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Race Rocks Marine Protected Area Designation:

A Social, Economic, and Cultural Overview

November 2010

Prepared for:
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Revised Draft Submitted March 2, 2011

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1. INTRODUCTION

1.1. Background

An area of interest (AOI) approximating the current Rockfish Conservation Area around the Race Rocks archipelago is being assessed as a potential marine protected area (MPA) under Canada's *Oceans Act* (Figure 1). Race Rocks represents a transition zone between the Pacific Ocean and coastal waters and is renowned for its exceptional marine biodiversity and biological productivity. The AOI represents important habitat for threatened marine mammal, seabird, fish, and invertebrate species. Establishment of a MPA at Race Rocks will be the first in what is hoped to be network of coastal marine protected areas (BC Ministry of Water, Land and Air Protection 2002).

Protection and conservation measures have been in place for the terrestrial ecosystem (nine islets) and the ocean bottom (to 20 fathoms) since 1980 when the Province of British Columbia designated Race Rocks as an ecological reserve under the *Ecological Reserves Act*. The ecological reserve was established to protect a provincially significant high current ecosystem as a result of a proposal by Lester B. Pearson College of the Pacific (the College); the College has managed the reserve since 1997 and has maintained a human presence to monitor the ecosystem and provide educational and research opportunities. The purpose of the ecological reserve was "to preserve for educational and research purposes, one of B.C.'s most biologically rich, marine ecosystems" (Fletcher *et al.* 1980). All activities in the ecological reserve are subject to review and approval by an Operating Committee comprising BC Parks and the College.

MPA designation of Race Rocks will provide additional protection of the high biodiversity of marine species and their habitat as well as further support ongoing resource management, public education, research and environmental monitoring at the ecological reserve. Resource preservation issues such as the protection of critical habitat for Rockfish (*Sebastes* spp.), Northern abalone (*Haliotis kamtschatkana*), Steller sea lions (*Eumetopias jubatus*) and other species identified under the Species at Risk Act (SARA) are current management priorities.

Both federal and provincial governments have committed to a Marine Protected Areas Strategy to establish a system of marine protected areas including the Race Rocks Ecological Reserve (BC Ministry of Water, Land, and Air Protection, 2002). However, the diverse marine environments of the Pacific Coast are not well represented in current Canadian protected areas systems.

1.2. Purpose and Approach

Socioeconomic base line reports have been commissioned for the Race Rocks AOI as part of the MPA designation process in 1999 and again in 2009. The purpose of this report is to edit and expand upon the 2009 **Socio-Economic Base Case Update for Race Rocks Proposed Marine Protected Area** by Randy Sunderman, Peak Solutions Consulting Inc. This document is intended to be a brief and concise summary of socioeconomic data for the Race Rocks AOI to ensure that key

information is available for the MPA designation process. This work presents a snapshot of the activities and stakeholder communities involved with Race Rocks with a focus on potential user conflicts and sustainable use of the marine environment. Spatial-temporal trends in human activities that take place in close proximity to the AOI and may influence activities within the MPA are also presented. Information collected here will contribute to a larger Socio-economic and Cultural Overview and Assessment (SECOA) and Cost Benefit Analysis (CBA).

Activities that have not occurred and are now not allowed to take place according to Race Rocks' existing ecological reserve status are excluded from this report. Specifically, actions from mineral exploration and mining, forestry, and oil and gas sectors are not investigated. Finally, First Nation interests in and around the AOI are not covered in this report. First Nation traditional uses, economic activities, demographic trends, and cultural importance are covered in a separate report.

1.3. Local Area Defined

The Race Rocks archipelago sits 17 km southwest of Victoria at 48.2984^{o}N latitude and 123.5317^{o}W longitude, 1.5km south of the southern tip of Vancouver Island in the Salish Sea. Race Rocks is positioned at the eastern end of the Strait of Juan de Fuca and is the southernmost part of Canada on the Pacific Coast. Race Rocks is part of the Juan de Fuca Electoral District; the nearest municipality is the District of Metchosin.

The Race Rocks ecological reserve established in 1980 was expanded in 2001 to include the majority of Great Race Rock and now covers 225 hectares of seabed (to a depth of 20 fathoms) and 2 hectares of terrestrial habitat (BC Ministry of Water, Land and Air Protection, 2002). An area of 0.144 hectares surrounding the lighthouse on Great Race Rock is under provincial *Land Act* lease to Canada Coast Guard and is not part of the ecological reserve.

The proposed Race Rocks Marine Protected Area's boundary approximates the current (2010) Rockfish Conservation Area but is fixed to map coordinates instead of a depth contour. The MPA will consist of the marine waters that surround the nine islets up to the low tide mark, the land above this point will remain under the management of the provincial Ecological Reserve. Figure 1.1 highlights the Race proposed Marine Protected Area and the existing Ecological Reserve.

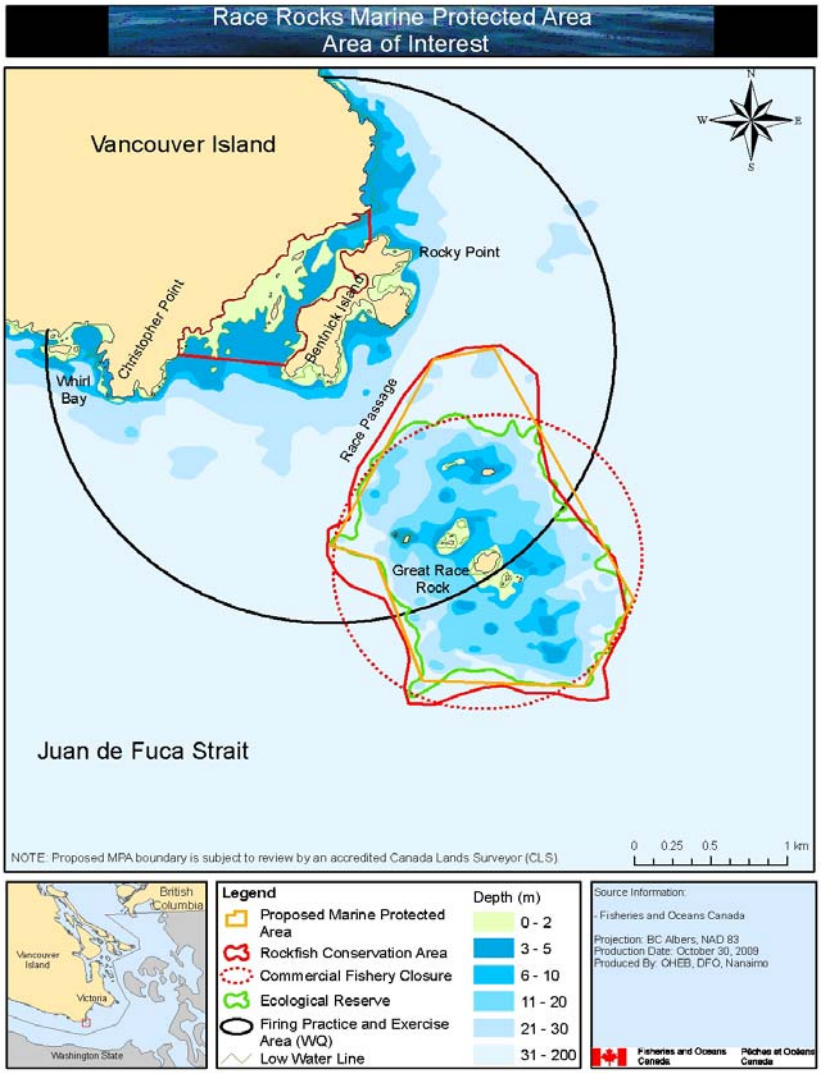

Figure 1.1: Current Marine Ecological Reserve and Proposed Marine Protected Area, (Source: Department of Fisheries and Oceans Canada)

1.4. Report Organization

The report is organized in the following sections:

- Section 2 outlines the values resources in and current governance of the AOI. This section details administrative responsibilities, governance structure, and the cultural and historical value of resources in the AOI.
- Section 3 presents demographic profiles the Capital Regional District as well as sector activities profiles that include future outlook for socioeconomic sectors active in and around the AOI.
- Section 4 comprises a "Values at Risk" analysis of existing and potential user conflicts, potential impacts of MPA designation on community stakeholders, and sustainable development of the Race Rocks resource.

2. RESOURCE VALUE AND MANAGEMENT

2.1. Governance

2.1.1. Federal Government

The responsibility of the Federal Government in protecting the Race Rocks ecosystem falls under both its planning role under Canada's Ocean Strategy and under its approval role of protecting fish and aquatic habitat, marine mammals, and migratory bird habitat. The Federal Government wishes to take on additional responsibilities for the Race Rocks Area of Interest with the designation of a Marine Protected Area. Federal government agencies that regulate or are involved in resource use, human use management, or other aspects relating to the establishment of an MPA at the Race Rocks AOI are: Fisheries and Oceans Canada, Environment Canada, Parks Canada and the Department of National Defense.

Fisheries and Oceans Canada (DFO), Environment Canada (through the Canadian Wildlife Service) and Parks Canada share mandated responsibilities to create protected areas in Canada's marine environment. DFO takes the lead in the development and implementation of the nation's marine protected areas systems, incorporating programs of all three departments.

Fisheries and Oceans is mandated to protect and conserve marine resources and habitat, including implementation of programs to provide for the sustainable use of Canada's marine resources. DFO is responsible under Canada's *Oceans Act* for identifying potential marine protected areas, presenting management plans for marine protected areas to the federal cabinet, and drafting federal legislation to implement these areas. DFO is also responsible for navigable waters and environmental response services (through the Canadian Coast Guard), organisms in the water column, and for managing marine resources under both the *Fisheries Act* and the *Oceans Act*.

Environment Canada is mandated to preserve and enhance the quality of the natural environment. It has legislative authority to establish marine protected areas and to regulate land activities that affect protected areas in the offshore through the *Migratory Birds Convention Act*, *Canada Wildlife Act*, *Canadian Environmental Protection Act*, and the *Species at Risk Act*. The primary focus of Environment Canada is protecting major marine and nearshore areas for wildlife conservation, research and public education. Both the Canadian Wildlife Service and Canadian Environment Assessment Agency are under the regulatory mandate of Environment Canada and play a role in the implementation and/or maintenance of Marine Protected Areas.

Parks Canada is mandated to protect and present significant aspects of Canada's natural and cultural heritage such that public understanding and appreciation ensures ecological and commemorative integrity for current and future generations. Parks Canada identifies and designates National Marine Conservation Areas (NMCA), National Historic Sites, and National Parks. The national system of marine protected areas that make up the NMCA Program are managed for sustainable use and may contain smaller zones of higher degrees of protection from ocean

dumping, undersea mining, oil and gas exploration and development, and related activities. Marine Protected Areas designated by other federal programs can be considered part of the NMCA plan if conservation objectives align.

