BC's Bountiful Sea

Heritage Worth Preserving

David Suzuki Foundation

SOLUTIONS ARE IN OUR NATURE

Sierra Club BC

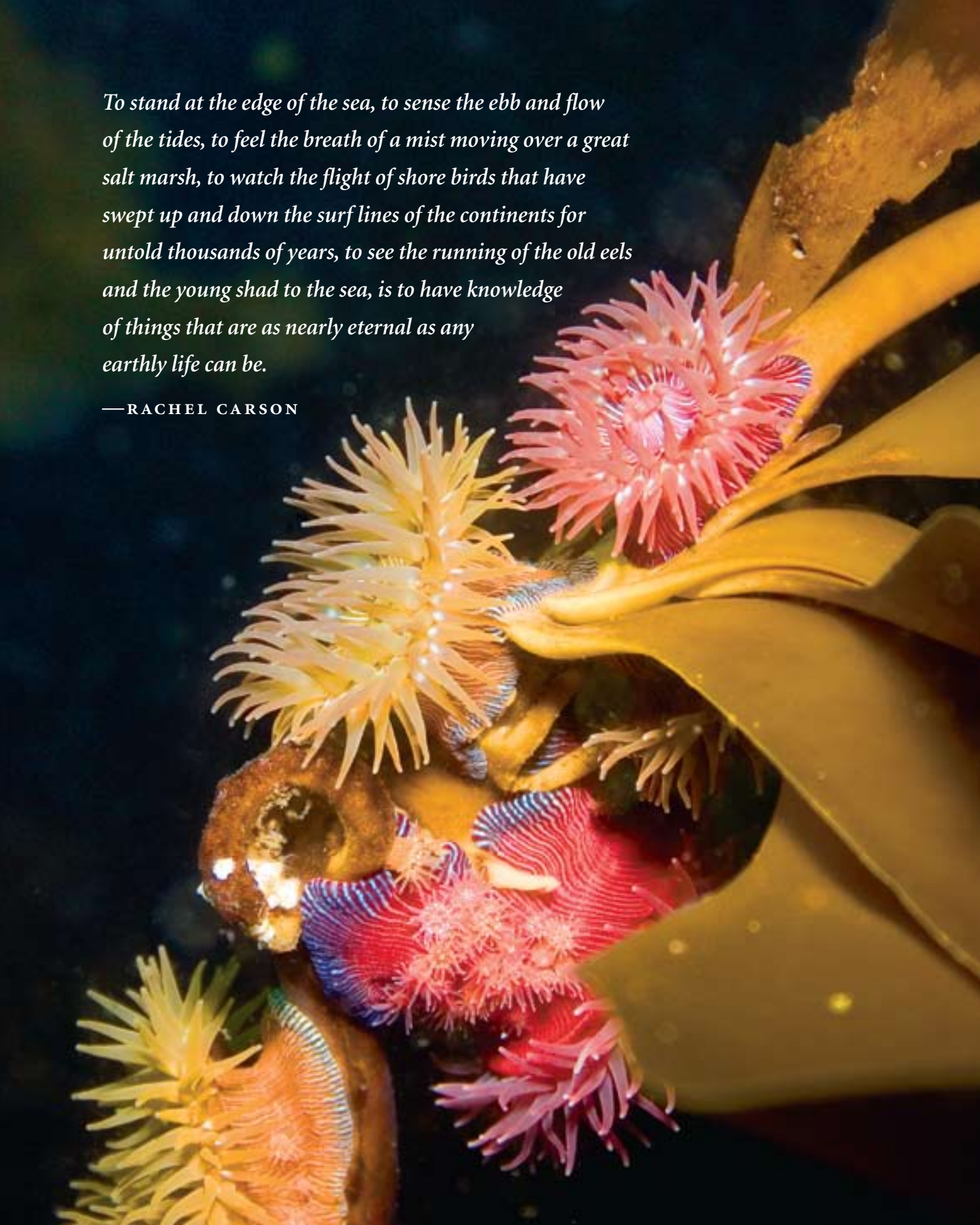
Living Oceans Society

Healthy Oceans. Healthy Communities.

CPAWS

Canadian Parks and Wilderness Society

British Columbia Chapter



To stand at the edge of the sea, to sense the ebb and flow of the tides, to feel the breath of a mist moving over a great salt marsh, to watch the flight of shore birds that have swept up and down the surf lines of the continents for untold thousands of years, to see the running of the old eels and the young shad to the sea, is to have knowledge of things that are as nearly eternal as any earthly life can be.

—RACHEL CARSON

Introduction

British Columbia's central and north coast marine environments teem with life and offer up adventure and opportunity. Few places in the world's oceans have the abundance and diversity of marine life that we have here in our own backyard.

Our rich ocean heritage ranges from tide pools rich with captivating critters to . . .

underwater gardens that paint the sea floor to . . .

schools of fish and pods of porpoises, dolphins, and whales that fill the vast ocean with life to . . .

art, culture, and recreation inspired by the sea to . . .

the generations of fishermen that are as much as part of the ecosystem as the fish themselves.

Photos, from top: Jodi Stark; John Rix; Chantelle Tucker; Dave Evtaets; Hussain Isa Aldurazi
Inside front cover: John Rix

The Canadian government has named this region the Pacific North Coast Integrated Management Area, or PNCIMA (pronounced pen-see-ma). The area is one of five large ocean regions selected by the federal government to undergo a planning process to improve management and ensure long-term ecosystem health.[1] Integrated planning is based on managing our activities in a way that adequately reflects the interconnectedness of the ocean environment.

The people who live, work, and play on this coast are full of stories about whales, salmon, and kelp forests, making every boat trip in the region an adventure. When a humpback whale surfaces near a boat of tourists or a visiting fisherman lands a chinook salmon so big it earns the nickname "smiley", it is difficult to fathom the intricate and dynamic world beneath the surface that creates and sustains these magnificent animals. And yet it is this underwater world that must be conserved if coastal residents and visitors are to reap the benefits this ocean provides.

Increasing industrialization is threatening the wildlife, natural spaces, and the very health of ocean ecosystems. PNCIMA is one of the few ocean environments in the world that still offers such an abundance of richness and opportunity.

The opportunity, and our challenge, lies in the potential to ensure the continual productivity and health of this region by developing a comprehensive management and conservation plan that considers the interests of all the people, animals, and plants that share our ocean resources.

The opportunity is before us. The challenge is ours.
Let's start unravelling some of PNCIMA's mystery by exploring its natural wonder . . .

These barnacles, corals, and sponges fill PNCIMA's ocean floor with colour and mystery.
Photo: John Rix

PNCIMA covers 88,000 square kilometres, a truly expansive and complex ocean space.[2] It is similar in size to the Great Bear Rainforest, its spectacular land-based neighbour. The region includes the areas commonly known as the Queen Charlotte Basin, Hecate Strait, Central Coast, and northern Vancouver Island.

Bounty of the Sea

From the beaches to the greatest ocean depths, from microscopic creatures to the world's biggest animals, and from the life undersea to the things we can see, this ocean region supports a richness, abundance, and diversity of life that is truly spectacular.

