
Total Calcium	mg/L	130	
Total Manganese	mg/L	430	
Total Potassium	mg/L	130	
Total Sodium	mg/L	3600	

*Few parameters have guidelines for comparison, or parameters that were analysed were below detection limits and so no comparison was possible. Parameters that were below detection limits (i.e. Total Copper) are not included in this appendix. **Guidelines do not exist for certain parameters because there is no risk associated with that parameter or for that particular water use, that is, for a marine system supporting aquatic life (Dawe: personal comm., 2006).

Appendix C

Images of Bird-watching (Viewing) Towers



Picture Courtesy of Tourism Carleton

View of bird-watching (viewing) tower overlooking estuary in Carleton, Quebec.



Picture courtesy of Tourism Carleton

View of bird-watching (viewing) tower overlooking estuary in Carleton, Quebec, built in 1990 for \$50,000 by local construction company (Tourism Carleton, 2005).

Appendix D

**Example of appropriate wording required
for potential "No-shooting" signs**

NO SHOOTING

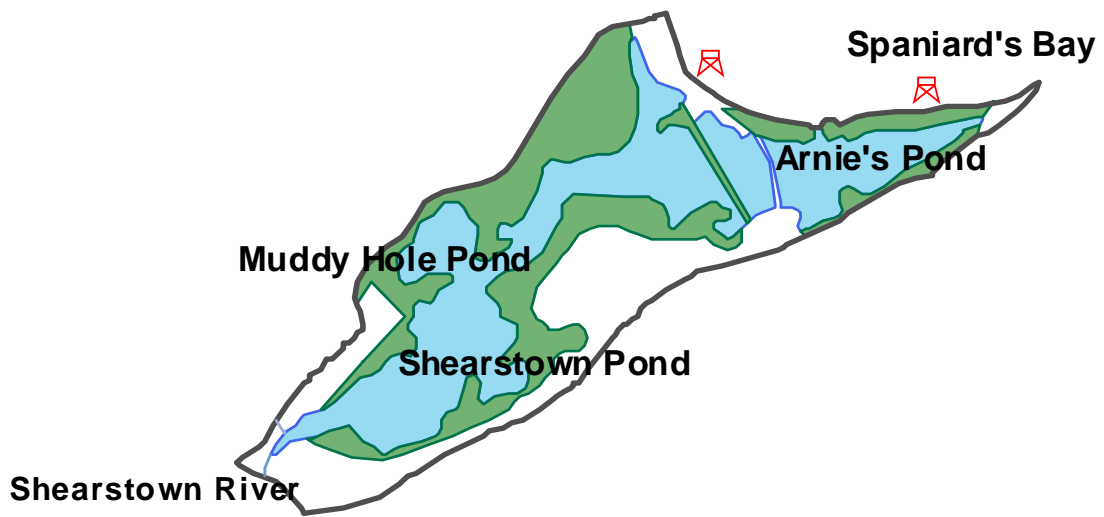
**THE DISCHARGE OF A FIREARM
WITHIN 1,000 METRES OF A SCHOOL,
PLAYGROUND OR ATHLETIC FIELD,
OR WITHIN 300 METRES OF A DWELLING
IS NOT PERMITTED.**

**NEWFOUNDLAND AND LABRADOR WILD LIFE ACT
WILD LIFE REGULATION 111 (1)**

Appendix E

Potential Artificial Osprey Platform location

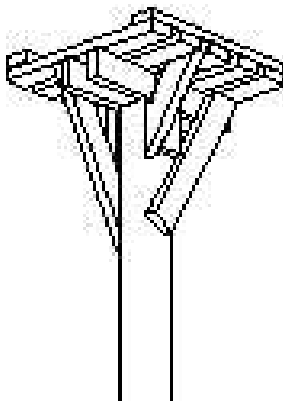
Instructions/Material for Artificial Osprey Platform Construction



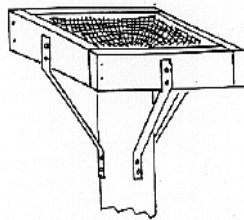
Potential sites for artificial osprey platform placement (🦅)

Quite a number of osprey artificial nest designs have been developed for different habitats and sites. One of the more suitable designs for the Shearstown estuary environment is the Minnesota Design. This structure is mounted on a single pole (i.e. untreated telephone pole) at least five meters above the ground. All nail and bolt holes are pre-drilled to prevent splitting. The wire mesh is nailed in the platform. Steel braces are bolted to the platform and the lag screws are used to secure the platform to the pole. Some sticks should be wired to the nest to help stimulate nest building. The use of tamarack larch or cedar is highly recommended.

