THE FIRST HUMAN INHABITANTS
The earliest known human inhabitants to reap the benefits of Great Bay Estuary and its shores were the Native American Tribes. These fishermen and hunter-gatherers lived on a rich harvest of the abundant shellfish, finfish and waterfowl that inhabited the Estuary. They were content to live with nature, and took only what was necessary for survival. Evidence of ancient shellfish harvests still exists today in the form of oyster and clam shell heaps (called middens) along the Estuarine shore and in some marshes.

Over several thousand years, these first settlers had little impact on the Estuarine environment. There were not many Indians, and the natural resources were many and varied. True, they did have some impact on the environment through clearing small areas of land for crops, such as corn, squash and beans, using slash and burn practices. However, careful use of crop rotation practices which allowed the fields to lie fallow in some years, and fertilization with fish and seaweed meant that it was possible to harvest the same fields for generations without exhausting the land. There was little erosion from these early cultivated lands. Primarily spring to fall residents, the Indians moved inland with the onset of winter.

* Estuary with a capital "E" refers to the entire Great Bay Estuarine system

EUROPEAN SETTLEMENT
With the arrival of European settlers in the early 1600's, human activities became a major force shaping and altering the Estuarine environment. The early settlers found a region rich in natural resources: the waters teemed with fish (so many that they were used as fertilizer); oysters were abundant and clams plentiful that they were fed to hogs; during the spring and fall migrations the skies were darkened with wildfowl; and deer, bear and other wild game abounded in the adjacent upland forests.

THE ARRIVAL OF THE GUNDALOW
The early settlers depended on the tidal rivers and estuarine waters for their livelihood and transportation. Around the early to mid 1600's, a simple square-ended flat bottomed vessel without a sail made its appearance. Known as "gundalows" these humble barge-like vessels had a major and lasting impact on the economic development of the region. This vessel, which was as commonplace then as trucks are today and seldom get a mention in history books, had a dramatic impact on the economic, military and cultural history of the Great Bay Estuary, and indeed New Hampshire itself. Without the gundalow, the development and growth of the towns around the Estuary would have been severely hampered.

The early gundalow was a simple 20-30 foot long, open barge-like craft, rarely rigged for sail, using poles for propulsion. In a video taped interview with NHF&G in 1991, Phil Johnson, a former Great Bay waterman and fisherman recalled that the early gundalow "...had a running board on the side so that they could pole and run along the boards. They would pole, run to the other end and pole, and so on. This was where the running boards of cars first got their names from". Over time, the gundalow acquired a fixed rudder and tiller, platforms or decks at either end, a cabin (known as a "cuddy") for living quarters and a simple square sail. By the late 1800's, the gundalow was more streamlined in shape and had a "lateen" or triangular sail. These later models were 60 feet or more in length.

The gundalow was a very utilitarian vessel, and this was the key to its success. Being flat bottomed, it could travel up almost any shallow river tributary as little as four feet deep, a depth impassable to ships. That there were few riverside wharves did not matter; the gundalow could come right up to the bank. Riverside storehouses were built with an overhanging upper story for this purpose. The gundalow would
pull up to the bank beneath the upper storey, and goods were hauled directly into the storehouse. Despite their bulky and somewhat clumsy appearance, the gundalows were surprisingly easy to maneuver in the swift currents of the Piscataqua, and provided an extremely cheap and effective means of transportation. They were dependent on the tides, sailing upstream on the incoming tide and downstream on the outgoing tide. Under favorable conditions of wind and tide, the gundalow could pick up a fair speed, accomplishing the 25 mile trip from Portsmouth to Exeter in a little over two hours.

The variety of cargoes carried by the gundalows during their brief 200 year history demonstrate the evolution of an increasingly sophisticated economy in the towns bordering the Great Bay Estuary. The gundalows played an important role in shaping the region we know today. Much of the history of the Great Bay Estuary since the arrival of the European settlers up until the end of the 19th century is encapsulated in the typical gundalow cargoes of the day.

AGRICULTURAL & FISHING PRODUCTS

The earliest gundalow cargoes were agricultural and fishing products, such as salt hay, fish, lumber, salt and farm produce. Salt hay, used for horse and cattle fodder was a part of New England agriculture that had all but vanished by the turn of the end of the 19th century. Each fall, farmers brought their horses on the gundalows to the high marshes to harvest the salt grass at neap tide. The gundalow then transported the hay downriver on the rising tide. For local use, the cut hay was raked into beehive shaped stacks, and loaded onto staddles, a circle of wooden posts (still visible in some marshes today) that served to keep the hay high and dry. For local use, the cut hay was raked into beehive shaped stacks, and loaded onto staddles, a circle of wooden posts (still visible in some marshes today) that served to keep the hay high and dry. The farmers returned in winter when the marsh surface was frozen to transport the hay over land to barn storage. Much of the hay was transported via schooners to Boston where it provided fodder for the carthorses. It was also used as mulch for crops (especially strawberries) because the salt hay would not grow or sprout in the upland, and it was even shipped out for packing bananas being imported from other lands.

The Great Bay Estuary was a significant hay producing area in the region. "They loaded an awful lot on the Oyster River. The hay was the same as our automobile fuel today. Everything depends on transportation which in turn depends on fuel. New Hampshire salt hay provided the "fuel" for the horses and oxen pulling wagons along the cobbledstone streets of Boston, so hay was the fuel for transportation in Boston. This is something in transportation that people lose sight of today." (Phil Johnson, 199 interview with NHF&G).