The combination of complex oceanographic conditions and seafloor characteristics in this region, with its channels, banks, deep troughs, eddies, upwellings, estuaries, and depths ranging from zero to over 2,000 metres, creates a wide range of ecological niches and in turn supports a diverse array of species.[3]

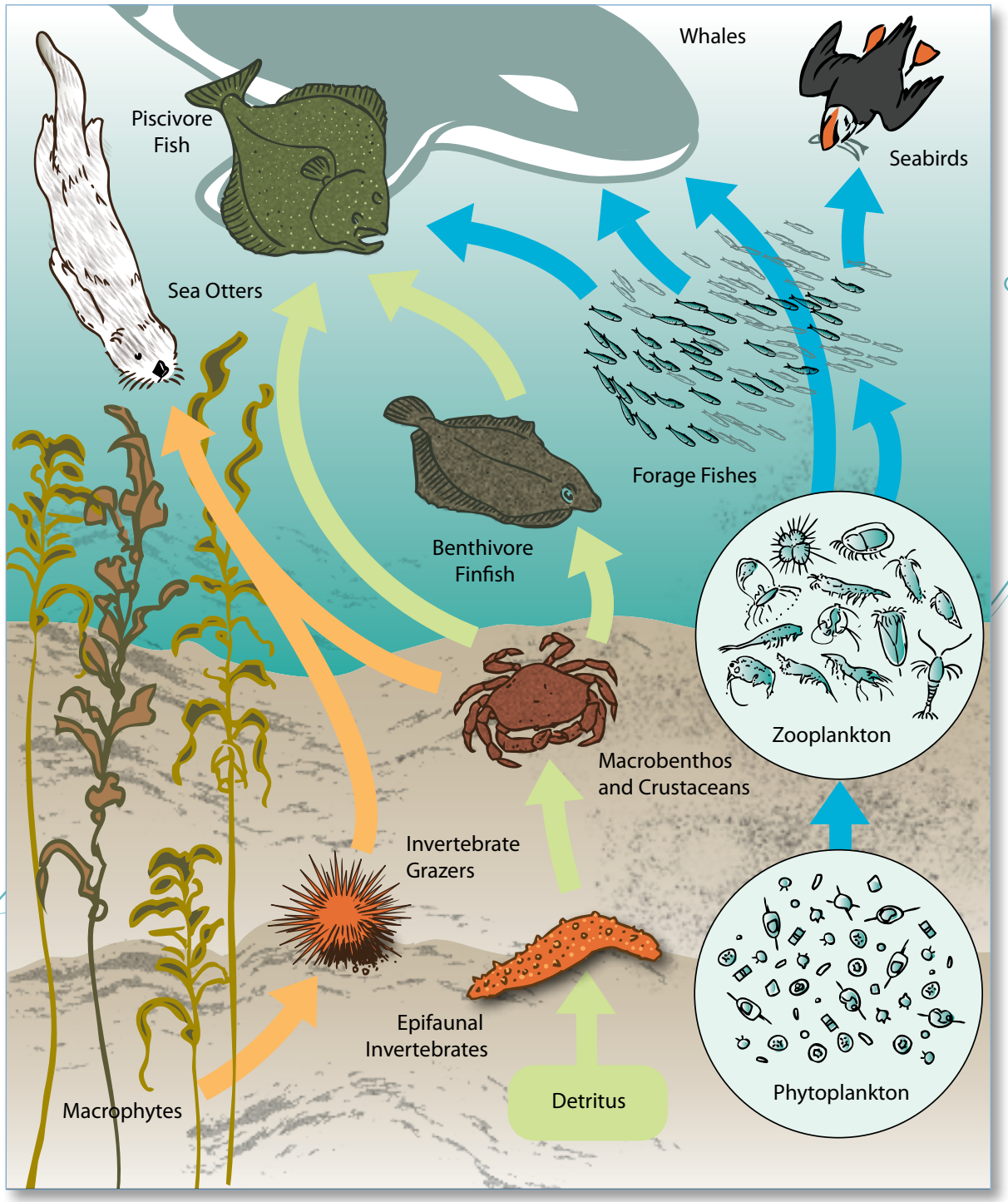
Rainforests of the sea

Often referred to as "rainforests of the sea", dense, towering underwater kelp forests provide food, shelter, oxygen, and nursery environments for a variety of sea creatures.

Kelp is one of the fastest-growing plants in the world. Giant kelp on the B.C. coast can grow more than 30 centimetres in a day! The numerous bays, shores, and current-swept passages within the area are lined with these productive underwater forests.[4]

Sea otters eat sea urchins. Sea urchins eat kelp. Kelp is the home of many sea creatures. So what happened to kelp forests when sea otters were hunted almost to extinction for their fur around the turn of the 20th century? Urchins ate the kelp forests and destroyed the homes of many other animals. Since everything is connected, it makes sense to manage the area accordingly and to protect what is needed to keep the entire system healthy.

Photo: Will Chen



The region's smallest animals, zooplankton, are the food source for the largest, baleen whales. No matter the size or abundance of the plants and animals in PNCIMA, all are connected in an intricate food web.

Illustration adapted by Soren Henrich from food web schematic in: Ecosystem overview: Pacific North Coast Integrated Management Area[5]

Corals provide homes, nurseries, and feeding areas for many commercially important young fish and invertebrates such as crab and shrimp. When corals are damaged, juvenile fish and shellfish lose the special areas they need for protection, feeding, and growing. To ensure that we can continue to fish our oceans for many generations, protecting these corals is . . . well . . . the logical thing to do.

Underwater gardens

From the surface, the ocean often looks like little more than an endless blue expanse. But an incredible rainbow of life lies below. Many parts of the seafloor off the B.C. coast are painted purple, orange, yellow, and pink by cold-water corals and the intriguing organisms that live among them. There are hard and soft corals such as sea whips, plumose anemones, and corals shaped like the antlers of a stag or a large brain. These coral "gardens" create underwater homes where other marine animals can hide, reproduce, feed, and grow.

Sixty-one species of corals have been identified in B.C.'s marine environments.[6]
Photo: Dale Sanders

Ancient sponge reefs made out of glass

PNCIMA has a truly fascinating and globally unique biological phenomenon below its surface. Sponge reefs, made out of tiny glass spicules (needlelike skeletal elements), were thought to have gone extinct during the Cretaceous period. But reefs were discovered in PNCIMA's Hecate Strait in 1987. These living fossils exist in only a few other places on the West Coast of North America, and the largest specimens live in PNCIMA. These living reefs are 9,000 years old and take the shape of large mounds, some of which have grown to the height of a five-storey building (18 metres) and cover about 1,000 square kilometres.

Sponge reefs provide structure, habitat, and nurseries for many species, including rockfish, which are 10 times more abundant in the sponge reefs than in nearby areas.[7]
Photo: Dr. Manfred Krautter

Something's fishy

A happy fisherman weighs his halibut catch of the day at 153 pounds (about 70 kilograms).

A description of ocean life in PNCIMA would be incomplete without the fish. Fish in the region vary in form, size, and life history. Among the many fascinating examples are tiny sandlance, which burrow into the sand to protect themselves from predators; herring whose schools can weigh thousands of tonnes; rockfish that live twice as long as humans; halibut the size of a sheet of plywood; and salmon, a cultural icon of British Columbia. Each species occupies a different niche, and together they create an enormous amount of biomass, biological diversity, and economic activity.

More than 400 known species of marine fish live in the ocean waters off the coast of British Columbia, and each has its own story. A few of those stories will give you a taste of the diversity.

