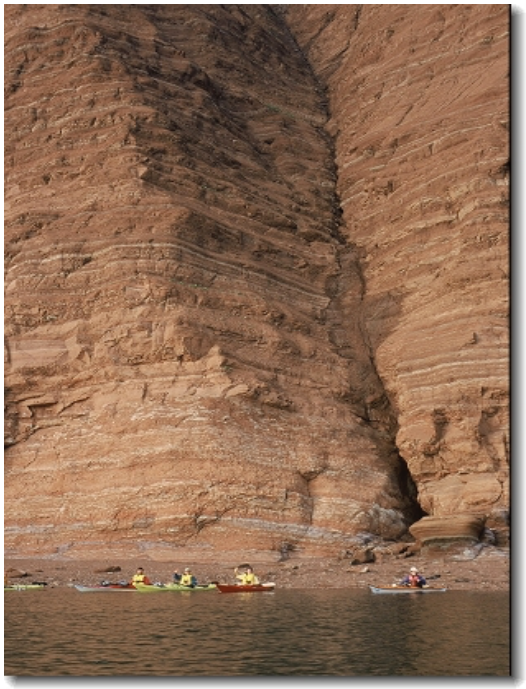
THE BAY OF FUNDY

Mud, Marsh and Cliffs - and the Highest Tides on Earth

INTRODUCTION

As we rounded the final bend we faced a chaos of white caps, stretching as far as the eye could see. It was definitely time to call it a day. The wind was howling while we sheltered our tent behind a jumble of granite blocks. Cattle, and their well seasoned paddies, were our only companions on the diked landscape. Over the next few hours the river mouth gradually disappeared, and the entire upper region of the Cumberland Basin exchanged its murky solution for a wet bed of glistening mire and marsh. Throngs of sandpipers descended to gorge themselves on the ubiquitous mud shrimp, fattening up prior to their long flight to South America. As the tide fell so did the wind, but this incredible spectacle reversed itself six hours later, and gave us cause to ponder our decision to cross the Bay of Fundy.



If you have heard of Atlantic Canada at all, you have probably heard of the Bay of Fundy - a unique ecosystem of salt marsh and mud flats, of labyrinthine creek and channel, and of ingenious dike systems guarding fertile farmland. There are few others like it on the globe. It it also where high coastal cliffs reveal gemstones embedded in volcanic rock and dinosaur bones concealed in layered sandstone - and it hosts some of the largest animals that have ever existed, the baleen whales. Above all, however, the Bay of Fundy claims the highest tidal range on earth.

I grew up next to the Bay and learned early on to have a healthy regard for its mythical tides, a respect reenforced when a school mate drowned on a bird hunting excursion, surrounded and engulfed by the rising waters on the flats. Other than hiking the dikelands, I kept my distance in those early years. When I returned to my home province in 1980 for my circumnavigation in a canoe, and after a portage and paddle from the Gulf of St. Lawrence, I was confronted once again by this great unknown.

The Bay of Fundy is a large (funnel-shaped tongue of ocean separating Nova Scotia from New Brunswick, stretching over 200 km (120 mi.) from its mouth in the Gulf of Maine to its apex. It covers and area larger than Massachusetts. However, its influence extends well beyond the ill-defined boundaries, blending into the Gulf of Maine and edging around Yarmouth, onto the Atlantic shores of Nova Scotia. About three-quarters into the Bay, Cape Chignecto splits it into Chignecto Bay and the Minas Basin.

It has few islands, and except for the Fundy Isles and Brier Island at the entrance, the only ones of note are Isle Haute and the Five Islands. Most are basalt reminders of an earlier geologic era, when crustal distortions unleashed lava flows that covered the surface. Basalt cliffs also define the Nova Scotia shoreline from Brier Island to the Minas Basin. Most of the upper regions of the Bay of Fundy, particularly the Cumberland and Minas Basins, are lined by softer strata (sandstone and shale), where rapid erosion has produced extensive, gently sloping, sand and mud flats and vast areas of salt marsh.