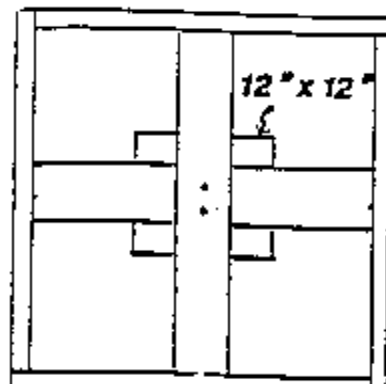
Nesting structures should be placed within fifty (50) meters of water and at least one hundred meters from the nearest residence. Regular inspection of the structure is necessary. After a few years some nests become quite large because the osprey continually adds new sticks. This weight may cause support structures to break. If the nest does become large, it is often a good idea to remove some nest material outside of the breeding season. With proper construction and maintenance, the nest structure may last up to fifteen to twenty years. It is not uncommon for several years to go by without osprey use of the artificial structure. Only an osprey can ever truly know what an osprey seeks during placement of nesting structures!



1) Osprey Platform

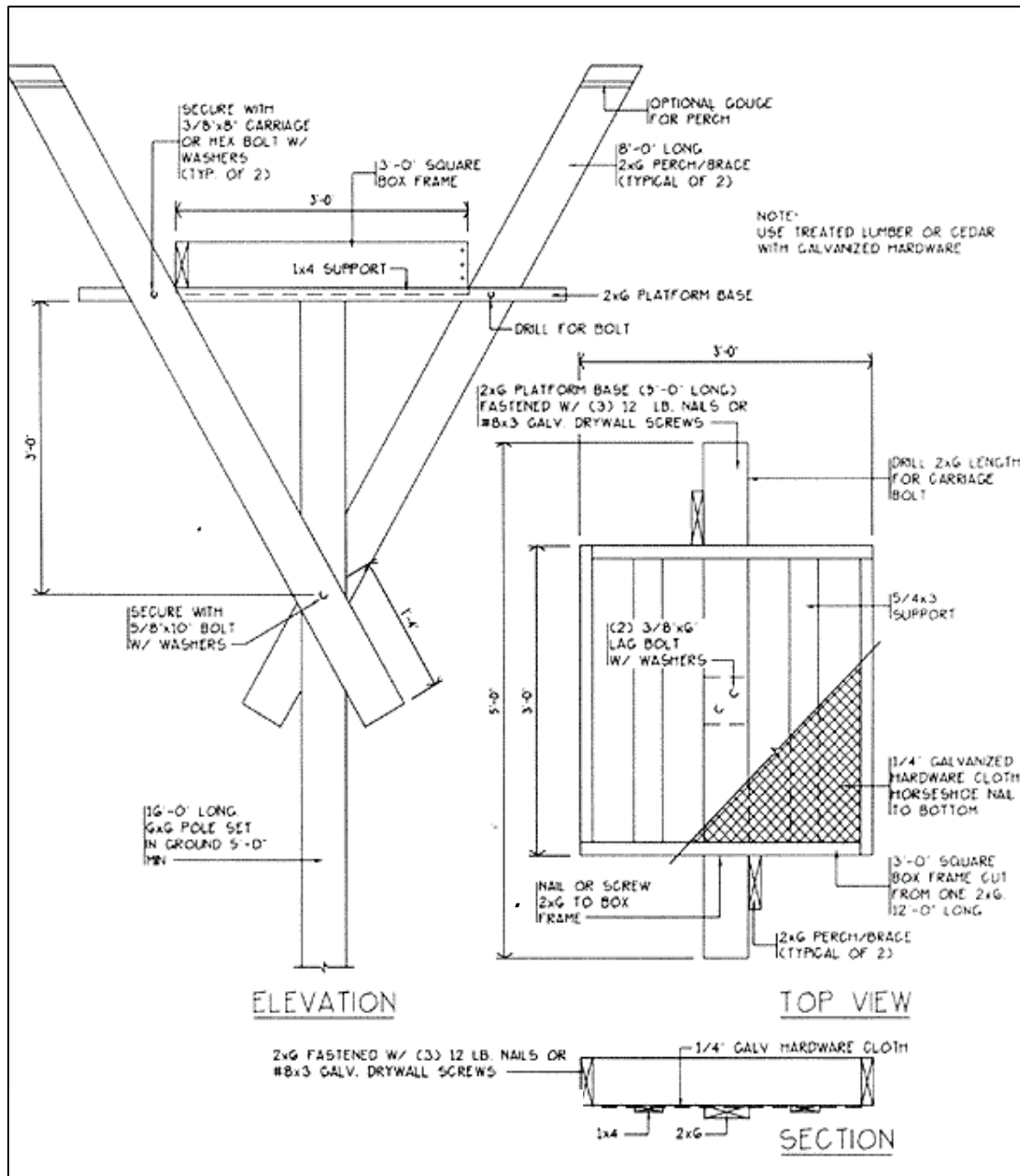


2) Osprey platform side view



3) Osprey platform top view

Pictures courtesy of U. of Minnesota Raptor Centre

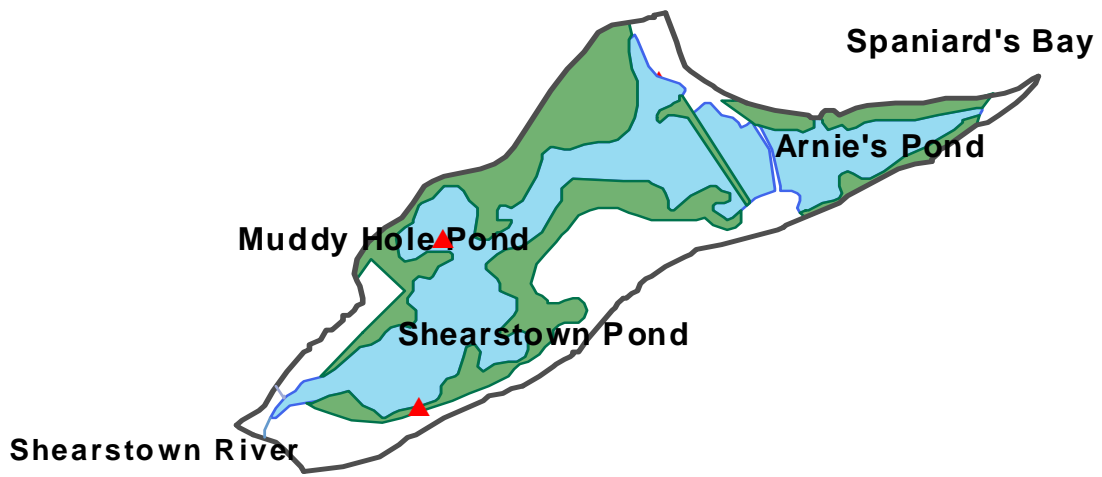


Artificial Osprey Platform design courtesy of "Citizens United to Protect the Maurice River and its Tributaries, Inc. NJ USA"

Appendix F

Potential Constructed and Floating Island locations

Instructions/Material for Constructed and Floating Islands



Potential locations for constructed and floating island placement (▲)



Photo courtesy of "Water Lines"

2m X 2m floating island constructed from high modular polypropylene floating booms and heavy gauge mesh

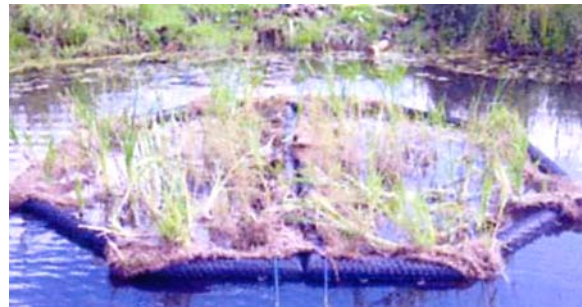


Photo courtesy of "Water Lines"

