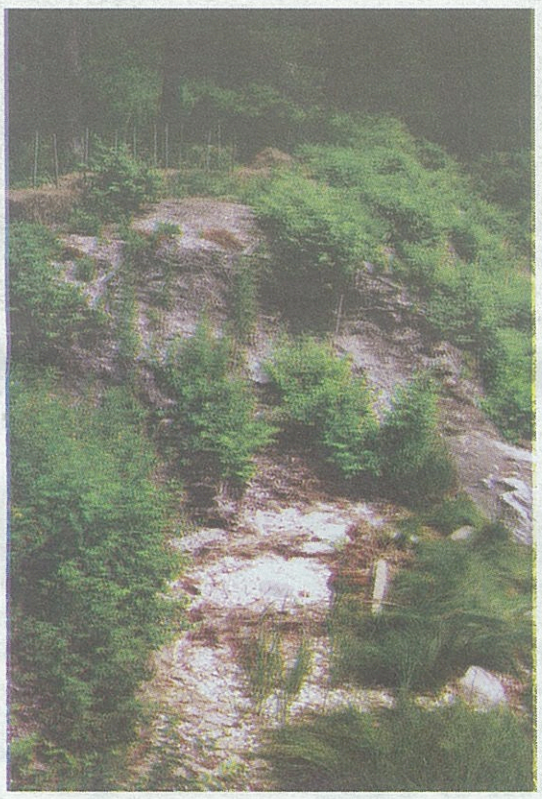
Archaeology *continued from Page One*

can tell us what people ate, how they fished and hunted, how they buried their dead and how their lifestyles evolved with the changing climate and sea levels. The little information archaeologists know about these ancient cultures, in fact, came mainly from rummaging through their garbage.



Coastal erosion and land development are causing shell middens dating back thousands of years, to crumble into the sea. *Photo: Andi Rierden*

But erosion from rising sea levels, land development, vandalism and other assaults are contributing to the middens' demise. Bourque is among a chorus of archaeologists in the Gulf hoping to change the public's perception of the ancient remains and encourage communities to rally for their protection. In addition to their cultural significance, the archaeologists say, shell middens and other historic sites can reveal how ecosystems developed across the long march of time and help clarify the underlying causes of ecological change. In turn, the knowledge can be translated into grounded policies for restoration and management.

In a study published last year in Science magazine, Bourque, along with a team of ecologists, archaeologists and marine biologists, drew from historic records to uncover past evidence of seas teeming with large animals as well as scores of shellfish and oysters so vast they posed hazards to navigation. Their data showed that historical overfishing of the world's seas triggered current ecological collapses—many of which have been mistakenly attributed to pollution. The researchers found a direct link between removal of key predators such as sea otters on the West Coast, for example, and Atlantic cod in the Northeast and how that has undermined the food web, unleashing a chain of ecological instability from toxic algae to diseases.

Bourque refers to the study as "the manifesto."

"Using the historical record showed how humans have disrupted the bottom up productivity of the oceans," he says, emphasizing that ecological problems have deep historical roots, therefore protecting artifacts and ancient refuse is critical.

Stealing from the past

While vandals have always looted archaeological sites–from middens to rock-filled cellars and shipwrecks–the rise in global commerce, including services like the online auction house, *eBay*, has made it more tempting. Even though various federal, state and provincial laws aim to protect the remains, many sites are hidden far from public view. "It's a major problem," says David Christianson, Nova Scotia's provincial archaeologist. "On the enforcement side, there are not enough people to patrol the sites and even if there were, with all the other crimes, it's not a priority. By the time we hear about it, the vandals are long gone."

He says a range of researchers depend upon archaeological sites, citing the work of marine biologists like Dr. Alfonso Rojo, who is developing a reference collection of fish skeletal structures from the Maritime provinces based on examining shell middens. "These sites are a repository for a whole range of data," Christianson says. "If we're trying to understand climate change and animal populations, it is pretty hard to come up with long-term plans if we don't have the information from the past."