The Bay of Fundy traces its origins into the Triassic era and the beginning of the age of the dinosaurs, over 200 million years ago. At that time all the earth's land mass had been compressed into a single mega-continent, called Pangea and the area that was to become Nova Scotia was at one of the collision boundaries. Situated near the equator, the terrain was relatively uniform and the climate hot and arid. Stability reigned for millions of years. Eventually the convection currents, responsible for bringing the crustal plates together in the first place, shifted, and Pangea began to break apart. Initially, the surface subsided where the crust was pulling apart, and the depressions were filled with sediment eroded from the surrounding highland. As the separation progressed, the crust faulted severely, allowing lava to pour out. However, the final rupture occurred along the current continental shelf far to the east, leaving a segment of early Africa attached to North America - part of a future Nova Scotia.

With time the rift valley widened, continued to subside, and was gradually invaded by the new Atlantic Ocean. Consumed by the sea and scoured by the glaciers, the new bay deepened, and recently, about five thousand years ago, developed the extreme tidal range. The ocean is continuing to rise relative to the land in most areas, and the shoreline is eroding at a rapid rate.

The special nature of the Bay of Fundy follows from its massive tides. These range from about 6 m (20 ft.) at the entrance to a record of 18 m (58 ft.) at Burntcoat Head, in the Minas Basin. A common misconception is that this unusual phenomenon is due to the funnel shape of the bay itself - a progressive narrowing and shallowing that accentuate the tides at the apex. However, there are plenty of similar shaped bays about the globe that do not have Fundy's tides. The main cause of this dramatic effect is a phenonomen called resonance. This refers to the natural oscillation inherent in every body of water (due to the rotation of the earth) whereby the water tends to slosh back and forth, or oscillate with a certain rhythm. The period of oscillation is dependent upon the size and shape of the basin. If that oscillation approximates that of the tides, which is the case in this bay, it will augment them. This extreme tidal range can generate considerable tidal flow that needs to be accounted for when paddling the basin (Trip Planner -Safety Considerations)

The continual turbulence in the Bay of Fundy also recycles nutrients which would otherwise settle to the bottom, producing one of the most productive natural areas in eastern North America. A prolific food chain ranges from microscopic phytoplankton to the enormous Fin and Humpback Whales which visit regularly in the summer and early fall to feed at the mouth of the bay. This is the only known breeding ground for the endangered Right whale. The extensive salt marshes are highly efficient producers

of biomass, and even the seemingly sterile mud flats will reveal a profusion of invertebrate creatures upon closer examination.

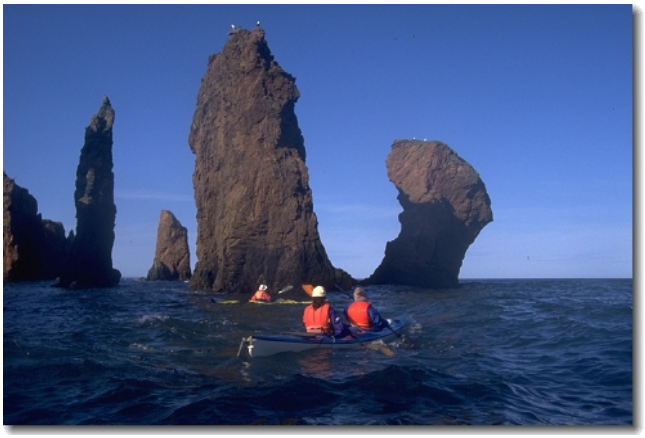
Humans have long harvested from this natural mecca. Native Americans hunted and gathered in these waters twenty-five hundred years ago. The French followed, and by the middle of the l700's the best fertile marshland had been diked and drained. In the l800's, the age of sail transformed the region and by the end of the century every cove, inlet, and river mouth that could be adapted for anchorage became the site of a mill or shipbuilding yard. These glory days were short-lived, and with iron and steam replacing wood and wind. Entire towns were abandoned and many never recovered. Reminders of these early years can be seen in the elaborate homes of obscure villages which are no longer mentioned on the maps and in the rotting wharf pilings that poke through the shifting mud and sands at deserted river outlets. However, the fishery in the bay is diverse - herring, scallops, and groundfish - and it hasn't been as devastated as elsewhere in the North Atlantic. Lobster fishing is successful, weirs are still capturing herring, and aquaculture is growing rapidly, particularly with Atlantic salmon.