3.5m octagonal floating island constructed from high modular polypropylene floating booms and heavy gauge mesh



Photo courtesy of "Water Lines"

Installation of floating island in the United Kingdom by "Water Lines" staff



Photo Courtesy of "Pine Creek Watershed"

Image of a timber rock crib installed in Kingsford, Mississippi by the Pine Creek Watershed Conservation Project. A proper crib is built from new, square-cut timber, not wire or driftwood or round logs tacked together with small nails. The timbers are assembled into a slatted, box-like affair. The box is then filled with rock and can weigh up to several tonnes!



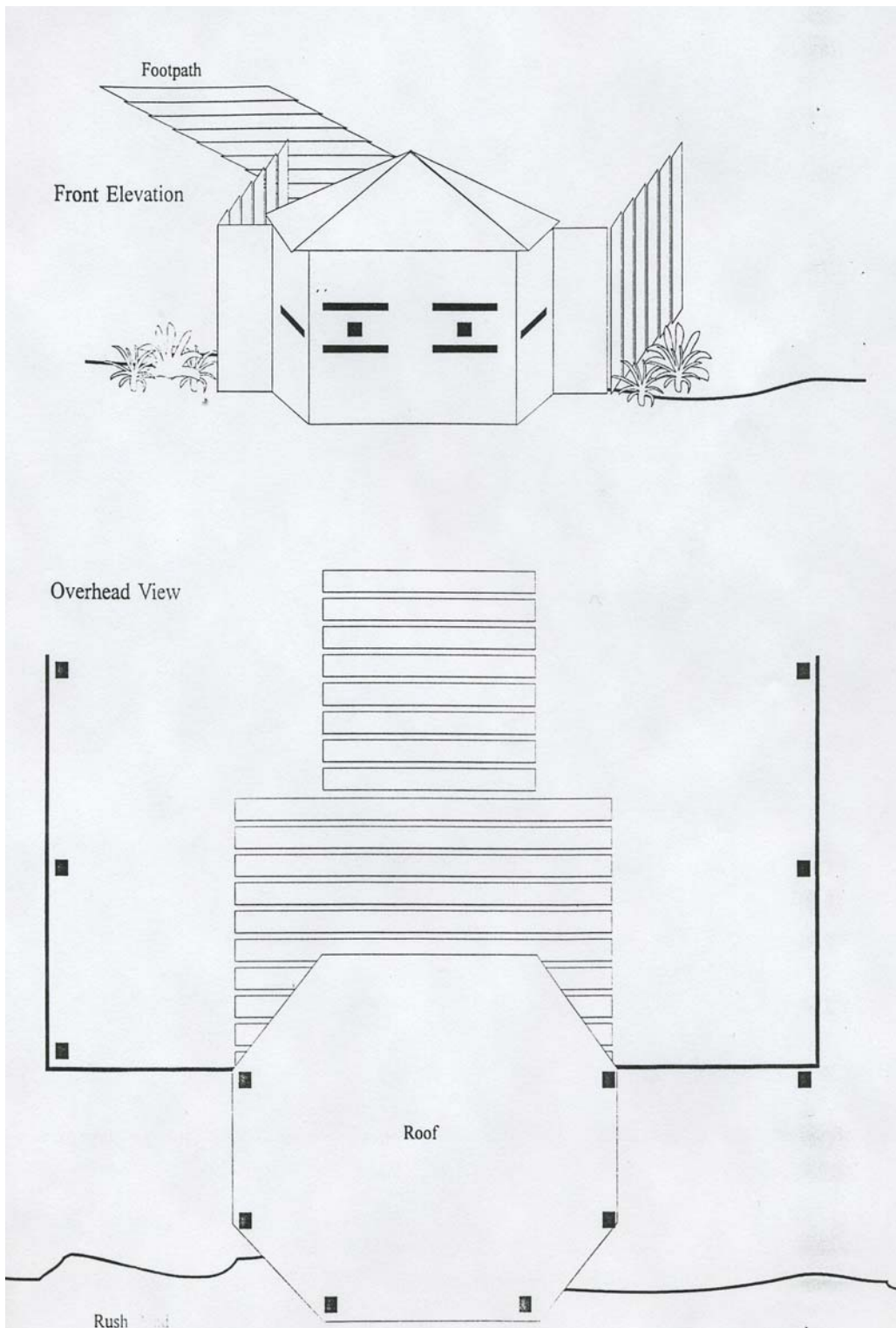
Photo Courtesy of "Pine Creek Watershed"