Finally, the Department of National Defense (DND) owns nearby Bentinck Island and nearby coastline as part of Canadian Forced Ammunition Depot (CFAD) Rocky Point. DND also makes use of waters and airspace surrounding the Race Rocks AOI for military purposes. DND is mandated to formulate and manage all aspects of defense policy, defense of Canadian interest and values, and contributing to international peace and security. DND is also tasked with assisting other government departments in achieving national goals.

At this point, the federal government is operating under the "umbrella" agreement of the current provincial Ecological Reserve Management plan that coordinates complementary marine protection initiatives under the *Oceans Act*.

2.1.2. Provincial Government

The provincial government of British Columbia is responsible for delivering coastal zone planning to address and land and resource use. The provincial government also approves and regulates aquaculture operations, oil and gas development, discharges into coastal waters, and can designate protected areas. Relevant legislation includes: *Waste Management Act*, *Fisheries Act*, *Fish Protection Act*, *Wildlife Act*, *Petroleum and Natural Gas Act*, *Park Act*, and the *Ecological Reserve Act*.

The responsibility for implementing the Race Rocks Ecological Reserve Management plan falls on BC Parks. This agency works cooperatively with First Nations to uphold treaty rights and incorporate their interests in management decisions. When management issues arise that require joint federal/provincial action, BC Parks coordinates participation of the appropriate provincial agency or agencies.

Currently, BC Parks leases an envelope of land around the lighthouse on Great Race Island to the Canadians Coast Guard (a division of Fisheries and Oceans Canada) that maintains a foghorn with solar panels and battery bank as a navigational aid.

2.1.3. Local Government

The Race Rocks AOI belongs to the Juan de Fuca Electoral District but represents important historical and ecological value shared by the District of Metchosin and the Capital Regional District. Local governments and municipalities prepare and implement regional and community plans that include the planning and provision of parks along coastal shores. The District of Metchosin's Official Community Plan protects several sections of mainland shore under special municipal zoning and includes Bentinck Island, Rocky Point, and Whirl Bay as potential park areas (District of Metchosin, April 1994).

2.1.4. Public Involvement

As part of the Ecological Reserve Management plan, the province actively encourages community involvement in the stewardship of the resources present in the Race Rocks AOI. In 1997, Lester B. Pearson College of the Pacific (the College) responded to the destaffing of the Canadian Coast Guard station by maintaining a year-round staff of Eco-Guardians living on site and facilitating the addition of the majority of Great Race Rock to the Ecological Reserve. The College has a longstanding position in the Race Rocks community from pre-designation of the Ecological Reserve (1980) to its current on-site management and involvement in the Marine Protected Area (MPA) process. The College currently manages the Ecological Reserve as part of a Joint Operating Committee with BC Parks, operating the facilities present on Great Race Rock with the primary objectives of:

-Protecting the ecological values of the island and surrounding ecosystem;
-Maximizing educational opportunities; and,
-Facilitating research.

This commitment gives the College unparalleled practical experience with and knowledge of Race Rocks, and has increased the College's capacity to facilitate other community sectors in their use of this shared resource. Garry Fletcher, a community leader in Metchosin and former faculty at the College currently serves as the ecological reserve warden.

2.2. Cultural and Social Value

Humans have valued and made documented use of the Race Rocks ecosystem for 1000 to 1500 years before present, with continual habitation stretching back 150 years (National Defence 2005; The British Colonist 1860). The resources contained within the Race Rocks AOI represent a diverse cross-section of Canadian values that include heritage preservation, education, recreation, and ecosystem conservation and valuation.

2.2.1. Canadian Heritage

The Race Rocks AOI has been an important area for resource gathering by First Nations. On the main island in the AOI, Great Race Rock, disturbed and 8 undisturbed First Nations burial cairns indicate the importance of Race Rocks to the ancestral Straits Salish peoples (Mathews 2006). These burial cairns date to ~AD 500 and are part of the late prehistoric mortuary landscape of southern Vancouver Island and are a physical reminder of a cultural heritage significant for all Canadians.

During the colonial period of British Columbia, Race Rocks was identified as a major navigational hazard for the fast-growing economies of the important ports of Vancouver, Seattle, and Victoria. As part of the response to increased marine traffic during the Fraser River Gold Rush, the Imperial Race Rocks lighthouse was the second constructed in British Columbia. The lighthouse that stands on Great Race Rock is the oldest granite lighthouse in British Columbia and along with Fisgard, is one of just two lighthouses constructed during the colonial period. Since 1991, the Race Rocks

lighthouse has been a Recognized Federal Heritage building because of its historical significance, and for its architectural and environmental values.

2.2.2. Historical Significance

Race Rocks received its English name from the Hudson's Bay Company because of the strong tidal flows that 'race' past the nine rocky islets. The islets' location in the Juan de Fuca Strait meant the lighthouse constructed there was a significant aid to merchant and passenger ships heading to Victoria as well as naval vessels destined for Esquimalt. With the influx of settlers during the 1850s, Victoria quickly changed from a fur-trading fort to an incorporated city with associated increases in marine traffic dependent on the navigational aids on Great Race Rock.

Despite the imposing grandeur of the granite tower, ships caught in the strong oceanic currents or lost in the fog continued to run aground at Race Rocks. From the wreck of the Nanette three days before the lighthouse was first lit to the present day, the Race Rocks lightstation has witnessed many maritime disasters making it a significant part of the Graveyard of the Pacific. To help avert further loss of life and property, in 1927 Race Rocks became the first site on Canada's West Coast to be fitted with a radio beacon.

2.2.3. Architectural Significance

As a navigational aid, the Race Rocks lighthouse dominates the small treeless archipelago with its distinctive black and white horizontal bands. The design of the Race Rocks tower is consistent with other Imperial lighthouses used along colonial trade routes. There is considerable debate surrounding the origin of the stones used to construct the tower, with some sources maintaining all rock used was quarried on Great Race Rock itself. Recent restoration work showed definitively that the lower three-fourths of the tower is constructed of granite (not the basalt available locally), and the top fourth of sandstone, consistent with other sources that claim that both granite blocks quarried in Scotland and sandstone from Gabriola Island were used in the tower's construction.

Other character-defining elements of the lighthouse's architecture include the tower's tall tapered form and stately proportions, robust rusticated block construction, raised door and windows set in arched openings of the thick masonry, its aesthetic design, and lasting-quality craftsmanship. The black and white bands reinforce the lighthouse's picturesque, maritime setting on Race Rocks, making it an easily recognized regional landmark.

2.2.4. Environmental Values

The islands of the Race Rocks archipelago are just the protruding tips of an ancient volcanic core that rises up from the ocean floor. Because of this distinct origin, the steep rock walls and narrow channels found in the AOI interact with and enhance the strong tidal flows of the Juan de Fuca Strait, creating areas of significant upwelling and seawater mixing. In February 1999, the Canadian Hydrographic Survey presented an acoustical bathymetric map of the Race Rocks AOI and

surrounding area to 100m to further scientific understanding of the area's currents and ecosystems (see Figure 2.1). An important consequence of the unique oceanographic conditions found at Race Rocks are the relatively cold, clear, and nutrient-rich waters ideal for the kelp forest ecosystem found in the AOI.

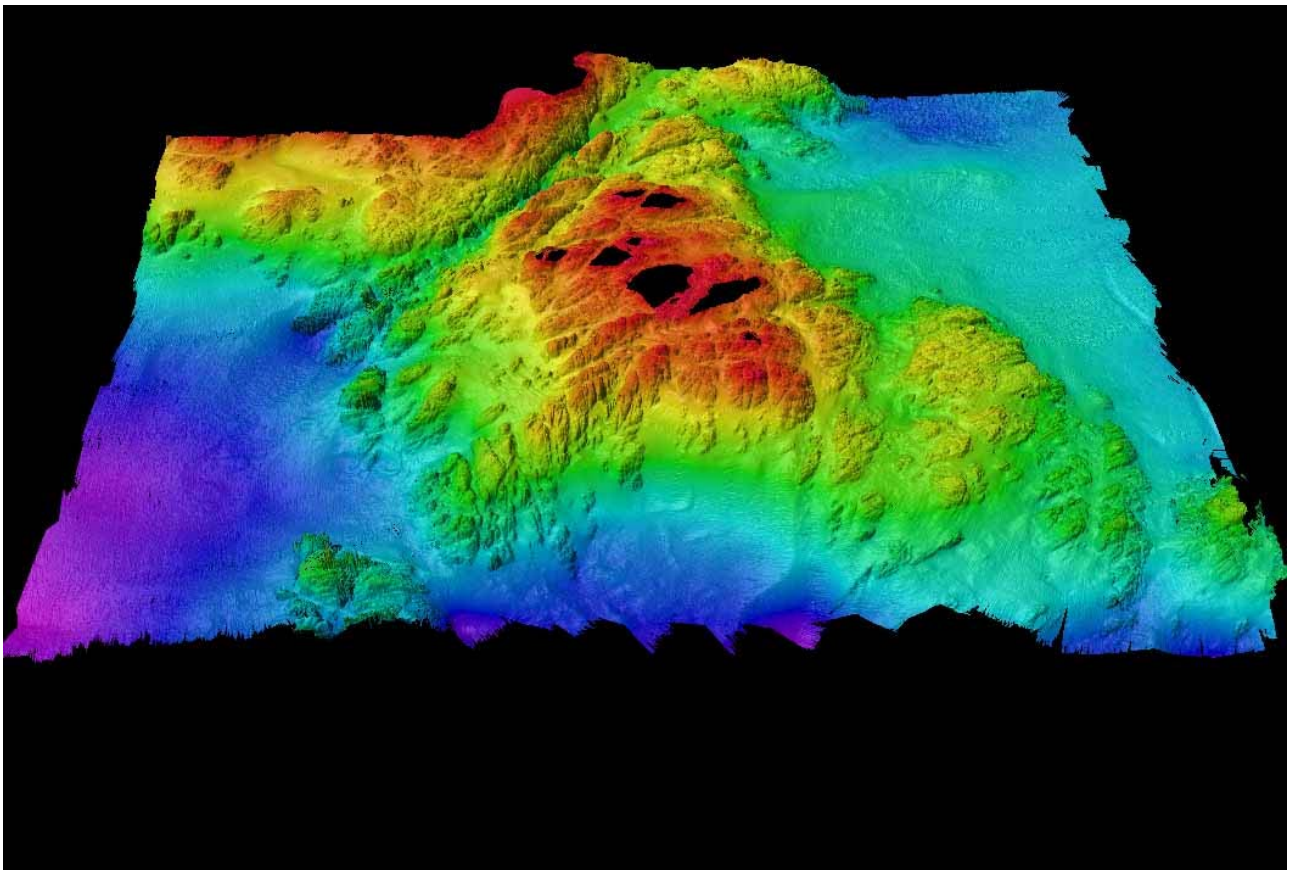

Figure 2.1: The black area represents land and areas not included within the survey (2d capture of entire area from south - 1 x magnification). Bentick Island appears at the top of the picture. Great Race Rocks, where the light station is located, is the large island in the center of the picture.