The reputation of the Bay of Fundy is cloaked in myth, folklore, and fact concerning its tides, currents, and whirlpools. This has colored people's perceptions, distorting the reality, and many who are suspicious in general about paddling small boats on the ocean would consider a sea kayaking trip on the bay foolhardy. Fools should indeed keep their distance. However several exceptional routes do exist which can be paddled safely, by experienced paddlers, and the following descriptions include details of some of my favorites.

ROUTES

CAPE CHIGNECTO

Cape Chignecto follows the collision boundary between an early Africa and North America, dividing Nova Scotia into two distinct geographical regions. It is my favorite destination in the Bay. The cliffs of its southern escarpment are the highest on mainland (up to 600') and composed of a striking array of rock types whose colors, textures and forms will be mesmerizing to even the non-geologist.



The 25-35′ tidal range has fashioned an uninterrupted series of pinnacles, arches and sea caves. Highlights are Eatonville, were remnants of a long abandoned shipyard and mill poke up through the sands, Refugee Cove where a group of Acadians sought shelter in 1755 while fleeing deportation from the British, and striking pillars of MicMac legend - the Three Sisters.

When I first “discovered” this region it was unknown and unpaddled and anarchy prevailed. You could pretty much do what, when and where you wanted. However, it has since been become a provincial park, a trail has been constructed (largely unseen from the water), and various rules are now in force. However, when I’m there I rarely encounter other paddlers and when I notice the occasionally hiker, up on the scarp, I tend to feel smug with my superior perspective of the scene. My recommended route is between Spicers Cove, on the western shore and Advocate Harbour on the south shore and you can begin/end at either point depending on the conditions.

This is a relatively linear coast and the current next to shore is usually reduced due to friction (but not always) although large back eddies in some spots can have you paddling against the flow even if you are “going with the tide”. The total distance is only about 40-50 km (depending where you start) and I have done it in one day. However, I recommend 3 days in order to take time to explore and as a buffer should the wind and weather keep you on shore. There are 3 designated beach “campgrounds”
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PARRSBORRO - FIVE ISLANDS

This route also traces it's origin to the continental collisions that created Pangea, and then tour it apart. The headlands and islands are basalt fragments that remain from the lava that poured through fissures in the earth's crust onto the rift valley. This volcanic rock is highly resistant to erosion. The layered sandstones that it covered are constantly washing away, depositing the sediment that has has become the mud flats and marshes of the upper bay. The tides here can exceed 40' and the gradual slope in may places will mean a major carry at low water.

Put in at the beach at Partridge Island (Parrsboro) and take out at the provincial park campground on Economy Mountain (Five Islands). The distance is 25 km but I would allow two or even 3 days to explore all that it has to offer. Highlights include Partridge Island and the weir, Clarke Head with the various hues from the sedimentary rocks, the Brothers, the Five Islands and the petrified sand dunes of Economy Mountain. Before your trip you should visit the Geological Museum in Parrsboro and find out more about the origins of this fascinating coastline.

At Five Islands there are a couple of campgrounds on the mainland shore and en route you can pitch a tent on the beaches above high tide. You will be able to find a private spot where no one bother you. Just be aware that if the moon is waxing the successive tides can move up a fair distance. On neaps you can camp comfortably on the east side of Pinnacle Island.

