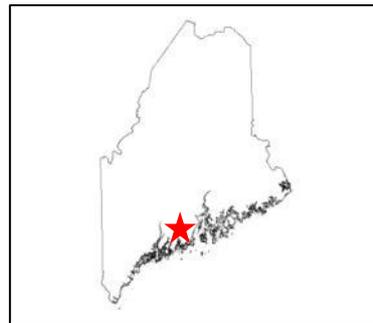


Geologic Site of the Month  
April, 2011

***Sea-Level Rise and the  
Damariscotta River Oyster Shell Middens***



44° 2' 18.79" N, 69° 31' 19.68" W

Text by  
Tom Weddle



## Introduction

Archaeological evidence indicates that about 12,000 years ago, people began migrating into areas that had once been occupied by the last great ice sheets, including the region we know today as Maine. From the middle and late 1800's up to the present time, researchers have studied places where these people left evidence of how they lived. In the coastal region of Maine, shell middens, also known as shell heaps or mounds, are one of the more common types of sites that document methods of food-gathering. Two of these middens are by far the deepest such sites on the Atlantic coast north of St. John's River in Florida (Bourque and Weddle, 1995).



**Figure 1.** These two men are standing next to the Whaleback Shell Midden in Damariscotta in 1886. The pile of oyster shells was once more than thirty feet deep.

## Shell Middens

The [Whaleback Midden](#) (Figure 2) and the Glidden Midden (Figure 3), are located respectively in the towns of Newcastle and Damariscotta, opposite one another along the shores of the Damariscotta River (Figure 4).