Kelp forests are the most productive ecosystems on the planet, and a conservative estimate of 7,370 metric tonnes representing more than 41 taxa of marine algae is thought to exist within the boundaries of the Race Rocks Ecological Reserve. The dominant kelp species *Nereocystis luetkeana* (bull kelp) forms thick canopies along the surface in approximately half of the AOI, while dense understory aggregations of *Pterygophora californica* (perennial kelp) form beds on the seafloor over an even greater area. Kelp forests of *Nereocystis* are predominantly found in wave-exposed areas where they absorb kinetic wave energy, sheltering nearby coastlines and influencing sedimentation and coastal erosion patterns. Furthermore, kelp forests host a great diversity of invertebrate and vertebrate species, acting as refuges and nurseries for young northern abalone (*Haliotis kamtschatkana*), Rockfish (*Sebastes* spp.), and other commercially important stocks.

Abalone were once found in great abundance in the Race Rocks AOI and surrounding area, however *Haliotis kamtschatkana* is now a severely depleted shellfish throughout the southern Vancouver

Island region and in 1990 the entire coast of British Columbia was closed to harvesting. In 1999, research showed that protection against illegal harvest provided by a manned-presence at Race Rocks resulted in greater abundance and size of abalone than in surrounding areas (Wallace, 1999). Furthermore, the wide range of abalone sizes at Race Rocks indicated active recruitment and population growth in the AOI, a phenomenon not observed outside of protected areas.

Rockfish are found through the northern oceans, however the waters of the Pacific Northwest provide habitat for the greatest species diversity. There are at least 6 known species of Rockfish in the Race Rocks AOI; the most common of these being the *Sebastes melanops* (Black), *Sebastes caurinus* (Copper), and *Sebastes maliger* (Quillback). DFO monitoring in B.C. has shown that inshore rockfish populations are at low levels of abundance, particularly those within the inland waters of Vancouver Island. Since 2002, Federally-designated Rockfish Conservation Areas (RCAs) around the coast have been designed to alleviate further population declines associated with recreational and commercial fisheries. However, forward-thinking conservation initiatives proposed by Race Rocks community stakeholders succeeded in 1990 with the first federal closure of commercial and sport fishing for groundfish of any marine reserve area on the B.C. coast. It is hoped and generally believed by stakeholders that the protection of Rockfish stocks at Race Rocks creates positive spillover into nearby areas where fishing is permitted. The Race Rocks Eco-Guardian reports fishing infractions as one of the most common negative human impacts on the Race Rocks ecosystem, second only to munitions testing and disposal carried out by the Department of National Defense. The proposed Race Rocks MPA approximates the current boundaries of the current Race Rocks RCA.

The Race Rocks islets serve as a haulout and excellent viewing opportunity for four pinniped species: two Otariidae (eared) and two Phocidae (true) seal species. Harbour seals (*Phoca vitulina*) are the most abundant pinniped species in B.C. waters, making year-round use of the Race Rocks AOI as both a haulout and pupping site. Harbour seals are observed to congregate in 'nursery areas' within the AOI from July to September to raise their pups; a sensitive time when viewing and administrative activities are reduced to minimize impact. Northern elephant seals (*Mirounga angustirostris*) have expanded their historical range northward and can now be found at Race Rocks from December to September. Elephant seals were first observed to use the haul outs in the Race Rocks AOI for moulting in 1998. In 2009, the first recorded Canadian birth of an elephant seal occurred on Great Race Rock. In 2010, four births were observed, however all pups perished before weaning. Race Rocks is the only known Canadian breeding colony for the Northern elephant seal. Steller sea lions (*Eumetopias jubatus*) are the largest Otariid at Race Rocks and males of this species are present in the AOI year-round. Steller sea lions are listed by COSEWIC and SARA legislation as Special Concern and are particularly vulnerable to entanglement in lost fishing gear and marine garbage. The first rescue of an entangled sea lion in Canada occurred at Race Rocks in December 2009 with the combined effort of DFO and the Vancouver Aquarium. Male California sea lions (*Zalophus californianus*) are seen sporadically in the Race Rocks AOI throughout the year, with the greatest abundance found from August to October. Sea lion abundance in the reserve can reach 1500 individuals, a time when each rocky islet in the reserve is used as a haul out. A year-round population of ~100 Steller sea lions are generally found on North, Middle, or South-East Rocks. The

Callorhinus ursinus (Northern Fur seal) species has not been observed at Race Rocks for more than 20 years. Southern Resident and Transient Killer whale (*Orcinus orca*) populations are regularly sighted in and around the AOI, and Humpback whale sightings have increased in recent years. Disturbances of Harbour seals, Steller sea lions, California sea lions, and Orca whales by Department of National Defense activities around and in the AOI have been documented.

A diverse array of seabirds, migratory songbirds, and birds of prey make use of the Race Rocks AOI. Three species of seabird (*Larus glaucescens*, *Cepphus columba*, and *Haematopus bachmani*) currently nest on Great Race Rock. Seabirds and songbirds are attracted to the Race Rocks AOI for its high abundance of food and protection from land-based predators, however River otters (*Lontra canadensis*) that have found refuge in the stonework found on Great Race Rock have recently invaded the ecosystem and prey upon cormorants and unfledged seagulls. Seabirds are regularly seen to congregate around 'bait balls' and sea lions feeding on larger fish such as salmon or sturgeon. Boat traffic is known to disturb seabird foraging behaviour (Ronconi & St. Clair, 2002), however these aggregations of seabirds serve to attract rather than discourage the majority of vessels in the AOI. Peregrine falcons (both *Falco peregrinus pealei* and *Falco peregrinus anatum*) are attracted to the Race Rocks AOI because of high concentrations of seabird prey species. Both of these species are listed by COSEWIC under Special Concern and have been observed to make regular use of the railings surrounding the lantern room of the Race Rocks lighthouse. Between November and April, Bald eagles (*Haliaeetus leucocephalus*) congregate mainly on North, West, and South-East Rocks providing excellent winter wildlife viewing opportunities in the AOI. The Race Rocks Eco-Guardian recently documented and photographed the second owl species (*Strix varia*) known to make use of the AOI.

2.2.5. Stewardship

The Race Rocks Ecological Reserve has served as and continues to be a commendable example of shared stewardship and ecological protection. Since the establishment of the ecological reserve, every community stakeholder has made efforts to reduce their impact on the Race Rocks ecosystem and improve the sustainability of their use of the marine resources found in the AOI. The importance of protecting Race Rocks became particularly evident in 1997 with the destaffing of the light station on Great Race Rock. Conservationists believed that the low compliance rates with existing regulations—despite a manned presence—would only worsen without supervision of the sensitive and limited resources found in the AOI. Pearson College stepped up to this conservation challenge and has provided a full-time staff of Eco-Guardians to maintain the facilities on Great Race Rock and to protect and promote the Race Rocks ecosystem for the last 13 years. The 2005 "State of British Columbia's Ecological Reserves" report cites the work of Pearson College as an exemplary case of building partnerships, supporting on-going research, and stewardship. As of 2005, Race Rocks was the only ecological reserve with an up-to-date inventory of species, thanks in part to the annual sub-tidal surveys performed by Pearson College students since 1980. As part of their commitment to research and inventory work, Pearson College hired marine scientists as the reserve's Eco-Guardians in 2008 and 2010; their work has catalogued many species previously unknown to make use of the Race Rocks AOI including 14 new vertebrate observations.

Recreational boaters and fishermen wary of DFO officers have commented that they appreciate the community-based approach employed by Pearson College staff to protect and encourage deeper stewardship of Race Rocks.

2.2.6. Education & Research

One of the original stated purposes of the Race Rocks Ecological Reserve was to preserve the ecosystem for educational purposes (Fletcher *et al.* 1980). Within sight of the province's capital, Race Rocks has incredible biological importance for and serves as a unique showcase of the natural history of southern British Columbia. From the very beginning, students and educational aims have been a critical component of protecting Race Rocks. Heavy student involvement and direct lobbying was instrumental in the creation of the Race Rocks Ecological Reserve (ER#97). Following Pearson College's example, the wildlife-viewing community and Shaw Ocean Discovery Centre utilize the tremendous educational potential of Race Rocks to help educate visitors in the Salish Sea ecosystem and the significant natural links between organisms and human activities.

The College has led educational initiatives for Race Rocks since 1978, keeping an up-to-date inventory of species, facilitating Christmas Bird Counts in the ecological reserve, attracting and supporting external research, and providing the award-winning racerocks.com website. Created in 1999, racerocks.com has brought a cornucopia of real-time video and audio, weather reports, archived educational videos, curriculum resources, and other materials to hundreds of thousands of visitors. Environmental Non-Governmental Organizations (ENGOS), the wildlife viewing community and Shaw Ocean Discovery Centre use resources made available by the College through the racerocks.com website to stress the importance of protecting the Race Rocks ecosystem. The College is building wi-fi and other technological capacity to better facilitate the educational objectives of the wider stakeholder community.

Over the past 30 years, external research conducted in the Race Rocks AOI has diminished. The University of Victoria once had a strong involvement at Race Rocks, with ongoing seabird and other ecology programmes (Dr. T. Miller, personal communication). Currently, data from environmental and population monitoring provided by Pearson College has taken a more prominent role in external research activities. Recently, research attention has been directed at Race Rocks in an effort to understand the interplay between community stakeholders, First Nations, and the Canadian government surrounding conservation issues (Murgatroyd, 1999; LeRoy, 2002). The Race Rocks MPA designation process has been identified as a model for evaluating and processing other candidate MPA areas, however process length and cost are considerable problems that face future conservation efforts of this type.

The Race Rocks ecosystem is an integral component for other regional ecosystems, however its educational value has a global appeal. The first *Canadian Underwater Safari* production involved terrestrial and underwater videography at Race Rocks and showcased the AOI's ecology to audiences across Canada and the eastern US with an estimated 2 million viewers (racerocks.com). Since 2008, documentary filmmakers and television crews from Germany and South Korea have

used the Race Rocks AOI to educate audiences in their home countries of this globally significant ecosystem.

2.2.7. Ecosystem Services and Valuation

As the MPA designation process moves forward for the Race Rocks AOI, a Cost-Benefit analysis must decide if the additional onus on Canadian taxpayers, businesses and government resources merits specialized protection for the resources contained within the proposed boundaries. An important class of information missing from this and many other conservation decisions is that of ecosystem valuation and natural capital, that is how natural systems sustain and fulfill human life. Global efforts are underway to value both ecosystems and the multitude of benefits they provide to increase human welfare (Costanza *et al.* 1997; TEEB 2010), however without true cost pricing indexed to actual social and environmental costs policy makers are confronted by a scarcity of economic incentives to maintain nature. In the Race Rocks MPA context, valuation techniques must first identify important uncertainties such as the replacement cost of Rockfish and abalone populations contained in the AOI before an understanding of conservation success and associated economic benefits can be reached. In matters such as the value of marine mammals to commercial interests, both the impact of human activities and the willingness of individuals to pay to protect ecosystems must also be known (Jansson *et al.* 1994).