TUSKET ISLANDS

For a journey into our past travel to the western tip of Nova Scotia. Here, where the Bay meets the open Atlantic the Tusket Islands are still used much as they were a hundred years ago. as a base for many fishermen , much as they were over a hundred years ago. From November until end of May, during the lucrative lobster season, the waters are busy with boats and the air with smoke rising from the fisherman shanties. Throughout the year sheep are left free to pasture. Come the summer, though, it is much quieter and except for a few pleasure craft and kayakers it is deserted.
The Tuskets are loose glacial debris left from the last ice age. These drumlins are gradually succumbing to the rising sea level leaving behind beaches of cobble and sand. Seals are common and sea birds (especially earlier in the season) are abundant. The shallow waters and narrow channels can result in rapid tidal flows (5 knots is not uncommon) and along with cold water and frequent fog days caution is required. Although not as extreme as in the upper reaches of the Bay, the tidal range can still exceed 12 feet.

Most of the islands are privately owned but it is easy to find a secluded spot where no one will mind. I suggest a fixed site from which you can explore for a couple of days. One of my favorite spots is on the Spectacle Islands. Circumnavigating the entire grouping would take you less than 30 km but this modest archipelago is full of interesting sites. Highlights are the abandoned light stations on Candlebox and Peases Islands, the beachstone ruins of the Acadian Tuna Club (visited by FDR) on Owls Head, the fishing community of Deep Cove Island, the strong tidal flow between Harris and Big Tusket. Put in (and take out) at the government wharf in Little River Harbour.

ALMA - ST. MARTINS

On the New Brunswick side of the Bay, between St. Martins and Fundy National Park, is an extension of the Appalachian Mountains and the least accessible stretch of coastline between Florida and Newfoundland. Only a few back roads and trails lead to the isolated valleys where decaying timbers and wharf pilings are all that remain of what, over a century ago, were the largest shipbuilding and lumber operations in the country. At Little Salmon River, a corduroy road several feet deep skirts the valley floor and at Martin Head the flood plain is interrupted with huge mounds of sawdust and the posts that once carried the wharves, sheds and machinery of the mill.

Nowadays you may spot the occasional hiker along the Fundy Trail (a wilderness path that skirts this coast) or perhaps the peregrine falcon, back after an absence of many decades. You will certainly find seals. Erosion of the cliffs, has covered the beaches with a vivid melange of ancient granite, basalt, jasper and porphyry. The waters are usually a murky rusty-brown from the suspended particles of sandstone and shale. The tidal currents drag along the gradual slope of this shoreline and, barring storms, you can expect easy sailing. A major exception is Martin Head, where a portage might be necessary.

Put in at Big Salmon River and plan on three days for the sixty plus kilometer journey to either Wolfe River, in the park, or the village of Alma (just beyond). Camping is “free for the taking” (except on the Goose River site in the park) either along the open coastline or in the valley. My favorites are Little Salmon River, Azors Beach and Sealy Beach. Avoid an overnight stay at Martin Head (especially on the weekends), unless you’re up for a party. ATV’s can, and do, make it down the fifteen-kilometer trail.

THE FUNDY ISLES

Lying even closer to the United States than the Canadian mainland, at the northern entrance to the bay this seductive archipelago is a striking juxtaposition of land and sea, where quaint coastal villages and struggling coastal forests, border a littoral zone than can stretch out hundreds of meters. A highlight is the West Isles, a collection of sand and rock, seaweed and woods, that dots the waters between Deer Island and Campobello (where FDR would spend his summer holidays). Some of these outpost scarcely breath air at high water, while others are igneous outcrops that reach over 350 feet and cover hundreds of acres. Vestiges of an earlier time remain but except for the bald eagles, herons and seabirds, all are now uninhabited. Surrounding the islands fishermen tend their traps, salmon cages and especially weirs, ingenious devices of poles and nets that trick the herring into entering and then disorientate them so that they can't escape.

While most of the Fundy Isles are private, if you find a secluded spot no one will bother you. An official campground, at the southern point of Deer Island, provides a view of Old Sow, a gigantic whirlpool created by the tidal flow which reaches across to the US mainland. There is concern with a proposal to build a LNG terminal on the Maine side and the huge tankers that would need to navigate these difficult waters.