Herring and their nutritious spawn are an important part of the diet of cod, halibut, lingcod, coho and chinook salmon, harbour seals, invertebrates, seabirds, sea lions, porpoises, baleen whales, and eagles. In total, the mature biomass of herring in the PNCIMA area averages about 100,000 metric tonnes. Three of B.C.'s five major herring stocks are found here.[8]

Much of the marine life in this part of the world would go hungry without herring.
Photo: Dale Sanders

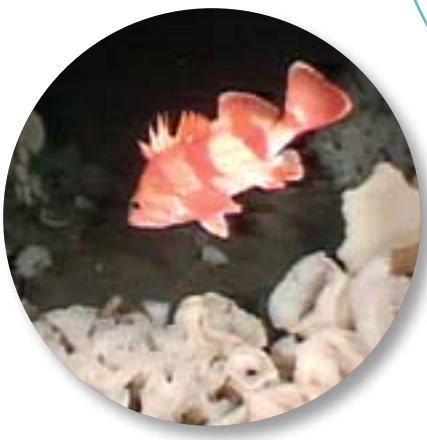
Schools of herring vary in size but can weigh as much as tens of thousands of tonnes and stretch several kilometres in length.[9]

B.C. First Nations eulachon smokehouse.
Photo: Samuel M. Beebe

Another schooling fish, the **eulachon**, is also an important base in the food chain. Unlike herring, however, eulachon are anadromous – they spawn in rivers but then spend 95 per cent of their lives in the ocean. Eulachon are sometimes referred to as "candlefish" because during spawning, they are so fatty that if caught, dried, and strung on a wick, they can be burned as a candle. This fish has historically been a dietary staple, as well as a culturally and spiritually significant fish, for many of the region's First Nations.[10]

Almost 90 per cent of B.C.'s eulachon spawning rivers are located within PNCIMA.[11]

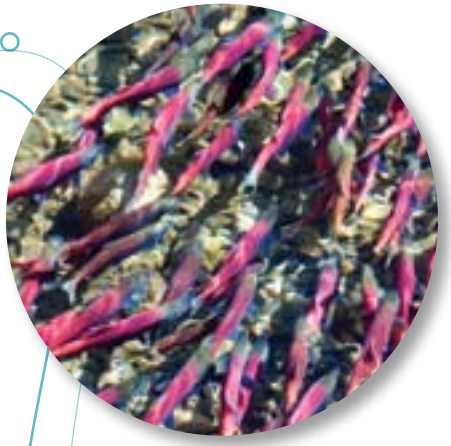
Rockfish are truly the elders of the sea. They are some of the longest living animals in the world, with some species surviving for more than 200 years,[12] outliving humans, elephants, and even turtles. That means some rockfish now swimming in PNCIMA may have been alive when the first European explorers were arriving on British Columbia's coast.



Young rockfish lived in the Hecate Strait sponge reefs long before we knew these sponges existed – these ancient fish have ancient homes.
Photo: Dr. Manfred Krautter

At least 36 different species of rockfish are found in B.C.,[13] and 19 of them are commercially fished.[14] Because they grow slowly and are slow to mature, this staple of B.C.'s groundfish industry is particularly vulnerable to overfishing.

This shortraker rockfish, which also lives in PNCIMA, was caught in the Bering Sea and was estimated to be 90 to 115 years old.
Photo: Karna McKinney, NOAA Fisheries



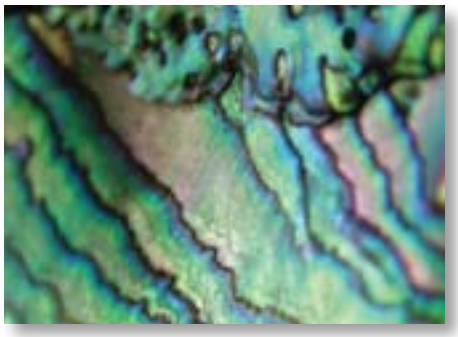
Wild salmon play a pivotal role in B.C.'s ecology and economy. They feed whales, eagles, bears, forests, fishermen, and millions of Canadians, and bring 1.4 billion wilderness tourism dollars into B.C., connecting the oceans to the mountains to the economy.

Salmon are a cultural icon in B.C. The ocean and tributaries of PNCIMA are truly "salmon country", with an average of 25 to 30 million adult salmon returning to the PNCIMA watersheds every year.[15] Millions of salmon – five different species in total – migrate through the area, travelling up to 3,200 kilometres at sea before returning to spawn in the rivers and streams where they were born.

The sea otter and abalone

The sea otter and abalone are two important species in West Coast marine ecosystems. Each has an intriguing history and is of significant cultural value.

Both of these species are now listed under the *Species at Risk Act*. Managers from Fisheries and Oceans Canada (DFO) are trying to rebuild populations of both of these important species in PNCIMA.



The northern abalone is a gastropod, or marine snail, with an iridescent mother-of-pearl inner shell and delicate meat. This fishery was closed in 1990 because abalone were harvested to commercial extinction. Illegal harvesting continues today.

Photo: Penny P. White

The sea otter is iconic – a cute, recognizable, furry, loveable animal that was hunted to near extinction for its fur.

Photo: Ken Bondy

The twist is . . . sea otters eat abalone. What do we do when one species-at-risk eats another? We must begin to manage the oceans in a more integrated way, taking into consideration more than one species, one issue, or one factor at a time.

The comeback of the humpback: Populations of humpbacks were depleted by whaling in the early 1900s to about 1,000 individuals in the entire North Pacific. Humpbacks are slowly rebounding, with current population estimates for B.C. hovering around 1,500.[17] These humpbacks can be seen most months of the year in the productive waters of PNCIMA.
Photo: Jackie Hildering

Whales' world

PNCIMA's whales, with their size, power, and diversity, command respect. It's hard to imagine how these giants of the sea remain so elusive. Much is still unknown about where the whales of this region breed, what they eat, how abundant they are, and how much of their lives they spend here.

Friendly Pacific white-sided dolphins cruise the entire coast of PNCIMA, readily approaching boats and mixing with other marine mammals. They usually travel in groups of 10 to 100 but have been seen in super groups of 2,000 or more.

What we do know is that an impressive 27 different types of whales, dolphins, porpoises, and pinnipeds (seals and sea lions) can be found in PNCIMA.[16] They include blue, fin, sei, and grey whales, as well as one of the best-known giants of the sea, the humpback whale. Humpbacks can grow to be as big as a school bus and weigh up to 45 tonnes.

Soaring and swimming seabirds: where the sea meets the sky

Millions of seabirds live in this area, flying, diving, and rarely ever setting foot on land except to nest and care for their young. The birds that live or migrate through this area include the black-footed albatross with its awesome

The Scott Islands are a cluster of uninhabited islands just north of Vancouver Island and are one of the most important seabird breeding areas in the world. The islands are inhabited by 12 species of seabirds that show up in globally or nationally significant numbers.[18]
Photo: Thomas Chamberlin

Puffins are world travellers, but more than 70,000 Tufted Puffins breed on the Scott Islands just north of Vancouver Island.[21]

two-and-a-half-metre wingspan, common murre that dive up to 100 metres deep, and sooty shearwater that hold the record for the world's longest migration. More than five million seabirds nest in PNCIMA, with more than two million seabirds taking up residence each year on the Scott Islands alone.[19]

The magnitude of the importance of this area for seabirds is impressive:[20]

- 108 marine bird species use habitats in the PNCIMA region during all or part of their life cycle.
- 80 per cent of the global breeding population of Cassin's auklets is found here.
- 56 per cent of the global breeding population of rhinoceros auklets live in PNCIMA.
- 74 per cent of the global breeding population of ancient murrelets call these waters home.