Image of a timber rock crib being installed in Kingsford, Mississippi by the Pine Creek Watershed Conservation Project. High quality construction would be essential to placement of this style of rock crib within the Shearstown Estuary to withstand ice and winter storm conditions. Design may have to be modified to deal with specific conditions existing within the estuary.

Appendix G

"Bird Blind" design from Winterland Ecomuseum

Images of observation platform, "bird blind" and viewing deck



Design of observation blind ("bird blind") at Winterland Ecomuseum



Photo Courtesy of EHJV

Image of typical observation platform



Photos Courtesy of Corduroy Brook Trail Association

Image of inside and outside of bird blind in Grand Falls-Windsor



Photo Courtesy of EHJV

Image of viewing deck with interpretive panel in Glovertown

Appendix H

Additional bird sightings within the Shearstown Estuary

Table 4: A sample of bird sightings in the Shearstown Estuary as noted by Eastern Habitat Joint Venture staff
(Dates reflect an absence in surveying for particular years, not an absence in birds)*

Species	Date	Location	Number Observed
American Black Duck	February 3, 1996	Spaniard's Bay	200+
	March 12, 1996	Arnie's Pond	56
	November 17, 1996	Spaniard's Bay	18
	January 1, 1997	Spaniard's Bay	170
	January 9, 1998	Spaniard's Bay	227
	November 1, 2005	Shearstown Pond/Muddy Hole Road	37
Green-winged Teal	December 31, 1996	Arnie's Pond	1
	September 17, 1997	Shearstown Pond	1
	November 1, 2005	Shearstown Pond	2
Northern Pintail	August 18, 1996	Shearstown Pond	4
	November 1, 2005	Shearstown Pond	2
Common Goldeneye	December 25, 1995	Spaniard's Bay	20
Bufflehead	December 18, 1997	Arnie's Pond	1
Greater Scaup	February 3, 1996	Spaniard's Bay	5
	December 18, 1997	Arnie's Pond	6
Canada Goose	March 30, 1997	Arnie's Pond	4
Common Loon	December 18, 1997	Spaniard's Bay	3
Greater Yellowlegs	August 18, 1996	Shearstown Pond	46
Ruddy Turnstone	August 16, 1996	Shearstown Pond	12
Semipalmated Sandpiper	August 18, 1996	Arnie's Pond	5
Semipalmated Plover	August 18, 1996	Arnie's Pond	8
Black-headed Gull	November 24, 1996	Arnie's Pond	27
	November 1, 2005	Arnie's Pond	40
Ivory Gull	January 10, 1998	Arnie's Pond	2
Osprey	June 25, 1996	Shearstown Pond	1
Ruffed Grouse	December 10, 1997	Muddy Hole Shoreline	1

For further information please contact:

The Eastern Habitat Joint Venture

Dept. of Environment and Conservation
Wildlife Division
117 Riverside Drive
P.O. Box 2007
Corner Brook, NL
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Town of Spaniard's Bay

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Town of Bay Roberts

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Bay Roberts, NL
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Phone: 709-786-2126
Email: info@bayroberts.com

Bay Roberts and Spaniard's Bay Joint Management Committee

Your local Joint Management Committee Members:

Mose Anthony: 709-786-2361
Patricia George: 709-786-1292
Cathy Kleinwort: 709-786-9829
Bill Seymour: 709-786-7423

Contact your JMC members to make a monetary donation or to volunteer your time and skills to projects that will improve the local ecosystem of the Shearstown Estuary.