**Figure 2.** Relict of Whaleback Midden as found today at Whaleback State Historic Site.

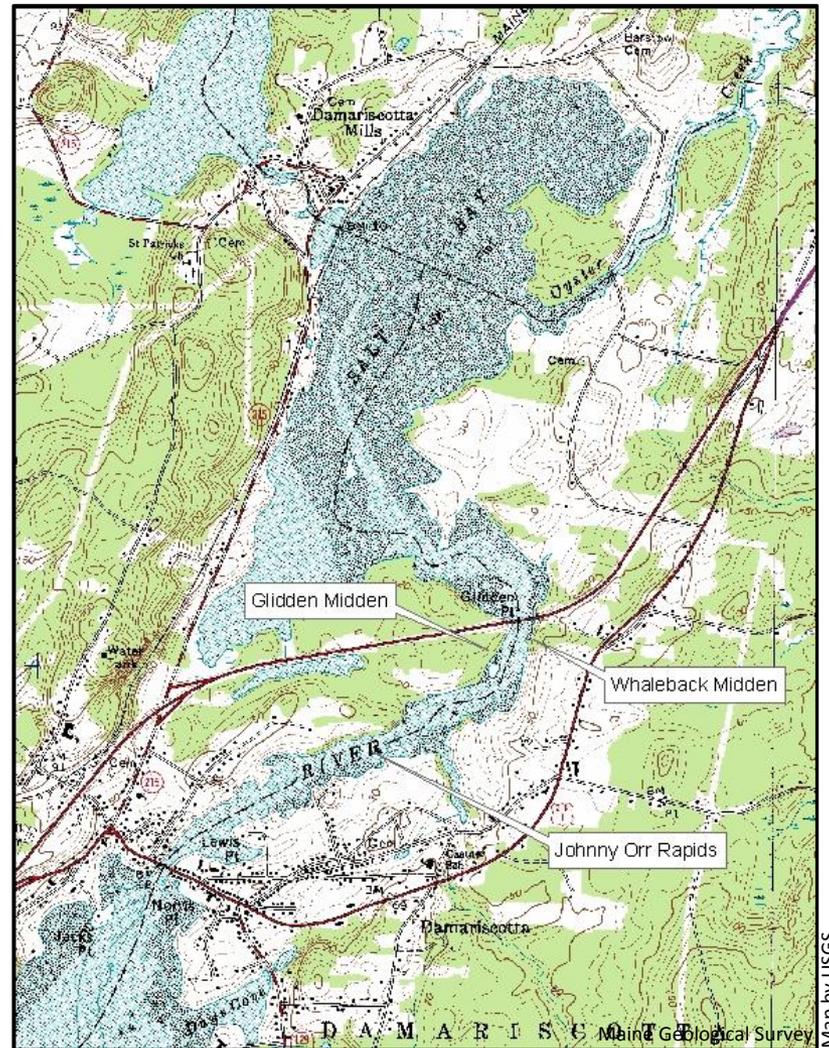
Shell Middens



**Figure 3.** Glidden shell midden viewed from the Whaleback State Historic Site.



Location

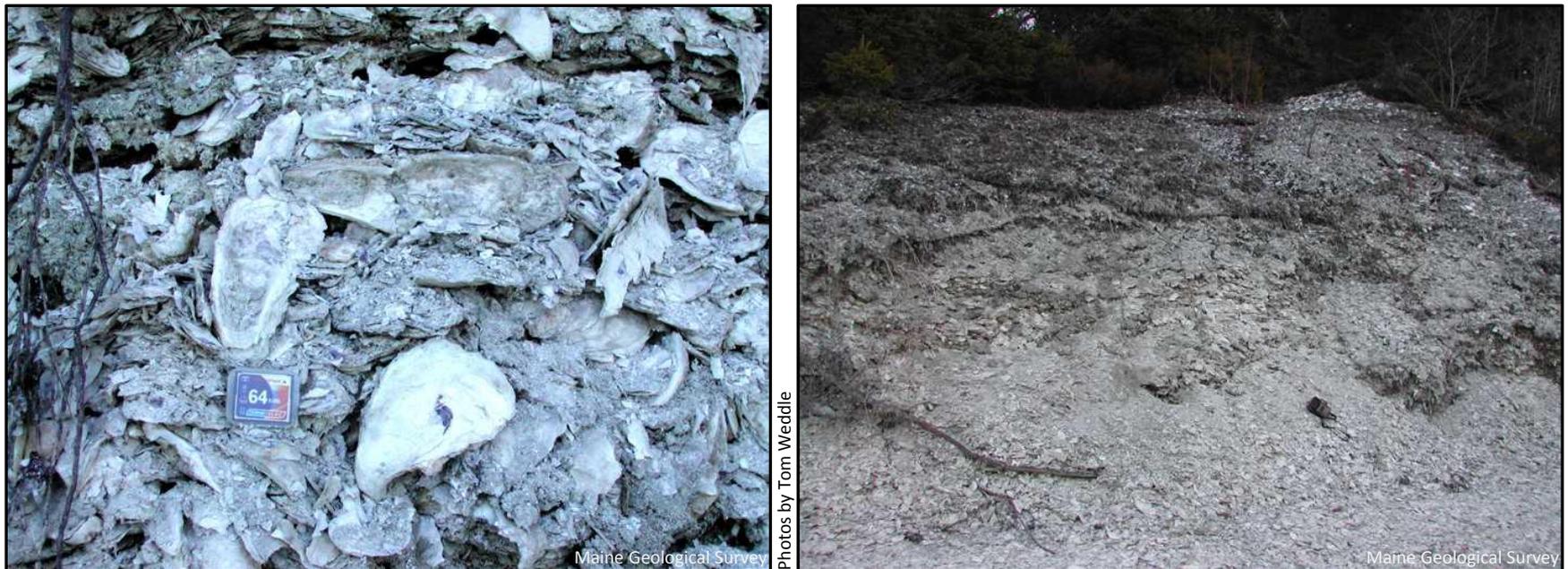


**Figure 4.** Portion of the Damariscotta 7.5-minute quadrangle showing location of the Glidden and Whaleback Middens.



## Middens

The term "[midden](#)" refers to a human refuse pile or dump, in this case, one primarily made up of bivalve shells. Most of the middens consist of clam shells; however, the middens discussed here are predominantly comprised of oyster shells (Figure 5)! The history of the original oyster beds does have an important geological component, hence the reason for this site of the month.



**Figure 5.** Oyster shells in Glidden Midden.

## Sea Level Rise

Prior to the region becoming inhabited, it was buried under a huge glacier of the last Ice Age. By around 28,000 years ago, the ice began to melt and the glacier retreated. As it melted, the water that was trapped in the glacier began to fill the ocean, causing it to rise world-wide. The land formerly covered by the ice was flooded, and the ocean continued to rise (for more information, read [The Surficial Geologic History of Maine](#)).

American oysters (*Crassostrea virginica*) were common in the Gulf of Maine about 2,400 years ago (Sanger and Kellogg, 1989). Since that time, [rising sea level](#) has allowed colder oceanic water into the coastal bays (Belknap, 2008). The cooling waters inhibited oyster reproduction, and the American oyster was one of a number of species that retreated up Maine rivers. In the Damariscotta estuary, oysters continued to thrive in brackish, warm water environments where spawning could occur in localized protected basins.



### Sea Level Rise

In the Damariscotta River valley, boulder accumulations, possibly eroded from glacial moraines across the valley (Thompson, 2009) and bedrock ledges acted as threshold barriers between the rising sea level and the upper part of the estuary (Goldthwait, 1935; Sanger and Kellogg, 1987). One of these thresholds, known locally as "Johnny Orr" or "Johnny Orr Rapids" is thought to have been the barrier that allowed the development of the Glidden and Whaleback oyster beds, which eventually became a significant food resource for the native people (Sanger and Kellogg, 1987).