3. PRESENT AND POTENTIAL: COMMUNITIES AND OTHER STAKEHOLDERS

3.1. Local Demographic Trends

In 2009, there were an estimated 367,572 people living in the Capital Region District, and a population of 371,748 is estimated for the CRD in 2010 (see Figure 3.1). Metchosin, the closest community to Race Rocks, had an estimated population of 5,133 in 2009. Communities in the CRD and their estimated populations are listed in Table 3.1.

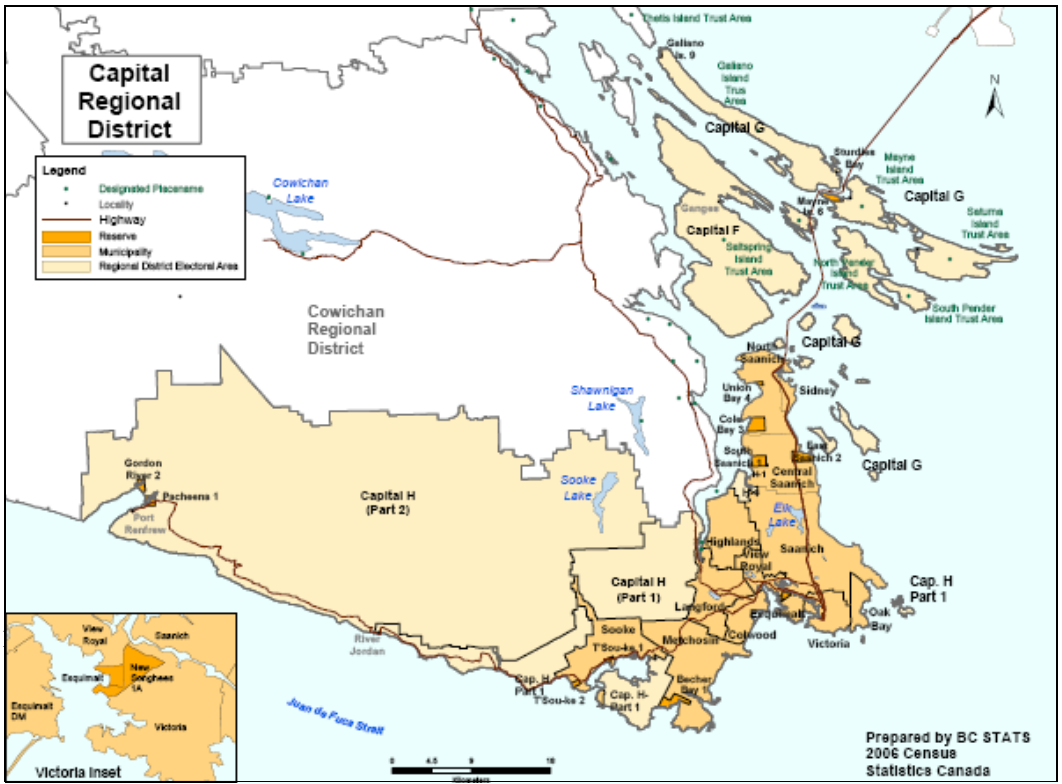

Figure 3.1: Southern Vancouver Island and the Capital Region District (from BC Stats).

Table 3.1: Population estimates for CRD Municipalities: 1996-2009. Source: BC Stats. November 2010.

	1996	2001	2006	2009
Municipalities				
Central Saanich	15,125	16,048	16,005	16,170
Colwood	14,384	14,575	15,260	16,174
Esquimalt	16,820	17,037	17,513	17,682
Highlands	1,479	1,822	2,010	2,175
Langford	18,206	20,070	23,513	27,328
Metchosin	4,890	5,113	4,969	5,133
North Saanich	10,750	10,630	10,923	11,021
Oak Bay	18,457	18,013	18,040	18,012
Saanich	105,253	108,607	111,575	113,516
Sidney	11,062	11,299	11,510	11,578
Sooke	8,763	9,226	10,077	10,540
Victoria	76,678	77,490	80,871	82,785
View Royal	6,690	7,719	9,126	9,583
Unincorporated Area	22,525	22,939	24,479	25,875
Total:	**331,082**	**340,588**	**355,871**	**367,572**

The CRD's population has increased by ~12% since 1996, and another 12% increase (to 412,789) is expected by 2020. Current projections hold that the CRD will surpass 400,000 people by 2017, and long-term projections estimate a CRD population of 461,412 by 2036 (BC Stats, 2010). Changing population structures in the province are thought to explain a general decrease in fishing activities (as measured by number of fishing licenses sold). Comparisons of provincial Labour Force data from the 2001 and 2006 censuses show that employment in the fishing, hunting and trapping industry was down 22.7% in the CRD compared with a provincial increase of 1.3%. Employment in the mining and oil gas extraction increased 87.9%, more than double the provincial growth average. Unemployment rates in the CRD have shown steady declines since the 2001 figure of 6.6%; the unemployment level in Victoria was a reported 3.9% in January 2009 (Statistics Canada 2009).

3.2 Socioeconomic Sectors and Activities

The diversity and abundance of wildlife, picturesque setting, and eponymous oceanic currents that race around the nine islets in the Race Rocks AOI encourage a variety of socioeconomic activities. This section presents a snapshot of the activities as they presently occur at Race Rocks.

3.2.1. Recreational Boating

i. Historical and Current Situation Analysis

The recreational boating sector traditionally encompasses three sectors of private boat owners, namely: power boating, sail boating, and human powered boating (kayaks, canoes, rowboats). In this report, sea kayaking is treated as a separate entity. Recreational boating is therefore defined as power and sailboat cruising, more specifically referring to cruising or sailing as the main purpose of the activity taking place (as distinct from fishing). It includes cruising by local residents and visiting boaters. These boaters make both operating and capital expenditures.

Race Rocks' position in the Juan de Fuca Strait makes it accessible to numerous ports and is considered a high traffic area for boating. It is strategically located as it has the only direct water access from Georgia Strait and Puget Sound to fishing grounds and wildlife viewing areas on the west coast of Vancouver Island and Washington State. It is also a good reference point in terms of navigational use, being equipped with a fully functional lighthouse and a fog horn. Its prominent positioning and surrounding rock inlets as well strong currents makes it an easily recognizable area for local boaters.

The nearest slipway and marina is located at Pedder Bay, which is approximately 2 miles to the North. However, recreational boaters from Becher Bay and Sooke (to the Northwest) as well as Esquimalt and Victoria (to the Northeast) frequent the AOI. Recreational boaters from Washington State also visit Race Rocks, however fewer than 5 such vessels per year have been observed since 2008 (personal observation; racerocks.com). Recreational boating traffic is largely weather-dependent and reaches its highest volumes during the summer months with a steep decline in October and for the duration of the winter months.

The majority of recreational boaters that enter the reserve engage in wildlife viewing. The Race Rocks area has a high concentration of marine life and on any given day depending on the season, boaters can see whales, two species of sea lions, Canada's only elephant seal breeding colony as well as an impressive abundance and diversity of seabirds. The highest levels of boat traffic occur during the summer months, coinciding with peak seasons for most wildlife species that use the AOI. The Race Rocks lighthouse, the second oldest in the province of British Columbia is also of interest to boaters for its historical significance in the region. The AOI is highly picturesque, with an attractive lighthouse surrounded by the Pacific Ocean with a background of the Olympic Mountain range. This distinct coastal panorama makes for an impressive sight and leaves a lasting impression to all who visit.

The high-current channels and other navigational hazards around the rocky islets discourage most sail-powered vessels from entering the Race Rocks AOI, with the exception of competitive teams in the annual Swiftsure Race. A team in the 2010 Swiftsure Race was unaware of Race Rocks' protected status and anchored in the ecological reserve. The HMCS Oriole (based at CFB Esquimalt) makes regular training trips to the waters east of Race Rocks, engaging its on board engines when necessary.

An estimated 5-10% of recreational boaters engage in illegal fishing activities in the Race Rocks AOI. Less than 1% of these vessels will be transporting SCUBA divers. These figures are a result of observation by the Eco- Guardians on the island and from Daily Log records available on the Race Rocks website. A significant proportion (up to 50%) of recreational boating traffic is either not knowledgeable or chooses to disregard the 7 knot speed limit within the reserve boundaries. However, the majority of recreational boaters do maintain the same or greater viewing distances from marine mammals as commercial wildlife viewing vessels (see section 4.1.2).

A small but growing number of recreational vessels drive through the kelp beds in the Race Rock AOI, some of which then require assistance. The latest case of a recreational vessel running aground and requiring assistance was 2005 (racerocks.com). It is often impossible to raise recreational boaters at Race Rocks on VHF 16 or 68 with many boaters reporting a preference of cell phones over maritime radio.

ii. Future Outlook for Recreational Boating

The Georgia Basin and Puget Sound region has an estimated population of 6 million inhabitants with high rates of boat ownership (Sunderman 2009). This has contributed to continuing strong demand for recreational boating in the regions coastal waters. There is no statistically reliable estimate of use levels for the study area. The development of nearby communities is expected to contribute to an increased boating use in the AOI. Demographic trends in the area suggest that an ageing population with greater wealth and leisure time will seek out and invest in motorized activities due to its ease and convenience. The Race Rocks AOI is thus expecting more frequent visitors due to its setting as well as its historical and natural values.

3.2.2. Kayaking

i. Historical and Current Situation Analysis

This recreational activity is growing in popularity in the Capital Region District, and visits to the Race Rocks AOI by kayakers have increased in recent years. Large, organized kayaking groups will leave from Pedder Bay, timing their visits to Race Rocks for slack or variable tides. Increasingly, small groups (2-3) visit Race Rocks during strong ebb or flood tides to ride the strong localized currents between the rocky islets, seeking refuge in sheltered kelp beds to rest. Fewer than 50 kayakers have visited the ecological reserve annually since 2008 (personal observation; racerocks.com). Kayaking is widely believed to be a non-obtrusive form of wildlife viewing, however the stealth of these silent craft can surprise marine mammals, leading to the highest rate of marine mammal disturbances per vessel visit of any human activity at Race Rocks. Kayaking

groups have landed on Great Race Rock seeking to camp, explore, and use washroom facilities for each of the last three summers.

ii. Future Outlook for Kayaking

Access to the Race Rocks AOI is available to a wide age range of the region's population. Visits to the AOI by kayaking groups is expected to increase in the coming years and increased outreach efforts are required to educate this sector in the regulations and requirements of human activities in the ecological reserve.

3.2.3. Sportfishing

i. Historical and Current Situation Analysis

The waters of South Vancouver Island are regarded as an important sport fishing destination with thousands of anglers seeking Pacific salmon, halibut, lingcod, rockfish and invertebrates such as prawn and crab year round in the vicinity of the AOI. The peak of the salmon-fishing season occurs in the late summer, with halibut as the main target species in the winter months. No official numbers exist on the number of active anglers in the area although the 1999 baseline assessment approximated that the AOI supported 4,320 sport fishing trips annually (Sunderman 2009).