Vandals are not the only problem. Victor Mastone, the director of the Board of Underwater Archaeological Resources of the Massachusetts Executive Office of Environmental Affairs, says even casual collectors from tourists to scuba divers can corrupt the historic record. Mastone recalls one sports diver who surfaced from Massachusetts Bay towing a frame from a shipwreck. "Because he didn't know anything about preservation, it dried up and became powdery and totally useless," he says.

In another instance, Mastone was called in to investigate some stone circles on the Taunton River. "But by the time we got down there, most of the stones had been turned over. So now we don't have the shape we wanted and the context of the site has been disturbed. People don't realize that any disturbance of a site can destroy information."

The human record

When archaeologists talk about the human record in the Gulf of Maine they're referring to a span going back 12,000 years. But it took many more thousands of years of glacial movement to create the setting for these ancient pioneers to migrate into this new land. In short, the Gulf of Maine as we know it today owes its existence to the Laurentian Ice Sheet—the last major ice sheet–that advanced from northern Canada and reached southern New England about 21,000 years ago. A few thousand years later, the ice sheet began retreating, exposing the land. Elevated banks in the Gulf remained above sea level for thousands of years. Animals and plants spread there from ice-free areas in the United States.

To get an idea of what the Gulf looked like 12,000 years ago imagine Stellwagen Bank. The bank stood well above sea level and may have been connected to Cape Cod. According to computer-generated models, lakes, swamps and marshes probably dotted the landscape, with tundra shrubs and grasses covering the bank top. Beaches, sea cliffs, spits and lagoons lined the shoreline. In recent years, fishermen have dredged up the teeth of woolly mammoths and mastodons from Stellwagen and Georges banks, giving some evidence of the animal life of the time. Humans possibly followed the herds out onto the banks and onto the continental shelf. By 11,000, the melting glaciers continued to return water to the ocean basins causing a rise in sea level. About 10,000 years ago, the rising waters inundated Stellwagen Bank.

Because sea levels have risen about 300 feet since pre-historic times, most of the early sites older than 5,000 years have been washed away. Even so, Mastone says, bathymetric and geophysical models can predict where sites might be. Models developed by Mastone and his team were used recently by a natural gas company to chart possible historic sites the companies by law must avoid before pipelines are laid along the sea floor in Massachusetts Bay. While the remote sensing technologies did not detect sites in the area mapped for dredging, that doesn't mean they don't exist elsewhere, Mastone says, adding, "We have all these intuitive suspicions as archaeologists that there are sites out there."

The Debert site in Nova Scotia, dating back 10,600 years and Bull Brook, in Ipswich, Massachusetts, dating back 9,000 years are among the Gulf of Maine's largest and earliest human encampments on land. Both sites contained similar signs of Paleo-Indian cultures. Stationed near caribou migration routes, the camps are surrounded by a cluster of smaller seasonal sites. Fluted spear points found at the sites indicate the people were technically astute at hunting big game.

