

4. A Coastal Labyrinth



The BC coast is only 900 km as the crow flies, but comprises 27,000 km of coastline. This geography makes the BC coast vulnerable. The isolation, and hence independent evolution of species on islands, means that their populations are not easily replaced if they disappear from these locations.

PHOTO: C.T. DARIMONT

The fragile biogeography of BC's coast

The interface between the land and the sea in coastal British Columbia has created a biological treasure, but one that is easy to spoil. BC's modest 900 kilometre north to south distance between Washington and Alaska contains 27,000 km of coastline that jogs around hundreds of islands and dozens of inlets to form a remarkable archipelago. Since the glaciers retreated over 10,000 years ago, this geography has yielded impressive diversity. But such diversity also comes with a cost. This configuration places coastal life forms at high risk and they can disappear in a (evolutionary) blink of an eye.

An archipelago environment blesses coastlines with biodiversity. We know from some of the most important biological studies ever conducted, notably Darwin's work on the Galapagos Islands, that islands foster diversity at the community, species, and genetic levels. Due to their isolation, animals and plants on islands diverge on their own evolutionary trajectories, creating novel adaptations to local environments. Research on BC's islands, including that done by Raincoast, has revealed tremendous diversity: from giant black bears on Haida Gwaii to "marine wolves" of the outer coast to endemic populations of lake fish.

These natural laboratories of biodiversity, however, bear a curse in today's world. The most rapid and severe human-caused extinctions our planet has ever witnessed have occurred on islands. The same isolation that allowed island populations to evolve on their own trajectory reduces their resilience to stressors. When island populations are stressed, the water barriers of channels and inlets slow down or prevent other individuals from coming to the rescue of dwindling populations.

Islands are fragile. But the possibility of a catastrophic oil spill compounds risks in many ways because spilled oil has a tendency to settle on shorelines and beaches. These serve as gateways or points of contact where oceanic resources (or pollutants) encounter much of the islands' diversity. The intertidal life, including foraging shorebirds, spawning herring, spawning pink and chum salmon, hauled-out marine mammals, and foraging maritime animals – all these utilize the interface between the land and the sea. Twenty-seven thousand kilometres of labyrinthine seaboard places this web of diversity much more at risk than a 900 km distance would suggest.

Maritime animals: Terrestrial creatures that depend on the sea

Terrestrial animals are not the first to come to mind when assessing risks of oil and gas development in coastal marine environments. After all, these land-based species ought to be “terrestrial”; that is, squarely inhabiting and making their living on land. Yet, contemporary science has taught us that a previously regarded boundary between ocean and land is actually non-existent. In reality, the movements and food habits of many of these “maritime animals” span both environments. Consequently, many species we consider terrestrial can be acutely sensitive to everyday activities associated with oil and gas exploration, production, and transport, as well as the recurring catastrophic accidents that have stained the oil industry's reputation.

Many maritime animals forage extensively, and occasionally exclusively, in the intertidal. They serve as significant vectors of energy transfer from ocean to land. Not only mammals, but also terrestrial birds can be significant intertidal foragers. For example, individuals within coastal northern saw-whet owl and northwestern crow populations forage solely on intertidal prey and carrion.⁵⁷

Raincoast's own work in coastal BC has demonstrated the importance of salmon and other marine resources to



Terrestrial wildlife that forage extensively in intertidal habitats may be more accurately termed “maritime animals” due to their use and dependence on food from the sea. Coastal bears, for example, supplement their diet of salmon by foraging on mussels, barnacles, crabs, and amphipods. Opportunistic wolves eat river otters, ducks, seals, Humboldt squid, and whale carcasses, as well as salmon.⁵⁶

PHOTO, ABOVE: N. DEBRUYN.

PHOTO, BELOW: C.T. DARIMONT



Sea Wolves. Families of wolves, for example, commonly inhabit a group of islands and mainland areas and frequently swim among them as part of their home ranges.⁶¹ Swimming distances can be significant. Areas colonized by wolves include islands up to 13 kilometres (8 miles) out at sea in Hecate Strait.⁶²

PHOTO: R. CARPENTER



When all else fails – swim!

Deer will cross channels and swim between islands to feed or escape predation by wolves. During a decade of fieldwork, Raincoast has documented more than 100 swimming events by large mammals such as grizzly bears, black bears, cougars, and deer.⁶⁶ Researchers in other areas have described similar swimming behaviour in these species.⁶⁷

PHOTO: C.T. DARIMONT

carnivores. Wolves, particularly those living on islands, can make most of their living from oceanic resources.⁵⁸ In fact, during the fall, an entire population selected salmon over deer (usually their main prey).⁵⁹

Similarly, coastal grizzly bears rely on salmon to maintain their population numbers. Examining populations in North America, US scientists showed strong and positive associations between the amount of salmon in the diet of grizzly bears and the productivity (fecundity, population density) of their populations.⁶⁰ This grizzly-salmon relationship is widespread in western British Columbia.

Grizzly bears as far inland as several hundred kilometres showed 20% or more contribution of salmon to their yearly diets, illustrating the importance of salmon as a food source. Coastal populations were almost exclusively dependent on this marine prey. Indeed, in similar work conducted by our team, grizzlies sampled from across the province were identified as either “interior bears” that were largely terrestrial or “maritime” bears, based on their diets. Maritime bears had diets that ranged from 13-61% “meat” consisting primarily of salmon but also including crabs and mussels.⁶³

Salmon serve as a tremendously important marine subsidy for an extensive breadth of wildlife. Even riparian vegetation (herbs, shrubs, and trees) benefits from this marine-derived source of nitrogen and phosphorous that salmon carcasses provide.⁶⁴ In addition to benefiting from this bottom-up fertilization of the food web, organisms as varied as invertebrates, amphibians, birds, and mammals either directly or indirectly receive sustenance from salmon. So far 138 terrestrial species have been identified that rely to some extent on salmon.⁶⁵