Sportfishing is currently not permitted in the majority of the Race Rocks AOI. A Rockfish Conservation Area (RCA) prohibiting hook and line fishing within the 40m depth contour surrounding Great Race Rock and Rosedale Reef is now in effect. Shellfish harvesting is also prohibited within 800m of Great Race Island. Despite these two bans in place, the AOI provides a geographical and navigational focus point for mariners. It also creates a refuge for resident fish species and their feed, and is believed to act as a seeding ground for the surrounding areas which are frequented by anglers. The Race Rocks AOI also provides an opportunity for anglers to view wildlife, a historical lighthouse and a beautiful setting, thus enhancing the value of their recreational fishing experience.

The local sportfishing community can be divided into two distinct functional groups: the experienced fishers with significant local knowledge and who have actively fished around the AOI (since before the first RCA closure), and the novice fishers who lack practical local knowledge of the fishery or regulations. The first group generally does not enter the Race Rocks AOI unless during sporadic wildlife viewing events. The second group is most active on holiday weekends and often uses the Race Rocks AOI to transit to and from halibut fishing grounds to the South and West of the Ecological Reserve. The majority of vessels fishing illegally in the Race Rocks RCA originate from the Pedder Bay Marina, most of these being rental boats. Those contacted during fishing infractions express an ignorance of their location: "*This* is Race Rocks?", mistakenly think the RCA was defined by physical distance from the islets, or are completely unaware of any protection measures in place. Signage posted on the Rosedale Rock navigational buoy has been proposed to notify novice fishers and boaters of conservation measures. In recent years, non-First Nations fishers have claimed status when questioned by the Eco-Guardian. Currently, there are not enough financial or human

resources available to enforce the bans in place. This on-paper regulation degrades fish stocks in the AOI and may impact surrounding areas.

Lost fishing gear and reckless boating practices have been observed to harm marine mammals in the AOI and have been documented on the Race Rocks website. Enhanced public education programs are thought to be a key feature in reducing the harm that can be caused by human behavior.

Fewer numbers of fishing licenses sold within the province of British Columbia and diminishing availability of major target species, mainly salmon populations have contributed to a declining recreational fishery catch within the past 20 years (Sunderman 2009). Harvests have been declining despite the fact that many fishermen practise catch-and-release. Many recreational fishermen are unaware that catch-and-release fishing yields limited value for Rockfish because of swim-bladder rupture and infection prevalent in Rockfish brought to the surface.

ii. Future Outlook of Sportfishing

The decadal trend in decline in the number of fishing licenses will likely continue due to diminishing fish resources. However, it is hoped that with the Rockfish Conservation Area in place and with continued preservation of the AOI, the surrounding waters will become host to larger populations of fish, thus drawing additional anglers to the region. Furthermore, increased public education initiatives will result in a better stewardship of the Race Rocks AOI by the sportfishing community.

3.2.4. Wildlife Viewing

i. Historical and Current Situation Analysis

Wildlife viewing encompasses a wide range of activities and, as such is difficult to document and classify. It can be formal or informal, guided or unguided and can be a part of other activities. Wildlife viewing occupies a major portion of British Columbia's tourism industry.

Wildlife viewing is the most prevalent human activity currently occurring in the Race Rocks AOI with an estimated 2000-3000 vessel visits each year (personal observation; racerocks.com). The Race Rocks islets serve as a haulout and excellent viewing opportunity for four pinniped species: two Otariidae (eared) and two Phocidae (true) seal species. The *Callorhinus ursinus* (Northern Fur seal) species has not been observed at Race Rocks for more than 20 years. Southern Resident and Transient Killer whale populations are regularly sighted in and around the AOI, and Humpback whale sightings have increased in recent years. The historical Race Rocks lighthouse is also an attraction to the AOI. The Race Rocks AOI is not considered a principal whale watching area, however, it is used when there is a shortage of sightings in other areas. Furthermore, the opportunity to see different species of marine mammals and bird species along with the historical and cultural significance of the area, makes it a popular choice among those engaging in wildlife viewing.

Both commercial operations and informal viewing activities take place, however commercial operations account for the majority of tourist and vessel traffic. Informal viewing follows the seasonal pattern of recreational boating with virtually no activity during the winter months. Commercial operations peak in summer months with up to 50 vessel visits a day, however regular visits are conducted to the Race Rocks AOI throughout the year (personal observation; racerocks.com). The majority of vessels are rigid-hull inflatables with a capacity of twelve passengers and two crew. These vessels are capable of high speeds in order to reach the whales and are able to approach animals at a closer range than larger capacity boats. Vessels are generally crewed by a captain and an on-board naturalist whereas in some boats these duties fall to just one crew member (Murgatroyd 1999). Natural interpretation allows for greater public awareness of the natural world and is a source of public education and is considered a value-added feature of commercial wildlife viewing. The breadth of conservation and stewardship issues that can be introduced to visitors within the AOI are great due to the great concentration of marine life available in a coherent and visually impressive entity. The encounters at Race Rocks can have a significant impact on viewers and can impel them to become involved in the marine conservation movement.

In 1998, whale watchers on the Canadian West Coast generated approximately $14 million in direct revenues and $108 million of total revenues (Fisheries and Oceans 2003b). Victoria has the highest concentration of whale watchers and is believed to generate approximately $12 million for the local economy.

Commercial wildlife viewing has increased in the AOI over the last 10 years. Most commercial eco-tour operations that make use of the AOI belong to the Pacific Whale Watch Association (PWWA), which has developed a set of local whale and wildlife guidelines for Race Rocks. These guidelines are generally less stringent than Fisheries and Oceans Canada's marine mammal viewing guidelines but can serve to reduce the impact of this activity on wildlife in the Race Rocks AOI when followed. No regular aircraft-based wildlife viewing has been noted at Race Rocks.

ii. Future Outlook of Wildlife Viewing Activities

Wildlife viewing activities within the Race Rocks AOI are likely to see an increase in the long term demand as visitors become more aware of environmental opportunities and want to experience wildlife "up close and personal". Although his trend will depend largely on the highly fluctuating tourism market, barring significant changes in the availability of wildlife at Race Rocks, the number of visitors to the area will likely increase.

Additional regulations for the wildlife viewing industry are not thought to be required at this point. However, enforcement of and greater adherence to the guidelines in place are critical in order to continue maintaining the ecosystem with fair and equitable access. As both professional and federal guidelines will be updated to reflect the best scientific knowledge available in sustainable viewing practices for marine mammals, policies such as traffic volume and noise limits or time/place access restriction may come to play a part in future structuring of wildlife viewing activities occurring within the Race Rocks AOI.

An increased capacity of the Race Rocks administration and Race Rocks website will enhance the experience of all involved if cooperation between different user groups continues along current lines. Increased multimedia resource availability for those travelling to the Race Rocks AOI focusing on public education and environmental stewardship is thought to be an ideal next step in promoting these values among those who experience Race Rocks firsthand.

3.2.5. SCUBA diving

i. Historical and Current Situation Analysis

Recreational divers were among the first to realize the uniqueness of the Race Rocks habitat and continue to explore the area's underwater topography and biodiversity. The area is known to have fast currents and thus is frequented only by experienced divers. Dive charters originating from Pedder Bay and Victoria make up the majority of diving-related traffic in the Race Rocks AOI with trips occurring on a weekly basis throughout the year. However, Ogden Point Dive Centre is the only company regularly conducting trips to Race Rocks, visiting the AOI weekly during the entire year, with approximately six to eight clients per trip. Pearson College also brings divers to the AOI, with most diving occurring in October and February. Recreational SCUBA diving is considered a low-impact activity, however gear loss and improper diving techniques can negatively impact sensitive benthic communities. Shellfish poaching by SCUBA divers in the AOI has been reported (Demarchi & Bentley 2003).

The 2009 Socio-Economic Assessment estimated that the demand for diving at the Race Rocks AOI represents $40,000 in direct spending on dive services and another $250,000 indirectly for travel-related purchases per year.

ii. Future Outlook for Scuba Diving

As SCUBA diving is a high risk activity practiced by a low percentage of the population, and given the characteristics of the AOI requiring high skill levels, the frequency of the activity is expected to remain stable in coming years.

3.2.6. Race Rocks Administration:

i. Historical and Current Situation Analysis

All activities at Race Rocks are subject to review and approval by the Race Rocks Operating Committee consisting of BC Parks and Lester B. Pearson College. Currently, the islands of Race Rocks are considered Crown Land belonging to the government of British Columbia. BC Parks administers the island as a Provincial Ecological Reserve. It leases to the Canadian Coast Guard, (a division of the Department of Fisheries and Oceans) the envelope of land surrounding the lighthouse, also including the vertical solar panels and the fog horn. In 1997, BC Parks granted Lester B.Pearson College a 30-year lease to manage the ecological reserve, and all the facilities not leased by the Canadian Coast Guard on the island. The maintenance of all facilities (except those leased to DFO), the provision of a manned presence on the island, and the protection of marine

resources in the AOI have all been undertaken at the expense of Lester B. Pearson College which have been valued at $150,000 per year (Matthews 2001, racerocks.com).

Despite fiscal restraints that limit conservation activities in the AOI, cooperation and support in instances of marine mammal disturbances and illegal fishing violations continue to be an integral part of government participation in protecting Race Rocks. The Department of Fisheries and Oceans (DFO) has also invested in a special notice to boaters and anglers in the vicinity of Race Rocks regarding the regulations that must be followed while in the ecological reserve. In one specific instance since 2008, a Canadian Coast Guard Ship, the CCGS Atlin Post, was available to give support to the Eco-Guardian in stopping a fishing violation in progress occurring in the Rockfish Conservation Area (personal observation, racerocks.com).

A permit is required for any research or commercial activity within the ecological reserve. Great Race Rock has a private-use jetty and can be accessed by permit only or through prior authorization of Lester B. Pearson College. This policy endeavors to minimize human impact on the island and to preserve sensitive natural systems. The staff and students of Lester B. Pearson College, including the resident Eco-Guardians, are available to assist in external projects that contribute to building a wider base of knowledge about the islands. All research, print material, film, video and other products from research activities at Race Rocks will be made freely available to the public via the Race Rocks website and will be available for use in the Pearson College library.

The commitment of volunteers, faculty, staff and students of Pearson College over the last 30 years in assembling the resources of Race Rocks and then making them available on racerocks.com and racerocks.ca is evidence of a wider public value of maintaining the ecological integrity of the reserve, while continuing to share with and educate a global audience.

ii. Future Outlook of Race Rocks Administration

Prohibitive financial and logistical constraints on government agencies leave both federal and provincial ministries unable to fund or otherwise support administrative actions at the Race Rocks AOI under its current status. Despite limited sources of income, Lester B. Pearson College is committed to its mission of reducing human impact in the AOI and on Great Race Rock in particular by barring paying eco-tourists from touring the island. The College is also committed to explore and expand research and educational opportunities on the island. Integral to a future manned-presence in the AOI, the College will continue to demonstrate the use and integration of sustainable resources and renewable energy with the goal to reduce the emissions from operations to an absolute minimum.