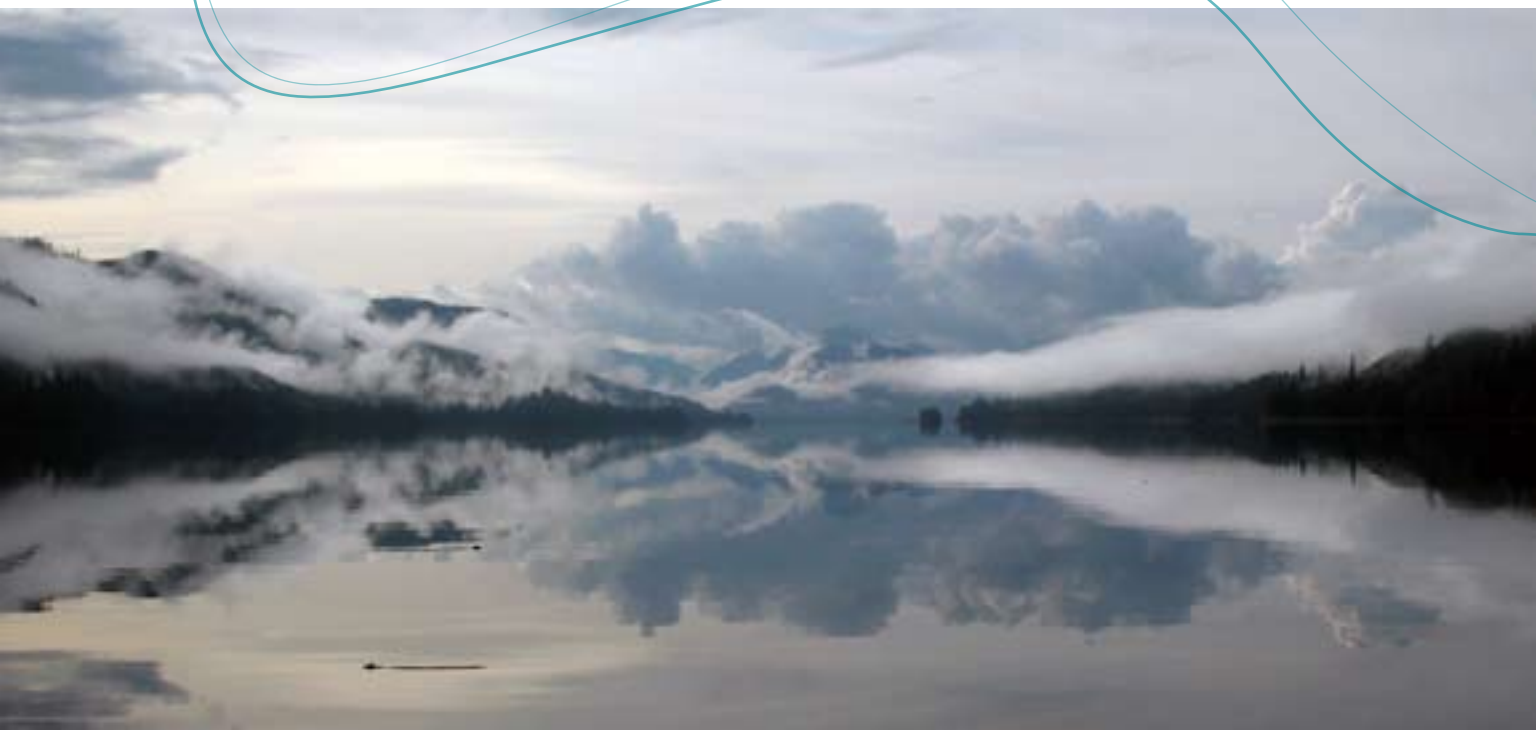
Changing seasons

As water temperature and weather change with the seasons in PNCIMA, so too do the plants and animals and their diets – just another reminder that all life here is connected.

The ocean environments of PNCIMA change dramatically throughout the year. With each season comes a different pulse of life. At the base of this transformation are changes in the abundance of plankton (tiny plants and animals in the sea) that result from seasonal differences in sunlight and oceanographic conditions. The enormous diversity of life found within the microscopic plankton is not obvious to the casual observer. However, in occupying the base of the food chain, their importance becomes obvious as the seasonal changes in plankton result in profound changes in concentrations of herring, seabirds, porpoises, and grey whales. The effects of these changes ripple throughout the entire ecosystem.

The many animals that depend on the seasonal bloom of plankton highlight the interconnectedness of all life in PNCIMA and the complex and intimate relationships between species and ocean conditions.

Photo: Stephen Hall



Benefits of the Bounty

From time immemorial, artists have drawn inspiration from the vast and mysterious ocean environment on Canada's West Coast.
Artwork by Bill Helin

Just like the waves and tides that shape the coastline, the ocean (and its weather, seascapes, and wildlife) shapes the lifestyle, culture, economy, history, personality, and art of B.C.'s central and north coasts. The ocean's very presence and its many sources of energy have always had an influence on people, from First Nations and early settlers who depended on the ocean for transportation and food to modern adventure-seekers who depend on the ocean for sport and recreation.

Generations upon generations

For more than 10,000 years, people have made their homes along the inlets, shorelines, and estuaries of this region.

The many First Nations and fishing communities here contain a wealth of knowledge about the ocean. This knowledge should be used to inform management and conservation of the resources here.

Many First Nations have lived in the same communities for hundreds of generations. They continue to live, interact, and change with the rhythms of the sea, preserving many aspects of their traditional culture. *Photo: Ra McGuire*

Thirty-six per cent of the residents are First Nations. At least 25 communities are located in the PNCIMA, including Campbell River, Port McNeill, Port Hardy, Alert Bay, Sointula, Rivers Inlet, Bella Bella, Bella Coola, Prince Rupert, Queen Charlotte City, Skidegate, and Masset.

We are part of the ecosystem. The people of PNCIMA breathe its air, play in its waves, and depend on its bounty for their survival and enjoyment.

Gone fishing

The PNCIMA region supports a significant portion of the province's fishing industry, including[22]:

- ~ 85 per cent of trawl catch (excluding hake);
- ~ 90 per cent of hook-and-line catch;
- ~ 85 to 90 per cent of sablefish catch;
- ~ 85 per cent of the salmon catch;
- ~ 60 per cent of the geoduck catch;
- ~ 95 per cent of Dungeness crab catch;
- ~ 45 per cent of B.C.'s prawn catch;
- ~ Almost the entire red and green urchin & sea cucumber catch.

Fishing is integral to B.C.'s north and central coasts, Haida Gwaii, and northern Vancouver Island communities. It has been a way of life for generations and continues to support a thriving industry. Fishing here provides work, recreation, and sustenance. Generations of fishermen can trace their lineage back to founders of coastal communities such as Port Hardy, Queen Charlotte City, and Prince Rupert.

Almost every square kilometre of PNCIMA is important to some aspect of B.C.'s fisheries.
Photo: Sean Griffin

The fishing methods are almost as diverse as the species being fished. Underwater divers harvest sea cucumbers, geoducks, and sea urchins; herring are gathered with large seine nets; halibut are caught with hooks attached to weighted fishing lines stretching for kilometres; large traps are used for sablefish; and massive nets dragged along the sea floor gather up flatfish and other bottom fish.

Few people are as intimately connected to the ocean as fishermen. And perhaps no one wants to see the health of the ecosystem maintained as much as fishermen. Their livelihoods depend on it.

Geoducks are one of the most valuable invertebrate fisheries in B.C., with a landed value of $42 million in 2000.[23]

In 2003 and 2004, more than 13,000 tonnes of Dungeness crabs were landed in B.C. This represents the highest recorded landing for this fishery, with a value of $83 million for the two years combined. Close to 85 per cent of these crabs were caught in PNCIMA.[24]

Farming the sea

Farming fish, shellfish, and marine plants is another marine industry in PNCIMA. Fifty-five per cent of B.C.'s finfish aquaculture sites (72 sites) are located within the PNCIMA region.[25] Only 2.4 per cent of B.C.'s shellfish aquaculture sites (11) are located in PNCIMA. However, 15 pilot projects are underway in the region to determine the feasibility of shellfish aquaculture on the north coast and Haida Gwaii. The marine plant industry is made up of small-scale operators harvesting less than 100 tonnes a year.