SHUBENACADIE RIVER

At the apex of the Minas Basin the Shubenacadie River, offers a unique sea kayaking experience. Twice a day the incoming tidal flow races over the sand flats and enters the river mouth, pulsating inland with a mixture of standing waves (some as high at 12 feet), eddies and whirlpools - all of which are constantly changing. This is not for the faint at heart but is actually quite safe in mid-summer. The water is very warm (over 70F), the flow is inland and not out into the open ocean, and the shoreline and bottom is mostly mud and sand. The entire journey take only 3-4 hours.A highlight of the "Shubie" is being able to surf with no fear of ending up on a hard sand or rocky beach. I recommend that you initially go with someone familiar, if possible. A detailed description can be found in my guide *Sea Kayaking in Nova Scotia* .

Since my circumnavigation of the province over 25 years ago I have been back to the Fundy many a time and there is scarcely a scrap of coastline that I haven't explored in canoe or kayak. The incredible ebb and flow never ceases to amaze and the shoreline is never the same. With a different the tide level a familiar route can be completely modified. What were once tiny islets that we poked among, may become isolated pinnacles draped with olive green seaweeds. Rivers and streams may disappear under a beach of cobble and sheer cliffs that overhung my boat under are now hundreds of meters from the water's edge.

TRIP PLANNER

SAFETY CONSIDERATIONS:

TIDAL RANGE: Tides affect the coastal paddler. Extreme tides will, at times, have an extreme effect. The degree will depend upon the shoreline and sea floor features, the weather, and your position in the tidal cycle (i.e., neap, spring, or somewhere in between). Your initial concern will probably be how far you will have to lug your boat to the water. In areas with usually a steep slope, such as Cape Chignecto, this distance may be minimal. However, over the gentle grade in upper reaches of the bay, a landing or launch at an inappropriate time could involve a plod through hundreds of meters of soft ooze.

En route, keep a sharp eye on the water level - and your gear - when stopping for a break. On more than one occasion I've had to scurry after a precious piece of overpriced equipment heading off to New England. Conversely, inattention may leave you and your fully laden kayaks stranded hundreds of meters above a rapidly receding shoreline. When setting up camp, pay more than cursory attention to what your tent site might look like a two in the morning - especially during the full moon!

CURRENTS: You must be particularly vigilant with the currents. Under some circumstances, they can exceed 8 knots, and with an opposing wind dangerous standing waves can evolve rapidly. Particularly areas of caution are headlands, narrow passages, and sudden shallowing over reefs and shoals. These are all situations where the

currents speed up in order to get through, around, or over an obstruction. Whirlpools that will grasp your kayak and pull you under are mythical musings, but large eddies do exist and can be confusing. Although you might be going "with the tide," you could still be paddling against the current. Frictional drag close to shore will slow the currents, and it often matters little whether you are paddling with or against the flow.

On the other hand, in calm weather the bay can be flat, reminiscent of a large inland lake. Ocean swells are absent and there may be no surf—features. However, this serenity is often transient and can change quickly, especially when the tidal flow reverses. The wind may increase dramatically, transforming a peaceful scene into a caldron of white caps and standing waves in minutes.

WATER TEMPERATURE: The Bay of Fundy waters can be quite cold! - even in mid summer. The constant turbulence mixes the colder bottom with the surface layers, maintaining a temperature that rarely exceeds 13°C (55°F). An unexpected plunge into this milieu, without adequate protection, can have tragic consequences. Consider wearing a wet or dry suit. An exception to this generalization is in the Minas Basin, and where the water can warm up considerably as it flows over the intertidal flats.

CLIMATE: The climate in the Bay of Fundy is similar to the Atlantic coast, although the air temperatures if often warmer. It is almost surrounded by land. Fog, however, is very common since warm, moisture-charged continental air condenses as it crosses the bay. Summers have passed in which the sun has not been seen until late August, especially in outposts like the Fundy Isles.

ROUTE DESCRIPTIONS :
For details on Cape Chignecto, Five Islands, Tusket Islands, Shubenacadie consult *Sea Kayaking in Nova Scotia* (Scott Cunningham, Nimbus Publishing, 2013).

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