3.2.7. Research

i. Historical and Current Situation Analysis

The unique location and characteristics of the Race Rocks AOI has allowed it to be an important site for researchers in past years. Certain types of ecological data has been recorded continually for over 87 years and has resulted in an unbroken chain of data that is of particular significance for

climate analysis and modeling (racerocks.com). The types of research undertaken at Race Rocks AOI aim to contribute to a better understanding of the Salish Sea and what conservation practises are most suitable for marine ecosystems.

Lester B. Pearson College has made its staff and facilities available for on-site research projects, providing a Marine Science Center featuring space for 6 people, a kitchen and basic furnishings for researchers on Great Race Island. Since 1974, Lester B. Pearson College staff and students have been the main researchers at Race Rocks and have worked with a variety of researchers to gather and document scientific information. With the establishment of the Race Rocks website in 1999, off-site researchers have been able to use the AOI for their own research. Streaming data is available online and is continually updated and archived. Historical data and past research projects conducted on Race Rocks are freely available through the racerocks.com website and from the Lester B. Pearson College library. At most times, two remote-controlled cameras can be used to collect qualitative and quantitative data from anywhere in the world with an internet connection.

Research at Race Rocks capitalizes on the islets' location in the Salish Sea, high densities of marine life, and the strong academic and procedural traditions of reducing human impacts, increasing public awareness and environmental monitoring. Prominent fields of research include Energy Systems, Conservation Issues, and Pure Discovery.

Some of the research includes:

- Oceanographic data for temperature (daily since 1923) and salinity (daily since 1934)
- AXYS Wind Assessment technology (2010) measuring offshore wind energy through an offshore buoy designed to record wind speed and direction data profiles up to 200 meters elevation
- Surface water temperature and salinity data gathered at Race Rocks between 1948 and 1957
- Inter-tidal and sub-tidal flora and fauna study for the proposed national marine park in Juan de Fuca Strait (Goddard, 1975).
- The Institute of Ocean Sciences (IOS), had a number of research vessels in the Race Rocks area between 1951 and 1982.
- A study of effects of human-caused disturbances on marine birds and pinnipeds at Race Rocks (Demarchi & Bentley 2003).
- A master's thesis on the public process and the Creation of a Marine Protected Area at Race Rocks (LeRoy 2002).
- Race Rocks Digital Herbarium (Murphy 2002a) and The epiphytic community of *Pterygophora californica*: Race Rocks MPA. (Murphy 2002b).
- Alberto Lindner's visit to Race Rocks in 2002 as part of his study into the systematic evolution of the hydrocoral populations.
- Canadian Hydrographic Service work on multi-beam sonar research in 1999.
- Race Rocks sea bed imaging and mapping survey undertaken by Coastal and Ocean Research Inc. in 1999.
- Scott Wallace's research in 1997 and 1998 of the population dynamics of the Northern Abalone.

• The study Seasonality of Hydroids from an intertidal pool and adjacent subtidal habitats at Race Rocks (Brinckmann-Voss 1996)
• The study *Rhysia fletcheri* (Cnidaria, Hydrozoa, Rhysiidae), a new species of Colonial Hydroid from Vancouver Island (Brinckmann-Voss 1993).

More research has been conducted by students of Lester B. Pearson as part of their coursework and is on file with BC Parks.

ii. Future Outlook of Research at Race Rocks

In the past few years, research at Race Rocks has been conducted mostly by Lester B. Pearson College staff and students as part of their International Baccalaureate programs. Once strong research partnerships with institutions such as the University of Victoria has dwindled, thus the majority of outside research is now attracted by Pearson College. It is hoped that a future MPA status and increased DFO support will help to fill the many knowledge gaps on the system of the AOI, will enhance ongoing projects and will attract more research activity.

3.2.8. Education and Outreach

Lester B. Pearson College is an educational institution with students from 85 countries, each attending on full scholarship. The Race Rocks Ecological Reserve is managed by the Race Rocks Operating Committee but has been granted a 30-year lease by BC Parks for operational and programming purposes. The students at Pearson College are involved at Race Rocks through their science classes as well as activities such as scuba diving and by completing a 48-Hour curriculum that highlights environmental stewardship, conservation and education.

Visits by external educational institutions such as elementary and high schools were a part of the Race Rocks agenda in the past. However, such visits are now discouraged in an effort to reduce the human impact on the islands and have been replaced by the low-impact web-casting. Increased technology capacity has meant that more curriculum has been developed for remote students to use the cameras and data in place without impacting the Race Rocks environment.

The racerocks.com website is devoted to increasing educational resources available for students, researchers and educators around the world, while concomitantly limiting environmental impact on the main island. The Race Rocks website is also a place that preserves cultural and historical knowledge of the area, people and historical events surrounding the lighthouse and its keepers as well as traditional practices of the indigenous communities with prehistorical connections to Race Rocks. For example, several interviews were conducted with Earle Claxton, councillor of the Tsawout First Nations, in which he shares Coast Salish cultural knowledge of Race Rocks and its marine resources are now available in perpetuity.

Pearson College has found the website tool has many educational applications including:

- The Jason Program Activity Files on Race Rocks;
- The Apple Learning Interchange Files;
- The Race Rocks Taxonomy Page;
- The Adopt an Ecosystem Project;
- Race Rocks as a Resource for Statistics exercise;
- Links to Race Rocks for the BC Grade 11 Curriculum;
- IB Biology and Environmental Systems Ecology Resource;
- The Animal Behaviour studies; and,
- The Ecological Niche and the Transect File.

Outreach programs consist of public service announcements concerning the hazards of misappropriate use of Race Rocks resources and illegal and/or harmful behavior that may take place. The website is the primary point of contact for these programs, however contacting the media when large-scale, immediate appeals are necessary (i.e. marine pollution entangling marine mammals). Lester B. Pearson College is also committed to working with local First Nations to disseminate cultural knowledge regarding conservation practices.

ii. Future Outlook of Education and Outreach

Lester B. Pearson College is committed to continuing its support of innovative educational and research opportunities. It hopes to secure funding for operational costs ensuring Race Rocks activities can continue at present levels. However, management capacity is limited with financial constraints that have already reduced college operations. For the first time in its 37 years of existence, the College has had to reduce enrollment in order to maintain its full scholarship merit-based acceptance policy. It is hoped that MPA status would contribute to greater public awareness and understanding of human impacts and work at Race Rocks and attract more resources for the protection of this and connected ecosystem. Expansion of public outreach programs are planned with increased technological resources and development of a network of environmentally-conscious and informed students, researchers and public able to generate online content. Off-site educational centers such as the Shaw Discovery Centre will benefit directly from technological advances better enabling personnel at Race Rocks to share their experiences more widely through the use of available media. An increased role of wildlife viewing commercial operations through better-trained operators and interpreters will be an effective way to increase public understanding of the conservation issues that face Race Rocks.

4. VALUES AT RISK ANALYSIS

4.1 User Conflicts

4.1.1. Department of National Defense

The Department of National Defense (DND) makes year-round use of Military Training Area WQ (Whiskey Quebec), which encompasses the majority of the Race Rocks AOI (see Figure 4.3). Additional training areas to the south and east of the Race Rocks AOI also create marine traffic around and air traffic above and around the ecological reserve. Nearby Whirl Bay is designated an Underwater Demolition Range.

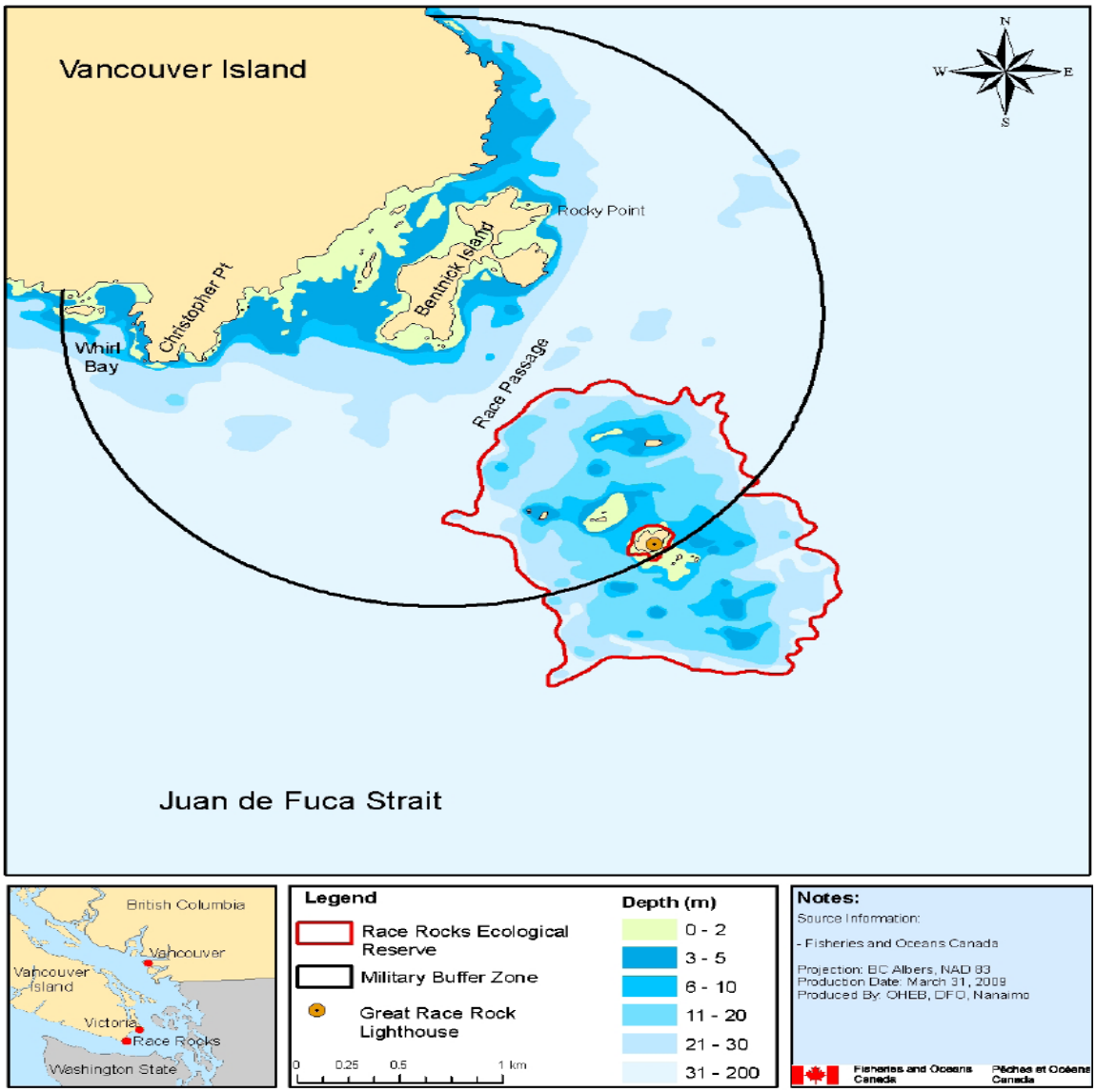

Figure 4.1: Military Training Area WQ and the Race Rocks Ecological Reserve (source Fisheries and Oceans Canada).