The way we move

Marine-based transportation is the primary method of travelling and moving goods to and from coastal communities in PNCIMA. The three main ports in the region (Kitimat, Prince Rupert, and Stewart) play a crucial role in bringing goods to Canada and connecting Canadian industries to the world.

Over the next 15 years, the volume of containers being shipped through these waters is expected to increase by 300 per cent, bulk cargo ships are expected to increase by 25 per cent, and cruise-ship traffic is expected to increase by 20 to 25 per cent. At least four development projects are in the works, which, if permitted, will allow more than 300 oil tankers to travel through PNCIMA every year.[27]

The Port of Prince Rupert is of particular significance because it's the deepest natural harbour in all of North America, is ice-free throughout the year, and is the closest North American port to Shanghai, China.[26] *Photo: Chad Graham*

The coastal waterways in PNCIMA are also important transportation corridors for people.

The ocean provides the way we move in PNCIMA. It connects people, places, and the things we need in order to live comfortably.

The Port of Prince Rupert welcomed 100,000 passengers and 60 large cruise-ship calls in 2007. And more than 900,000 passengers on 275 sailings travelled through PNCIMA from Vancouver to Alaska,[28] generating an estimated $530,000 in sales taxes and 53 full-time equivalent jobs.[29] *Photo: Chad Graham*

Many people travel to and between PNCIMA's coastal communities by ferry. The Discovery Coast BC Ferry alone transports 8,000 passengers a year to the central coast.[30] A steady stream of recreational and commercial boaters also travels the marine highway every day.

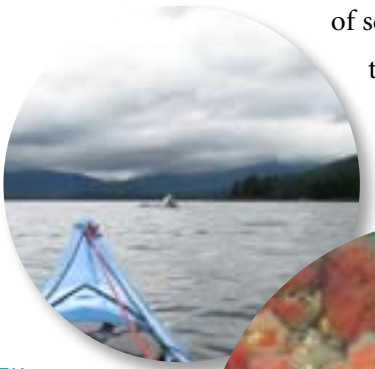
Our ocean, our playground

The fjords, coasts, wildlife, land, and seascapes make this area a remarkable place for kayaking, whale watching, surfing, sport fishing, pleasure boating, scuba diving, beachcombing, and cruising. In addition to local residents and other Canadians, people from all over the world come to enjoy the marine wildlife and the spectacular scenery PNCIMA has to offer.

The marine-recreation sector in B.C. had revenues of $3.8 billion in 2005, contributed $1.8 million to the provincial GDP and $1.2 billion to provincial labour income, and employed 32,200 people on a person-year basis. [31]

The region's 43 fishing lodges provide a broad range of services and offer jobs and economic opportunities to local communities.[32] Haida Gwaii alone has 18 fishing lodges that, as of 2002, provided 425 seasonal and 95 year-round jobs.[33]

Surfers experience the powerful (and cold!) waves in Haida Gwaii.
Photo: Chris Burkard



Kayakers can be surprised by close encounters with great whales.
Photo: Bruce Rattray

Browning Wall is a sheer cliff 76 metres deep. The cold, clear waters here offer scuba divers an amazing opportunity to view a stunning variety of fish and other marine life. Browning Wall is considered one of the best cold-water dive sites in the world.
Photo: Dale Sanders

Feeding our land

The ocean of PNCIMA not only feeds us but feeds our coastal forests as well. The low elevation forestlands in this region are generally starved of nutrients because heavy rainfall can wash them away. But every year, thousands of salmon swim from the oceans upstream to spawn and then die. Full of nutrients from the ocean, salmon become food for many animals, including bears, wolves, and eagles that live along the creeks and rivers. As the dead salmon decompose, the marine-derived nutrients make their way into the animals, plants, insects, and soil of the terrestrial ecosystems, sometimes hundreds of kilometres upstream. [34]

Nitrogen from salmon has been found in trees next to salmon-spawning rivers, demonstrating the role of salmon in bringing nutrients from the ocean to terrestrial systems.[35] *Photo: Wayne Cooper*

The ocean not only feeds us but feeds our coastal forestlands as well.

The State of the Sea in PNCIMA

British Columbians are truly fortunate to have some of the last intact marine environments right in their backyard. Glimpsing a pod of orca from the ferry, exploring tide pools alive with sea critters, and seeing flocks of seabirds fill the sky remind us of how abundant life is here.

Photo: Penny White

Globally, oceans are experiencing collapsing fish stocks, oil-spill contamination, escalating pollution levels, and increasing numbers of "dead zones", creating a sense of hopelessness. But the relatively healthy marine ecosystems in PNCIMA offer a tremendous opportunity to demonstrate how responsible management can help to maintain the health and productivity of the region for generations to come.

The opportunity won't last forever, though. The time to act is now. And while marine life in PNCIMA is relatively healthy, it is also showing signs of stress. Increasing pressure from industrial activities and escalating demand for seafood is creating a greater need for good management. The whole system must be in good health if it is to continue to provide social benefits and economic opportunities.

Some success stories of good management in B.C. give us hope that, with proper leadership and commitment, we can reverse some of the negative trends we are seeing in the ocean today.

But protecting one species at risk at a time can be slow! An approach that simultaneously considers multiple species, management decisions, and conservation initiatives can be more effective and efficient.

Species at risk

Thirty-two species living in PNCIMA waters are listed as endangered, threatened, or special concern.[36] Some species, such as the basking shark, have been fished or hunted down to the point of near extinction. Some, but not all of these species, are recognized under the *Species at Risk Act* (SARA). It is illegal to kill, capture, or harm in any way a species listed under SARA. The critical habitats of listed species are protected and recovery strategies, action plans, and management plans are developed.

The Basking Shark is listed as endangered but is not protected by the Species at Risk Act.
Photo: Chris Gotschalk

Plenty of fish in the sea?

While some fish populations are plentiful, others are not.

Many rockfish populations are in trouble. These fish are slow to grow and reproduce and are relatively sedentary animals that remain in one habitat for most of their lives.[37] This makes them particularly vulnerable to overfishing. In response to these low numbers, 59 conservation areas covering 3,020 square kilometres have been established throughout the region in hopes of recovering populations of these magnificent fish.

In addition to rockfish-conservation areas, a new groundfish-management program is being implemented with a goal of reducing the amount of rockfish bycatch in B.C.'s groundfish fishery,[38] demonstrating that there are better ways to manage the fishery – ways that avoid harming species that are threatened, endangered, or not desired by the fishery. This new system promises to help sustain abundant groundfish populations while improving the economic efficiency of the fishery and preventing unnecessary harm to rockfish populations.

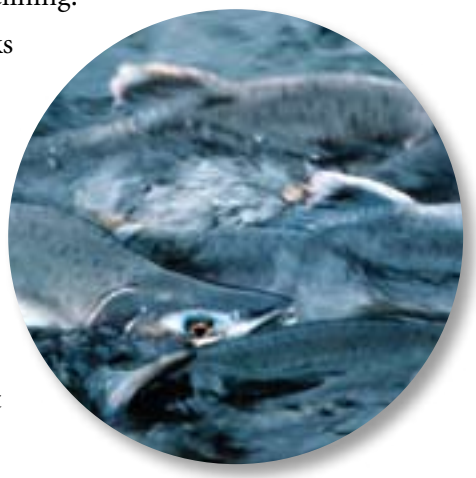
Since the entire food web is interconnected, changes in abundance of one species will be felt throughout the whole system.