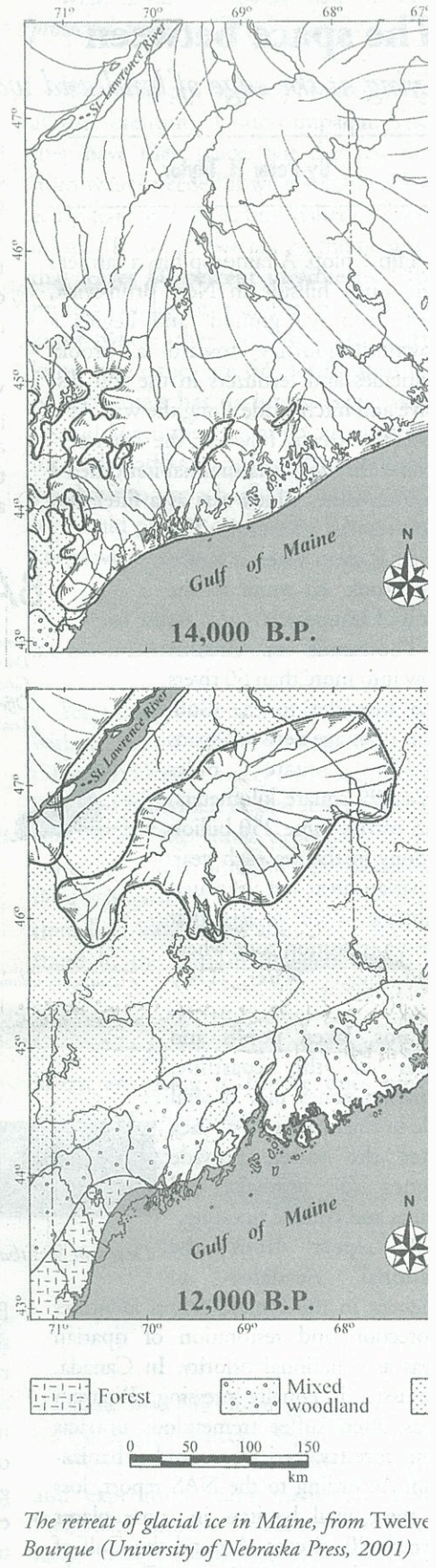
Later cultures adopted a maritime-oriented lifestyle. The Seabrook Marsh Site in New Hampshire discovered in 1954, dated back 4,000 years and produced small, stemmed projectile points made from animal bones used to fish cod and swordfish. A major site first excavated in the early 1970s on North Haven Island in Penobscot Bay, Maine, called Turner Farm, details the record of what some archaeologist call the Red Paint People, named so because of the red ocher they placed in their grave sites.

Also referred to as the Moorhead phase, after archaeologist Warren K. Moorhead, who excavated many of those sites in Maine, the Red Paint People took full advantage of the Gulf's biological productivity. The people were highly skilled swordfish hunters and also ate an abundance of cod, shellfish, deer and quahogs. They left barbed hooks made of deer or moose bone along with elegantly carved slate bayonets, chisels, plummets, gouges and daggers. The vast collection of artifacts from this period can be viewed at the Maine State Museum as part of a permanent exhibit.

About 3,800 years ago the Red Paint People vanished mysteriously. One possible explanation was the disappearance of swordfish, brought about by the cooling of the water.

The Red Paint People were replaced by a distinct culture called the Susquehanna, whose remains were also found at Turner Farm and in other parts of New England, Nova Scotia and New Brunswick. Chemical analysis of bones found in Susquehanna shell middens indicates they survived more on inland resources than marine life. They probably ate a mix of mollusks and game.

David Black, an archaeologist at the University of New Brunswick, has dedicated the past 20 years to piecing together a narrative of the Bliss Islands in the Quoddy region of southern New Brunswick. His story spans from the tail end of the Susquehanna era, 3,500 years ago to the early 1800s. Situated at the confluence of the U.S. Gulf of Maine and the Bay of Fundy, the Bliss Islands are surrounded by a highly productive



The retreat of glacial ice in Maine, from Twelve *Bourque (University of Nebraska Press, 2001)*

mosaic of marine and inland life; in short, a great place for early inhabitants to set up camp. The native people, Black says, "Must have thought this was heaven on earth."

Four thousand years ago, the islands were one land mass with the average high water line located where the average low water line is today. Today these three islands continue to be shaped by the rising seas. Occupied by ancestors of the Passamaquoddy people of southern New Brunswick and northern Maine, Black found some of the sites to be remarkably intact. Excavations have produced a bonanza of artifacts, including 18 species of shellfish.

At one location called the Weir Site, "By the time that native people abandoned it about 1,000 years ago there was this build up of forest soil that was