The most frequent DND activities impacting the Race Rocks AOI are the burning and detonation of munitions and the explosives training for military personnel (together referred to as 'blasting'). Bentinck Island, the closest point of land to the Race Rocks AOI, holds several Propellant Burning Areas (PBAs) and High Energy Open Detonation Areas used by CFAD Rocky Point. A 2000

environmental assessment showed activities in PBAs such as burning of gun propellants was a dirty process and action was required to reduce heavy metal and nitroglycerine contamination occurring at this site (Ampleman *et al.* 2000). This Defense R&D Canada assessment stated that the climactic conditions at CFAD Rocky Point created incomplete combustion of explosives and increased ground infiltration of contaminants such as nitroglycerin. Thus, the inappropriateness CFAD as a blasting site is not only an environmental concern, but has been a safety concern as well (Ampleman *et al.* 2000). Aside from environmental contamination, noise pollution from blasting—with up to 12 high-order detonations per day—is viewed as the most significant and detrimental human impact on the marine resources in the Race Rocks AOI (racerocks.com). All respondents to this study indicated their concern of the impact of blasting on the fish and wildlife at Race Rocks and the surrounding area, and DND has responded with on-going environmental assessments by LGL Ltd. Environmental Research Associates during some blasting exercises. In addition, the shock waves from blasting has caused items to fall off walls and shelves in the buildings on Great Race Rock, and have caused boaters and vessel operators to fear they have run aground (note the lighthouse in Figure 4.2). The wildlife viewing community also reports blasting activity causes fear and displeasure for tourists, often contradicting their stewardship messages. Use of the Rocky Point and Bentinck Island demolition sites presents a safety concern for boaters in and around the Race Rocks AOI, so a Military Buffer Zone is established during blasting operations. This buffer zone restricts both commercial and recreational traffic through Race Passage and diverts additional traffic into and around the Race Rocks AOI. Blasting activities have remained relatively constant since 2004, however designated blasting areas have been lined with sand to absorb explosive shock waves and blasting patterns have changed with five-minute intervals between blasts introduced in an effort to minimize impact on wildlife. DND reports mitigation efforts to avoid blasting when whales are present, however blasting at Rocky Point on October 2010 while orca whales were within Military Training Area WQ was observed to coincide with a change in the whales' direction of travel, away from the Race Rocks AOI.

Figure 4.2: High Energy Open Detonation Area at CFAD Rocky Point (from Ampleman *et al.* 2000).

Low-altitude overflights by DND aircraft (both Navy helicopters and Air Force fighter jets) over the Race Rocks Ecological Reserve increased significantly in 2010 (see Figure 4.3) (racerocks.com). Other community stakeholders question the necessity of these activities over the Race Rocks AOI, particularly as these loud disturbances impact hauled out sea lions (*E. jubatus* and *Z. californianus*) and seals (*Phoca vitulina*), as well as sensitive populations of seabirds including Brandt's and Pelagic cormorants (*Phalacrocorax penicillatus* and *Phalacrocorax pelagicus*).

Underwater demolitions do not occur in the Race Rocks AOI, however ordinance tests using 0.5-10 kg of C4 plastique do occur at Whirl Bay (northwest of the AOI) (Demarchi & Bentley 2003). Taken together, these highly visible and disruptive activities impact both the Race Rocks ecosystem and other socioeconomic activities that occur in and around the AOI. Respondents from the recreational boating, sportfishing and educational communities perceive DND's activities to be a poor example of federal stewardship and inappropriate management of British Columbia's coastal resources.

Figure 4.3: A Canadian Forces helicopter is seen flying low over Great Race Rock. Note the main residence's eave in the top-left of the image.

4.1.2. Wildlife viewing

Boat-based wildlife viewing brings the vast majority of in-person visitors to the Race Rocks AOI. Professional and federal standards for wildlife viewing guide vessel operators to minimize their impact on the wildlife and ecosystem in general. However, individual operators often ignore professional standards of conduct established by the PWWA specifically for operation at Race Rocks. In some cases, PWWA guidelines are less stringent than stated regulations for the Race Rocks ecological reserve or DFO's guidelines for viewing marine mammals. In both cases, guidelines have been developed in conjunction with consultations with wildlife biologists, eco-tour operators, and business leaders with the newest and best science available to ensure the safety and well being of marine mammals. Major areas of conflict include:

1. In 2009, DFO requested that boaters slow to 7 knots or less within 400m of the rocks surrounding Great Race Rock and Rosedale Rock. PWWA guidelines hold that vessels slow their approach to minimal wake and wash "when practical" at 220 yards from any rock or

landmass in the AOI. Most operators follow the PWWA guidelines on approach to the Race Rocks area, however fewer find it practical to restrict speed when exiting the reserve.

2. The 2009 DFO notice also requested that boaters not approach any marine mammal closer than 100m, including those on the rocks. PWWA guidelines hold no such restriction on distance from viewing marine mammals. Operators from all companies operating in the AOI regularly approach marine mammals in the water and on the rocks as close as 20m. Instances of vessel operators pursuing sea lions in the water and driving through rafts of sea lions have been observed and reported. Approaches closer than 100m have caused stampedes of sea lions from their haul outs on Middle (Helicopter) Rocks, Great Race Rock, and South-East Rocks.
3. PWWA guidelines have designated a "Go Slow Zone" where vessels are to remain as close as practicable to the middle of channels between the islets of the Race Rocks AOI. Operators routinely favour routes that optimize wildlife viewing opportunities, significantly deviating from the mid-channel lines between North Rock, West Rocks, and Middle Rocks. Since 2008, large enough deviations such that operators drive through kelp beds have been noted.
4. Drift viewing is a recommended form of non-disruptive wildlife viewing in the Race Rocks AOI. PWWA guidelines state "vessels will transit the area with the current whenever conditions are suitable to do so". Most operators choose to transit the area based upon their approach of the AOI, not the direction of the current. Some operators choose to make multiple passes of the same channel, motoring against the current up to 5 times in a single visit.
5. Engine noise from vessels in and around the Race Rocks AOI is believed to affect sea lion behaviour in the water. SCUBA divers note a change in behaviour and a relocation of Steller and California sea lions in the water when engine noise is present.

4.1.3. Ecological Reserve Management

Pearson College has attracted tens of thousands of online visitors to the Race Rocks AOI through the racerocks.com website, and brings ~100 marine science and biology students to Great Race Rock each year. Despite hosting student scholars from a wide range of socioeconomic and cultural backgrounds, Pearson College is sometimes viewed by the general public as a private school for kids of privilege. This perceived exclusivity and the College's unique access to the Ecological Reserve has fostered resentment and antipathy in some individuals from wildlife viewing, recreational boating, and sportfishing communities. Keeping a manned-presence on Great Race Rock presents both current and potential problems in the AOI. Boat traffic that brings personnel, supplies, and students to and from Race Rocks can disturb foraging seabirds, and is the most disruptive human activity for sea lions hauled out on the jetty area (August-October). Furthermore, an area of kelp in front of the jetty (~5m x 5m) is removed each year to facilitate operational boat traffic. The facilities on Great Race Rock are currently powered by a combination of solar and diesel power. Since taking on administrative and operational responsibilities at Race Rocks in 1997, the College has reduced diesel requirements by 80%. However, one 10,000 L diesel tank is currently in use and another scheduled for removal. All community stakeholders have identified fuel/oil spills as a pressing concern for the Race Rocks AOI.

4.1.4. Canadian Coast Guard

Canadian Coast Guard helicopters and zodiacs make periodic visits to Great Race Rock to perform maintenance on the navigational aids located there. While low-altitude overflights can disturb marine mammals and seabirds, a CCG helicopter landing on Great Race Rock in February 2010 did not interrupt Elephant seal (*Mirounga angustirostris*) coitus less than 100m away. Helicopter landings during the seabird-nesting season (June-September) have been discouraged, as in the past these disruptions have led to mass mortalities in Glaucous-winged Gulls (*Larus glaucescens*).

4.2 Potential impacts of MPA designation

Marine Protected Areas are fast becoming a mainstream management tool for conserving marine biodiversity in the World's Oceans and is one of the highest levels of protection given to marine ecosystems in Canada. Marine ecosystems of British Columbia occupy a complex jurisdictional space because of the division of federal and provincial powers, such that cooperation between both levels of government and consideration of First Nation aboriginal and treaty rights are required for ecosystem-level conservation efforts. In 1998, Canada's Minister of Fisheries and Oceans announced that Race Rocks was earmarked to become one of Canada's first MPAs under the *Oceans Act*. The regulatory intent has been to consult and collaborate with First Nations, community stakeholders and the general public to create a no-take Race Rocks MPA that would be part of a national system of MPAs. Consensus processes have been employed to empower local users and allow for more equitable sharing of benefits, a level of community involvement widely held as fundamental in the successful creation of an MPA (Kelleher 1999). True to its origins in adaptive management, the Race Rocks MPA designation process has struggled with scientific uncertainties and differences of opinion, however it is hoped that other conservation efforts can learn from its application and that management strategies can be adjusted as needed.

Race Rocks fits all four criteria of the 1996 *Oceans Act* mandate to protect and conserve:

1. Commercial and non-commercial fishery resources, including marine mammals and their habitats.
2. Endangered or threatened marine species and their habitats.
3. Unique habitats.
4. Marine areas of high biodiversity or biological productivity (Oceans Act 1996, p.s. 35(2)).

In spite of Race Rocks' natural fit to these MPA criteria, MPA implementation is not just a conservation problem. Political and social opposition to MPA designation can stem from real or perceived financial losses associated with potential use exclusions (Sawyer 2009). DFO's responsibility to manage marine resources requires concomitant management of socioeconomic activity, and in the case for Race Rocks there is a very small geographic area impacted by increasing concentrations of human activity. Human use of natural areas, both for social and economic purposes, contributes to ecosystem degradation and adversely impacts conservation success, and it is paramount that stakeholders and the general community understand the economic trade-offs associated with conservation policies. At Race Rocks, DFO is tasked with both understanding how

shifting patterns of human use impact the marine resources in the AOI and designing an effective, flexible management strategy that will make this MPA an effective vehicle for promoting long-term conservation and sustainable use practices.

In a MPA designation scenario, DFO scientists and resource managers make management decisions that take into account best available science, socioeconomic considerations and the results of consultation. A Regulatory Impact Analysis Statement (RIAS) for the proposed MPA will include a qualitative cost-benefit analysis that provides supporting information for the MPA Regulations. The RIAS also provides background and intent behind the Regulations. In practice, systematic testing of assumptions and adaptive application of diverse MPA management strategies are critical for successful MPAs to meet their conservation objectives and improve resource management. The proceeding text summarizes feedback received from community stakeholders and the Race Rocks Public Advisory Board and is designed to aid impact analyses in finding non zero-sum solutions for environmental issues in the Race Rocks AOI.