Different species of fish all make up essential components of the marine food chain. They all serve an important role. Fishing for one species affects, and sometimes even kills, other species through unintentional bycatch. We cannot manage resources as if fish lived in separate fish tanks. We need to acknowledge the interconnections to realize effective management.

Eulachon and herring, which are significant food sources for marine fish, mammals, and seabirds, are in decline. Several subpopulations are low compared to historic numbers and much of the herring fishery is now closed in most areas in PNCIMA.

Many animals have been forced to find something else to eat as populations continue to decline. We need to be diligent in tracking and understanding these changes if we hope to prevent further declines.

The number of salmon in the world's oceans is declining. B.C. is no exception. While PNCIMA salmon stocks are healthier than most, they are showing signs of stress, and some stocks, like the sockeye in Rivers Inlet, have crashed to fewer than 10 per cent of historic levels. Some sockeye and coho runs have been declining since the 1960s and are showing few signs of recovery.



Salmon landings in B.C. have fallen dramatically, from 96,000 tonnes in 1990 to 33,000 tonnes in 2002. The landed value declined from $263 million to $57 million.[39]

But, there is hope. Nass River salmon management is informed and directed, in part, by local communities and stakeholders' intimate knowledge of the area and the resource. These well-managed salmon stocks provide promise for other fisheries in the region. The participatory management model provides an example of how to rebuild salmon stocks and maintain a viable commercial fishery.

Research has demonstrated that sea lice generated from fish farms are killing juvenile wild salmon.[40] This has many people who fish wild salmon concerned. It is not possible to manage either industry without considering the other.

Salmon stock declines highlight the need for comprehensive management that considers more than one industry at a time, since the health of their populations is affected by mining, forestry, finfish aquaculture, coastal/land development, fishing, and climate change.

Glass sponge reefs half full, half empty

Since their discovery in 1987, half of the globally unique glass sponge reefs in PNCIMA have been destroyed, mainly by bottom trawling, a fishing method whereby a net is dragged along the seafloor, breaking and killing the fragile glass reefs.[41]

While the damaged reefs will be extremely slow to recover (if they can recover at all), further damage has been curtailed through a voluntary trawl closure in 2000, followed by a formal closure in 2002[42] and an expansion of that closure in 2006. These sponge reefs have survived 9,000 years in the Hecate Strait. We need to make sure they survive another 9,000. A protected-area designation could ensure that.

Corals, which play a similar ecological role to sponge reefs, are also vulnerable to damage in B.C. waters. No conservation strategy has been developed to protect them in B.C. From 1996 to 2002, about 295 tonnes of cold-water corals and sponges were observed as bycatch in British Columbia's groundfish fishery.[43]

Glass Sponge Reefs before and after being trawled. These reefs may take centuries to recover, if they can recover at all.
Photo: Dr. Manfred Krautter

Rockfish Conservation Areas (RCAs) have been established throughout B.C.'s oceans to protect these vulnerable species. Since young rockfish are more abundant in the also vulnerable glass sponge reefs, it would be more efficient for conservation efforts here to be dovetailed and made in a more comprehensive region-wide conservation strategy. Managing one issue, one industry, or one species at a time often leads to inefficient and redundant processes.

The killer whale is an iconic animal of British Columbia, and yet it is surprisingly rare in PNCIMA.
Photo: Chantelle Tucker

The resident killer whale's summer diet is almost entirely salmon. To ensure killer whale recovery, salmon stocks need to be abundant. For salmon populations to be healthy, many other fish populations need to be healthy. For those fish populations to be healthy, populations of euphausiids need to be healthy. The list goes on – everything is connected.

Where are the whales?

Many marine mammal populations, including most whales, have been increasing in abundance in PNCIMA since commercial whaling ended in the early 1970s, demonstrating that our actions and improved management can affect even these largest and most powerful animals. Many population levels are still, however, precariously low.

In 2007, five blue whales, including one calf, were spotted near Haida Gwaii. This is the largest number of these endangered blue whales to be seen in half a century and provides hope for the future of these ocean giants.

Seasons of seabirds

In 2005, the breeding-season success of all species of seabirds at Triangle Island (one of PNCIMA's Scott Islands) was poor. Only eight per cent of the Cassin's auklet pairs laid an egg and fledged a chick.[44] The fledglings that were born were severely underweight. Scarce ocean food sources were seen as the main factor.

To breed and forage successfully, marine birds depend on the presence, abundance, and seasonal availability of specific marine species that make up their diet. Many things can affect the

When seabirds aren't breeding, or are breeding with low success, it is an indication that the health of the entire ecosystem has been compromised. They are easy-to-read and easy-to-understand indicators of ocean health.

In recognition of the importance of the ocean to the seabirds of the Scott Islands, the Canadian Wildlife Service is working to establish a Marine Wildlife Area that would protect the marine environment around the islands, as well as the nesting grounds.
Photo: Bob Whitney

survival of marine birds. Marine pollution, fishing gear, food shortages, and introduced rodents can all threaten these birds. Some species are declining, and more research is required to understand how best to ensure their long-term survival in PNCIMA.

Less than one per cent protected

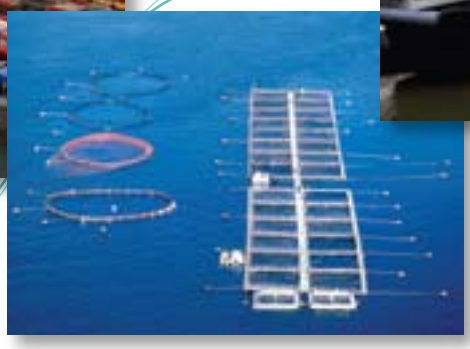
Despite the incredible diversity and abundance of life in PNCIMA, the health of these ecosystems is facing many silent but persistent ailments. While approximately 12.5 per cent of B.C.'s land base is formally designated as protected area, where industrial activities are prohibited, less than one per cent of our ocean is afforded the same kind of protection.[45]

Integrated management and conservation plans that carefully balance ecological needs with social and economic activities will help ensure that our oceans thrive well into the future.

No ecosystem can remain unaffected by the cumulative effects of habitat alteration and destruction, pollution, commercial harvesting, expanding industries, and changing temperature and ocean conditions resulting from global warming. The health of our marine ecosystems will continue to decline unless we improve management and establish sound conservation plans.

Prince Rupert's container port.
Photo: Bruce Rempel

A commercial fishing vessel.



An open net-cage salmon farm.
Photo: David Suzuki Foundation

Vision for a Thriving Sea

Thousands of people value the ocean environments in PNCIMA. Although these people have diverse interests and needs, they have in common the need for a thriving sea for generations to come.

When asked about how they feel about the ocean, the people who live, work and play in PNCIMA said this:

We know that everything in the sea is connected. It is connected by the fluidity of the water, through the links in the food web, and through the way we manage and use its components.

Photo: Chantelle Tucker

If we hope to maintain the entire marine ecosystem in a functioning, healthy state we need to start managing it in a way that considers all the parts. All things should be considered in an integrated way when making decisions about conservation, about which fishing gear can and cannot be used in specific areas, about which activities are allowed or prohibited in sensitive areas, and about where ports are built, what transportation routes will be established, and whether or not and where we can transport dangerous goods. It's a big job but it needs to be tackled.

Ocean planning for our future

Because of the connections between the various components of the marine ecosystem and between the various uses and activities, making management decisions without considering the big picture simply won't work to keep our oceans healthy.

Uncoordinated decisions are currently undertaken in a way that has in some cases resulted in inefficient, redundant, and ineffective resource management.

In Canada's Oceans Act (1997) and subsequent Oceans Strategy (2002) and Oceans Action Plan (2005), the federal government committed to a new approach to managing our oceans – to a more holistic, precautionary, and integrated approach.