Continued rising of sea level increased the salinity of the basins, allowing the introduction of other predators, notably the oyster drill. By the time of the arrival of European colonists, the extensive oyster beds were significantly reduced (Sanger and Kellogg, 1987). Moreover, after sawmills were built upriver of the beds, the oyster population was nearly decimated because of sawdust released in the river which suffocated the oysters (Cushman, 1882). Today, with the sawmills gone, there is once again a vibrant shellfish aquaculture business in the Damariscotta region, including [oyster farms](#) re-introduced by seed oysters.



### Johnny Orr Rapids

As an aside, the name of the rapids, Johnny Orr, is attributed to a local trader, John Orr, who settled in the region. Local deeds in Bristol identify a certain tract "where John Orr formerly possessed and lived, suggesting that Orr was a squatter being dispossessed" by the true owners (Warner, 2006). Orr apparently moved to a new location and built a home, later bought by John Fitch after Orr's death by drowning in 1792 (Warner, 2006). Local lore regarding the name "Johnny Orr" for the rapids is that it was at the rapids site where Orr met his demise, drowned when his boat capsized there as he was traveling in the area selling his wares to other landowners (personal communications, March 2011; Paul Bryant and Calvin Dodge, Damariscotta, Maine).



**Figure 6.** Johnny Orr Rapids, a narrow stretch along the Damariscotta River. (see Figure 3 for location)



### Mining the Midden

The Glidden and Whaleback Middens were known by early explorers and settlers (Figure 7), and they were reported in the first geological survey of Maine (Jackson, 1839). Jackson states: *"From our measurements, it will appear that there are no less than 44,906,400 cubic feet of shells in this bed; and since they are generally of large size, they may be easily burned, and will make about ten million casks of lime. Hence it will appear that this bank may be drawn upon quite extensively without exhaustion, while the lime is a most valuable article for the improvement of soils. It will be easy also to grind the shells to fine powder, in mills -- an operation which will answer better for agricultural purposes, since the amendment will remain more permanently in the soil. Good mill sites may be obtained, and if the shells are reduced to fine powder and packed in casks, it might be advantageously exported to other places for sale."* (Jackson, 1839, p. 57)



**Figure 7.** (Left) Postcard view of Glidden Midden from Whaleback site. (Right) Postcard mailed in 1922 of Whaleback Midden prior to mining operations, view from Glidden Midden.



### Mining the Midden

It wasn't until 1886 that the Whaleback Midden began to be mined (Figure 8). This operation lasted for about three years. Artifacts discovered in the mining of the midden included "... charcoal, bones of fish and animals, and of the human frame; stone hatchets, chisels, and deep sea sinkers; bone stilettos, and tools of art and the chase; pottery, sometimes ornamented; and even lumps of clay ...)" (Jackson, 1839).



**Figure 8.** (Left) Excavation operation at Whaleback Midden; note screening boxes at left in photo as well as wooden barrels and casks on right side. (Right) Artifacts discovered during mining.

### Mining the Midden

*"Incredible as it may seem by today's preservation standards, that mining effort largely destroyed the huge Whaleback Midden to produce an additive fed to chickens to strengthen their egg shells. The mining business, Massachusetts-based Damariscotta Shell and Fertilizer Company, built several structures here to house this work. The structures contained a fertilizer factory, mill (or grinder), dryer (including a furnace), well, and storehouse. Workers packed and shipped more than 200 tons of shells during the operation, with much of the mining apparently completed in the first year. Indeed, after only three months, Abram Gamage wrote: "The shell heap is dwindling away and after this month the grandeur of the heap will be so far gone as not to be worth going to see." The buildings burned in 1891 and the operation was abandoned. Before the company's mining activities, Whaleback Midden extended 400 feet uphill from the river bank and was up to 15 feet deep. Afterward, only a small portion remained."* (quoted from [Whaleback Shell Midden](#) Historic Site)



## Access to the Midden

The [Whaleback Shell Midden](#) is a State Historic Site, owned by the Maine Department of Conservation Bureau of Parks and Land, and managed cooperatively with the [Damariscotta River Association](#). A half mile loop trail leads to the remains of the shell midden.

The Glidden Midden is managed by the Damariscotta River Association. The Salt Bay Preserve Heritage Trail leads to the midden on the banks of the river. A printed field guide to the upper river region of the Damariscotta River is available from the Association.

The author wishes to thank the Damariscotta River Association, Steven Hufnagel (Executive Director), and Steve Spencer (Stewardship Director), for assistance and access to the sites. For more information on its properties, as well as information about the middens, contact the Damariscotta River Association.



## References and Additional Information

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[Damariscotta Shell Middens](#)

[Whaleback Shell Midden](#)