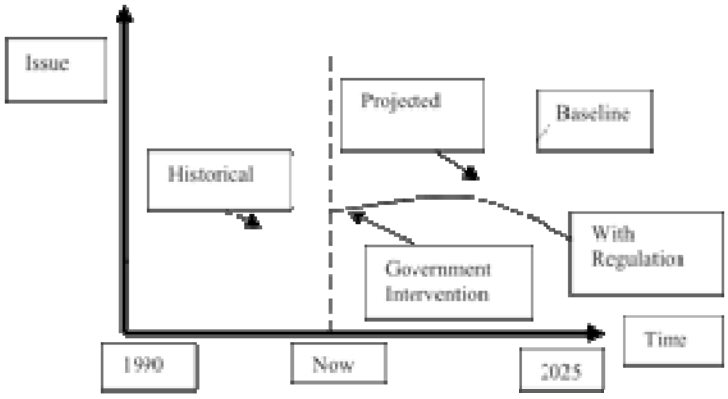

Figure 4.4: Comparison Between the Baseline and "With Regulation" Scenarios

Community stakeholders that claim all or part of the Race Rocks AOI represent a wide range of interests and involvement, yet most are united in recognizing the broad applicability of MPAs to conserving marine ecosystems in British Columbia. With this spirit of cooperation then, it is somewhat paradoxical that conservationists are among those that hesitate in employing an MPA at Race Rocks. It became apparent from discussions conducted for this study that this hesitation stemmed from the empirically unsubstantiated of Canada's MPA management strategy in general and lack of conservation objectives for the Race Rocks AOI in particular. Truly, prescription of overly simplistic solutions to complex marine conservation problems without a firm understanding of both ecological and socioeconomic conservation science risks polarization of stakeholders and threatens real progress made in marine conservation. At this point, knowledge gaps in our understanding of the Race Rocks conservation problem present significant difficulties for effective management and meaningful policy decisions. It is with this precaution that DFO's integral task in

MPA management of increasing understanding of the Race Rocks ecosystem becomes both a tangible and highly-desirable benefit of MPA designation.

Generally, MPAs are believed to be the right choice for conserving Canadian marine ecosystems when there is minimal conflict with treaty claims and the candidate site is secure from uncontrollable threats that limit their potential effectiveness. The most significant threat that faces the Race Rocks ecosystem is a catastrophic ecological disaster caused by an oil or other hazardous material spill in or near the Juan de Fuca Strait. All respondents identified the shipping of oil and hazardous materials in the Juan de Fuca Strait as a primary conservation concern and it is hoped that with MPA designation for Race Rocks, DFO will maximize regulatory protection from this type of disaster to the fullest extent of Canadian Law. Another concern associated with commercial shipping in the Juan de Fuca Strait is the pollution and invasive species threats presented by bilge and ballast water dumping and exchange. Bilge and ballast waters can act as incubators for microbial life, and are responsible for transporting foreign species and human disease across the globe (WHO 2003). Water quality is the principal ecosystem component valued in the Race Rocks AOI, and a monitoring programme is required to meet dependent conservation objectives. The existing daily seawater-monitoring programme at Race Rocks performed by the on-site Eco-Guardian is not sufficient to detect or evaluate invasive biological threats to water quality in the AOI.

A key impact desired from MPA designation is the protected area's contribution to economic and social welfare (UNEP 1995). Positive harvesting spillovers into adjacent areas are often cited as a way that MPAs increase environmental value and social benefits (Grafton *et al.* 2009). Both management and community stakeholders believe MPA designation will have a positive impact on Rockfish and other recreational fish stocks in the area. Unfortunately, with no baseline data from the Race Rocks AOI and a history of protection as an Ecological Reserve and Rockfish Conservation Area, little if any accrued positive harvesting spillover will be attributable to the costs of MPA designation for Race Rocks. Along similar lines, protection of the Northern abalone population, marine mammals, and seabirds in the Race Rocks AOI is highly valued by community stakeholders. Degradation of these populations and/or a reduction in their use of the AOI would create serious conservation, social, and economic problems, however it remains undetermined what impact invasive species such as River otters (*Lutra canadensis*) and non-migratory Canada geese (*Branta canadensis*) are having on the Race Rocks ecosystem. Filling knowledge gaps with an aim of optimizing ecological value are critical to meaningful habitat stewardship, and are time-sensitive for such matters as Northern abalone recovery efforts (Fisheries and Oceans Canada 2007).

The Race Rocks AOI has become a significant destination for coastal tourism and recreation, including wildlife viewing, SCUBA diving, sportfishing, and recreational boating, such that a manned presence (presently a staff of Eco-Guardians) has become increasingly important to monitor and protect the Race Rocks ecosystem (Murgatroyd 1999). Significant efforts have been made by Pearson College to increase capacity of distance technology in—and no-impact access to—the AOI, however these valuable educational and monitoring tools require on-site maintenance and operation. Attracting sufficient donations to supervise the ecological reserve, supply educational

resources, and maintain the infrastructure and personnel on Race Rocks has been a major challenge every year for Pearson College, but particularly so in the current economic climate. The College is in the process of temporarily withdrawing 40 of its 200 full-scholarship positions due to budgetary restraints; this will make it even more challenging for the college to fully protect the Race Rocks ecosystem and maintain current levels of programming without additional support in the years to come (Matthews 2001; Blondeau 2010). As the College's current management mandate is to observe and report infractions, the resources of the Race Rocks AOI continue to be illegally harvested and degraded for private benefit (Demarchi & Bentley 2003). Ecological Reserve and MPA designation is intended to protect ecosystem structure, function and integrity, however only through increased monitoring and enforcement can management succeed in creating more desirable population structures of Rockfish (Grafton & Kompas 2009), reduce the probability of extirpation of the Northern abalone (Wallace 1999), and increase the aesthetic and recreational values of the Race Rocks resource for SCUBA divers and wildlife tours (Lloret *et al.* 2006).

Federal and provincial guidelines currently regulate commercial and recreational boating traffic in the Race Rocks AOI, however low compliance rates are an acknowledged conservation problem affecting seabird foraging and marine mammals. Regional consultations concerning the marine mammal viewing industry found a large majority of respondents supported implementation of additional regulations, however the effectiveness of these regulations was questioned because of the inherent problems of enforcement/monitoring and businesses' lack of control of their operators (Fisheries and Oceans Canada 2003). Wildlife viewing sector respondents indicated that any increase in compliance costs from additional MPA regulations would make their businesses interests in the Race Rocks AOI untenable, however a Cost Benefit Analysis will not support a regulatory decision if it imposes excessive burdens on Canadian business (Sawyer 2009). Some respondents outside of the wildlife-viewing sector also replied that additional restrictions on boating traffic would be inappropriate, rather increased enforcement and compliance with existing PWWA and DFO guidelines were a more appropriate MPA management strategy, particularly in light of difficulties wildlife-viewing companies may have in controlling individual operators. Impacts of boating traffic on nesting seabirds in the Race Rocks AOI such as the Pigeon guillemot (*Cepphus columba*) have received very little research or management attention. However, research on the related Black guillemot (*Cepphus grylle*) in New Brunswick indicates that speed limits already in place for the Race Rocks Ecological Reserve act to reduce disturbance rates. It is currently unknown what impact foraging disturbances by boating traffic are having on seabird nesting success. As with Harbour seal *(Phoca vitulina*) nursery areas, flexible management tools including seasonal avoidance of sensitive areas or additional distance afforded feeding organisms can be successfully employed in the AOI.

Finally, conservationists look to DFO to be a champion for Race Rocks at the federal level. Perhaps nowhere else in Canada are the conflicting interests of two federal agencies more apparent than on the two sides of Race Passage. At Race Rocks, DFO may not only demonstrate a contrasting, estimable example of federal stewardship of British Columbia's coastal resources but showcase the Canadian government's ability to enact positive change as well. Canadian citizens expect to demonstrate excellence on the world stage, and it is hoped that DFO will encourage and facilitate

best practises at CFAD Rocky Point to eliminate the negative impact DND activities have on the Race Rocks AOI and surrounding waters.

4.3 Sustainable Development

MPA designation is not a panacea for all the conservation problems facing the Race Rocks ecosystem. No management strategy or regulation enforcement can protect the waters in the Race Rocks AOI from ocean acidification or from global climate change. Furthermore, the scarcity of society's unallocated financial resources is such that MPA conservation objectives will be designed for cost-effective measures of conservation success. What MPA designation for Race Rocks can do is to showcase on a national and international level a holistic approach to environmental stewardship that includes green energy and energy efficiency measures, water conservation methods, waste management, ecological restoration projects, and joint-stewardship practises.

The Integrated Energy Project overseen by Pearson College is responsible for a significant reduction in energy costs and carbon emissions in the AOI. Operation of the facilities on Great Race Rock has moved from 100% dependence on diesel generators in 1997 to 100% reliance on solar energy during the first week of October in 2010. Energy efficiency measures including LED bulbs, propane stoves and water heaters, and insulated windows have also reduced energy demands of management activities. The tidal turbine pilot project has demonstrated the benefits and challenges of tidal energy, while the College looks to incorporate wind energy to further offset fuel demand and carbon release to the atmosphere. The significant operational cost savings of these alternate energy projects are particularly valuable for the continued manned-presence required at Race Rocks.

There are no sources of fresh water in the Race Rocks AOI, so seawater must be desalinated by energetically expensive reverse osmosis. Besides drinking water and water for household use, the Energy Centre's lead-acid storage batteries require continual additions of deionized water, buildings' windows and walls require frequent washing to clean away salt deposits and alga growth, and most of the island's solar panels require weekly washing and pressure washing to remove guano that reduce the effectiveness of the photovoltaic cells. All aspects of island life and operation from personal hygiene to battery chemistry attempt to best conserve water. Additional infrastructure is also being purchased as funds permit to recapture grey water and harness usable water from fog.

An overarching aim of Pearson College in managing the Race Rocks Ecological Reserve has been to minimize the ecological impact of the human presence on Great Race Rock. Waste management on Great Race Rock has evolved from raw sewage entering the ocean at two locations to composting toilets and a portable septic system that sees human waste transported out of the AOI and put through a sewage treatment system. Household waste, recyclable materials, and oil wastes are sorted and transported to Pearson College for proper disposal and re-use.

Habitat stewardship initiatives are another example of sustainable development of the Race Rocks AOI. The Ecological Restoration Project began in 1997 with the removal of excess concrete paths and a tank farm on Great Race Rock. This work was designed and performed such that environmental impacts on sensitive populations were minimized. Since the College began management of the ecological reserve, the timing and patterns of animal use have observed to change. For example, Elephant seals began to use Great Race Rock as a breeding colony in 2009 and their only access to the pupping grounds is via the light station boat's slipway. Efforts began in 2010 to minimize human interference with Elephant seal access to the island. Stewardship of Race Rocks by the College holds that adaptive management is key to sustainable development and continued use of the marine ecosystem.

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