Fisheries and Oceans Canada defines integrated management as "an ongoing and collaborative planning process that brings together interested stakeholders and regulators to reach general agreement on the best mix of conservation, sustainable use and economic development of marine areas for the benefit of all Canadians".[46]

The DFO has identified five priority Large Ocean Management Areas (LOMAs) across the country in which it will coordinate Integrated Management efforts. In the Pacific Region, the priority area is the Pacific North Coast Integrated Management Area or PNCIMA.

Unfortunately, the Government of Canada has failed to deliver on its mandate, and has been slow in establishing integrated management plans and marine protected areas.

The end result in many instances has been environmental degradation and conflict among uses and user groups, and in worst cases, serious declines in the abundance of marine species.

By working together, engaging in dialogue, and considering all values, it is possible to develop a management and conservation plan for PNCIMA that includes tangible benefits for the ecosystem and for all those who use the region's resources. This approach would maximize the benefits and opportunities we realize from our ocean while minimizing negative effects on the environment.

We can detangle the overlapping, and sometimes contradictory, web of management decisions, and build a more integrated, comprehensive, and effective decision-making model. This would provide security and certainty to those who use ocean resources and would give confidence to conservation interests that the health of our oceans is being maintained in the best way possible.

The best way to achieve this vision is by creating detailed conservation and management plans through an integrated

We need a thoughtful management and conservation plan for PNCIMA to ensure the health of our oceans and to continue to realize the social and economic benefits that they provide. After all, what would our communities be like without fishermen? Without tourists? Without the sights and sounds of marine wildlife?

Photos: Dale Sanders (top); John Rix

marine-use planning process that actively engages the people who live, work, and play in the PNCIMA and that brings the best available science to the table to inform decisions about the future use of this magnificent region.

We have an opportunity now to make sure that PNCIMA remains a healthy, thriving, and productive ecosystem for generations to come.

Act now to become part of the chorus calling on the federal government to launch a marine-use planning process and to begin the work of establishing a network of marine protected areas and a world-class management framework for all industries operating in the PNCIMA. Join the active constituency of people who share a vision for a thriving sea in PNCIMA.

Find out how to get involved by visiting the following websites:

David Suzuki Foundation: www.davidsuzuki.org

Sierra Club of BC: www.sierraclub.bc.ca

Living Oceans Society: www.livingoceans.org

Canadian Parks and Wilderness Society: www.cpawsbc.org

PNCIMA Watch: www.pncimawatch.ca

For more information about the state of the marine environment in PNCIMA go to:

- ***State of the Ocean in Pacific North Coast Integrated Management Area*** by David Suzuki Foundation: www.davidsuzuki.org/Publications/PNCIMA_Hall.asp
- ***Ecosystem Overview: Pacific North Coast Integrated Management Area*** by Fisheries and Oceans Canada: www.dfo-mpo.gc.ca/Library/328842.pdf
- ***Marine Use Analysis of the Pacific North Coast Integrated Management Area*** by Fisheries and Oceans Canada: www.dfo-mpo.gc.ca/Library/332374.pdf
- **View this document online:** www.davidsuzuki.org/Publications/Bountiful_Sea.asp

References

1 Fisheries and Oceans Canada. 2005. Canada's Oceans Action Plan: For Present and Future Generations. Ottawa: Government of Canada.

2 Lucas, B.G., S. Verrin, and R. Brown (Editors). 2007. Ecosystem overview: Pacific North Coast Integrated Management Area (PNCIMA). Can. Tech. Rep. Fish. Aquat. Sci. 2667: xiii + 104 p.

3 Crawford, W., D. Johannessen, F. Whitney, R. Birch, K. Borg, D. Fissel, and S. Vagle. 2007. Appendix C: Physical and chemical oceanography. *In* Ecosystem overview: Pacific North Coast Integrated Management Area (PNCIMA). Edited by Lucas, B.G., S. Verrin, and R. Brown, Can. Tech. Rep. Fish. Aquat. Sci. 2667: vii + 77 p.

4 Lucas, B.G., S. Verrin, and R. Brown (Editors). 2007. Ecosystem overview: Pacific North Coast Integrated Management Area (PNCIMA). Can. Tech. Rep. Fish. Aquat. Sci. 2667: xiii + 104 p.

5 Illustration adapted from foodweb schematic in: Lucas, B.G., S. Verrin, and R. Brown (Editors). 2007. Ecosystem overview: Pacific North Coast Integrated Management Area (PNCIMA). Can. Tech. Rep. Fish. Aquat. Sci. 2667: xiii + 104 p.

6 Jamieson, G. S., N. Pellegrin, and S. Jessen. 2006. Taxonomy and zoogeography of cold water corals in explored areas of coastal British Columbia. Canadian Science Advisory Secretariat Research Document: 49

7 Cooke, S. 2005. Ecology of the Hexactinellid sponge reefs on the western Canadian continental shelf. Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Science in the Department of Biology, University of Victoria. 127p.

8 Schweigert, J., B. McCarter, T. Therriault, L. Flostrand, C. Hrabok, P. Winchell, and D. Johannessen. 2007. Appendix H: Pelagics. *In* Ecosystem overview: Pacific North Coast Integrated Management Area (PNCIMA). Edited by Lucas, B.G., S. Verrin, and R. Brown. Can. Tech. Rep. Fish. Aquat. Sci. 2667: iv + 35 p.

9 Watters, D.L., K.T. Oda, and J. Mello. 2001. California's Living Marine Resources: A Status Report, Pacific Herring. California Department of Fish and Game.

10 Schweigert, J., B. McCarter, T. Therriault, L. Flostrand, C. Hrabok, P. Winchell, and D. Johannessen. 2007. Appendix H: Pelagics. *In* Ecosystem overview: Pacific North Coast Integrated Management Area (PNCIMA). Edited by Lucas, B.G., S. Verrin, and R. Brown. Can. Tech. Rep. Fish. Aquat. Sci. 2667: iv + 35 p.

11 ibid

12 Alaska Fisheries Science Centre. 2007. Rougheye Rockfish. www.afsc.noaa.gov/ABL/MESA/mesa_sa_rock_rbr.php Accessed May 21, 2008.

13 Gillespie, G.E. 2005. Draft publication "Marine Fishes of British Columbia", prepared for the British Columbia Conservation Data Centre. Fisheries Biologist, Invertebrate Section, Marine Ecosystem and Aquaculture Division, Fisheries and Oceans Canada, Pacific Biological Station, Nanaimo, B.C.

14 Wallace, S. Pers. Comm. 2008. Sustainable Fisheries Analyst, David Suzuki Foundation.

15 Hyatt, K., M.S. Johannes, and M. Stockwell. 2007. Appendix I: Pacific Salmon. *In* Ecosystem overview: Pacific North Coast Integrated Management Area (PNCIMA). Edited by Lucas, B.G., S. Verrin, and R. Brown. Can. Tech. Rep. Fish. Aquat. Sci. 2667: vi + 55 p.

16 Heise, K., J. Ford, and P. Olesiuk. 2007. Appendix J: Marine mammals and turtles. *In* Ecosystem overview: Pacific North Coast Integrated Management Area (PNCIMA). Edited by Lucas, B.G., S. Verrin, and R. Brown. R. Can. Tech. Rep. Fish. Aquat. Sci. 2667: iv + 35 p.

17 ibid

18 Environment Canada. 2004. A Profile of the Scott Islands. www.pyr.ec.gc.ca/scottislands/index_e.htm. Accessed May 20, 2008.

19 McFarlane Tranquilla, L., K. Truman, D. Johannessen, and T. Hooper. 2007. Appendix K: Marine Birds. *In* Ecosystem overview: Pacific North Coast Integrated Management Area (PNCIMA). Edited by Lucas, B.G., S. Verrin, and R. Brown. Can. Tech. Rep. Fish. Aquat. Sci. 2667: vi + 68 p.

20 Lucas, B.G., S. Verrin, and R. Brown (Editors). 2007. Ecosystem overview: Pacific North Coast Integrated Management Area (PNCIMA) K – Marine Birds. Can. Tech. Rep. Fish. Aquat. Sci. 2667: xiii + 104 p.

21 Environment Canada.2004.Tufted Puffin. www.pyr.ec.gc.ca/scottislands/tufted_puffin_e.htm Accessed May 20, 2008.

22 MacConnachie, S., J. Hillier, and S. Butterfield. 2007. Marine Use Analysis for the Pacific North Coast Integrated Management Area. Can. Tech. Rep. Fish. Aquat. Sci 2677: viii+188p.

23 ibid

24 ibid

25 Coastal Alliance for Aquaculture Reform. 2008.

26 Prince Rupert Port Authority. Strategic Advantages. www.rupertport.com/advantages.htm Accessed on May 20, 2008.

27 Hall, A. 2008. State of the Marine Environment in the Pacific North Coast Integrated Management Area (PNCIMA). Prepared for the David Suzuki Foundation.

28 Prince Rupert Port Authority. Facilities Overview. www.rupertport.com/facilities.htm Accessed on May 20, 2008.

29 MacConnachie, S., J. Hillier, and S. Butterfield. 2007. Marine Use Analysis for the Pacific North Coast Integrated Management Area. Can. Tech. Rep. Fish. Aquat. Sci 2677: viii+188p.

30 ibid

31 GSGislason & Associates. 2007. Economic Contribution of the Oceans Sector in British Columbia. Prepared for: Canada/British Columbia Oceans Coordinating Committee. In Association with: Ellen F. Battle Consulting Inc, BC Edna Lam Consulting, and BC Pierce Lefebvre Consulting.

32 MacConnachie, S., J. Hillier, and S. Butterfield. 2007. Marine Use Analysis for the Pacific North Coast Integrated Management Area. Can. Tech. Rep. Fish. Aquat. Sci 2677: viii+188p.

33 ibid

34 Stockner, J.G., editor. 2003. Nutrients in salmonid ecosystems: sustaining production and biodiversity. American Fisheries Society, Symposium 34, Bethesda, Maryland.

35 ibid

36 Hall, A. 2008. State of the Marine Environment in the Pacific North Coast Integrated Management Area (PNCIMA). Prepared for the David Suzuki Foundation.

37 Fargo, J., L. MacDougall, and I. Pearsall. 2007. Appendix G: Groundfish. *In* Ecosystem overview: Pacific North Coast Integrated Management Area (PNCIMA). Edited by Lucas, B.G., S. Verrin, and R. Brown. Can. Tech. Rep. Fish. Aquat. Sci. 2667: vi + 28 p.

38 Fisheries and Oceans Canada. 2008. Pacific Region Integrated Fisheries Management Plan – Groundfish. March 8, 2008 to March 31, 2009.

39 MacConnachie, S., J. Hillier, and S. Butterfield. 2007. Marine Use Analysis for the Pacific North Coast Integrated Management Area. Can. Tech. Rep. Fish. Aquat. Sci 2677: viii+188p.

40 Krkosek, M., J. S. Ford, A. Morton, S. Lele, R.A. Myers, and M.A. Lewis. (2007). Declining wild salmon populations in relation to parasites from farm salmon. Science. 318, 1772-1775.

41 Conway, K. 2003. Presentation to the Expert Panel on Science Issues Related to Oil and Gas Activities, Offshore British Columbia. October 30, 2003.

42 Jamieson G.S., and L. Chew. 2002. Hexactinellid sponge reefs: areas of interest as marine protected areas in the north and central coast areas. Can Sci Adv Sec Res Doc 12.

43 Ardron, J.A. and G.S. Jamieson. 2006. Reducing Bycatch of Corals and Sponges in British Columbia's Groundfish Trawl Fishery through Trawl Fishery Closures. Canadian Science Advisory Secretariat Research Document – 2006/061.

44 Fisheries and Oceans Canada. 2005. State of the Pacific Ocean 2005. Ocean Status Report 2006/001.

45 Ministry of the Environment. 2006. Ecosystem Protection. www.env.gov.bc.ca/soe/bcce/06_ecosystem_protection/protected_areas.html Accessed May 21, 2008.

46 Fisheries and Oceans Canada. 2006. Pacific Region Integrated Management Home Page. www.pac.dfo-mpo.gc.ca/oceans/im/default_e.htm Accessed on May 20, 2008.

B.C.'s Bountiful Sea: Heritage Worth Preserving

ISBN 978-1-897375-15-0

Canadian Cataloguing in Publications Data for this book is available through the National Library of Canada

Written by: Jodi Stark

Contributing Writers: Jennifer Lash, Executive Director, Living Oceans Society;
Bill Wareham, Senior Conservation Specialist, David Suzuki Foundation

Released in conjunction with *State of the Ocean in the Pacific North Coast Integrated Management Area (PNCIMA)*, by Anna Hall (www.davidsuzuki.org/Publications/PNCIMA_Hall.asp)

Acknowledgements

Editing and review: Katrina Assonitis, Jacqueline Booth, Colin Campbell, Anna Hall, Ian Hanington, Kate Willis Ladell, Jennifer Lash, Catherine Stewart, Scott Wallace, Bill Wareham, and Jeffery Young

This report was made possible by the generous support of the Gordon and Betty Moore Foundation.

The greenhouse gas emissions from the production of the paper used in this publication have been offset through investments in renewable energy projects.

David Suzuki Foundation
2211 West 4th Avenue, Suite 219
Vancouver, B.C., Canada V6K 4S2
www.davidsuzuki.org
Tel 604.732.4228 • Fax 604.732.0752

ECO-AUDIT ENVIRONMENTAL BENEFITS STATEMENT

This report is printed using vegetable-based inks on Rolland Enviro 100 (inside pages) and Chorus Art Silk (cover). By using these environmentally friendly papers, the following resources have been saved: 13 trees; 370 kg of solid waste; 35,042L of water; 2.4 kg suspended particles in water; 829 kg of air emissions; 52m³ of natural gas

Design & art direction: Arifin Graham, Alaris Design
Printing: Western Printers and Lithographers, Burnaby, B.C.
Illustrations (pages 5 and 24): Soren Henrich

Front cover photos (from top): iStock; Jackie Hildering; Dale Sanders; John Rix; Ryan Weese; Jackie Hildering; Chantelle Tucker
Back cover (from top): Wayne Cooper; Chris Burkard; Ra McGuire; Dale Sanders; John Rix; Bob Whitney
Photo this page: Geoffrey Einon

Oceans support livelihoods, contribute to our well-being, and offer recreation, inspiration, and solace.

Let's not take them for granted. Help ensure our oceans remain healthy, thriving, and productive for generations to come.

To learn more about what you can do, contact:

David Suzuki Foundation
219–2211 West 4th Avenue
Vancouver, BC V6K 4S2
604.732.4228
www.davidsuzuki.org

Living Oceans Society
PO Box 320
Sointula, BC V0N 3E0
250.973.6580
www.livingoceans.org

Sierra Club of BC
302–733 Johnson Street
Victoria, BC V8W 3C7
250.386.5255
www.sierraclub.bc.ca

Canadian Parks and Wilderness Society – British Columbia Chapter
410–698 Seymour Street
Vancouver, BC V6B 3K6
604.685.7445
www.cpawsbc.org