A profitable fishing industry thrived in the Estuary through the first half of the 18th century. Salmon were particularly abundant in the Salmons Falls and Cocheco Rivers. A report by C.F. Jackson in 1944 cites a Portsmouth merchant recovering 1,000 tons of salmon in a single season in 1717. Salted alewives were sent to Boston, and exported to the West Indies. The wealth of fish harvested from the Estuary also included "cod and haddock... bass, shad, mackerel, herring, blow-fish, alewives, pollock, firrost fish, perch, flounders, sturgeons, lumbs, eels, seals, salmon,... and all sorts of shellfish such as lobsters, crabs, cockles, clams, mussels, oysters etc." (From A Biological Survey of Great Bay, NH by C.F. Jackson, 1944). The gundalows transported the cured fish from the Estuarine waters downstream to Portsmouth for trade with other American coastal cities and for export to Canada, Spain, Portugal and the West Indies.

LUMBER

Lumber (mainly white pine and oak) was another important natural resource harvested from the shores of the Estuary. The water powered sawmills were located on the waterways, which facilitated easy export. By 1700, there were an estimated 90 sawmills along the Piscataqua River. The gundalows transported lumber from the riverside sawmills to local shipyards and to the waiting schooners and coastal ports for export and use elsewhere in the US.

However, the profitable sawmills had a down side. Sawdust from the sawmills presented an early estuarine pollution problem. For each 1,000 feet of lumber cut, approximately 40 bushels of sawdust were produced and disposed of in the Estuarine waters. Historical reports recall a thick layer of sawdust coating the mudflats at low tide. Sawdust smothered and destroyed finfish spawning beds and young fry. In 1750, a visiting merchant remarked that salmon weren't returning to the Piscataqua as much as in the past because of sawdust choking the waterways (Jackson, 1944). Portable sawmills still existed along the Estuarine tributaries as late as the 1950's.

SHIPBUILDING

Along with lumber, shipbuilding became a thriving business. By the mid 1700's, numerous sawmills and
shipyards dotted the banks of the Piscataqua River and the other tidal rivers flowing into the Estuary. The gundalows plied the tidal rivers with lumber and cordwood for shipbuilding operations at the local shipyards, including the Portsmouth Naval shipyard.

Shipbuilding at the Dover boatyards produced as many as six vessels a year during the 1800's. The shipbuilding industry and the ship and packet lines relied on the gundalows to support their many activities. Shipbuilding operations in turn spawned profitable businesses for carpenters, shipwrights and sailmakers, further stimulating the coastal economy.

Lumber and shipbuilding operations continued throughout the 200 years leading up to the Industrial Revolution. By the late 1800’s, steam powered vessels built of steel replaced wooden sailing vessels. The shipyards were unable to compete with the cheaper building materials, and the shipbuilding industry declined.

Hill in Boston were built of the high quality Dover Point brick. The gundalows were instrumental in transporting bricks from the brickyards to the building sites and to the schooners for transport to Boston and other nearby centers. The brickyard kilns burned around 20-30,000 cords of wood a year, which represented many gundalow loads. However, since the clay was a limited resource, the Estuarine clay banks were eventually exhausted, closing down the brickyards. Extraction of the blue clay resulted in permanent modification to the Estuarine shoreline.

COTTON MILLS

During the Industrial Revolution, the red brick mill became a ubiquitous part of the Estuarine landscape. The major gundalow ports of Newmarket, Durham, Dover and Portsmouth contained some of the largest mills of their kind in the world. The cotton industry took hold in the early 1800’s, with five mills built in Dover by 1827. Known as the Cochecho

BRICKYARDS

The blue marine clay found along the Estuary shores was found to be particularly suitable for brickmaking, spawning a major industry. At its peak in the late 1800's there were at least 43 brickyards, with the greatest number at Dover Point. These bricks were used locally in the construction of mills, factories and breweries, and also found a market throughout New England. Many homes on Beacon Manufacturing Company, these cotton mills dominated Dover's economy for over 100 years. Dover was an extremely prosperous town during the cotton boom years. Gundalows brought up raw cotton, textile machinery, cordwood and coal to the factories, and transported the finished cloth downstream to the packets and ships.
A LUCRATIVE EXPORT BUSINESS
Sooner or later, the gundalows docked Portsmouth, at the mouth of the Piscataqua. In the early years Portsmouth's economy was based on fishing and pinemasting. Following the American Revolution, Portsmouth became a thriving export center in the region, being involved in lucrative export trade with the West Indies. Exported cargoes included pine lumber, dried fish and beef, while molasses, rum, sugar and cocoa were imported. The gundalow was a critical link in this maritime economy, transporting products from the riverside operations to the waiting ships, and bringing the imported products upstream to the Estuarine towns. Ironically, by the 19th century, the self-sufficient farming and fishing community of the early days could no longer feed itself and had to import large quantities of flour, butter, corn and cheese. The gundalows transported these products as well.

THE GUNDALOW AND THE AMERICAN REVOLUTION
The gundalow played an important, but little known role during the colonial wars and the American Revolution. During the Revolution, gundalows were used to carry raiders to Fort Constitution and then transported gunpowder back to the towns along the estuarine shoreline. In 1775, part of General Sullivan's plan to speed the defenses of Portsmouth was to use the gundalows to secure access between the Portsmouth side of the Piscataqua River and Pierce's Island. "... Sullivan explained, "I immediately collected a number of Gondalows moored them head to stern and laid pieces from one to the other & plank across & soon completed the bridge". This pontoon bridge, connecting the island to the mainland, constituted the first link between the two points of land .... The British never breached Sullivan's elaborate defenses during the war, thanks in part to the pontoon bridge, certainly one of the earliest in American Military History". (Excerpt from The Piscataqua Gundalow by R. Winslow).

A CHANGING ECONOMY
With the advent of the Industrial Revolution, the economy of the towns around the Great Bay Estuary started moving from dependence on Estuarine resources to manufacturing and industry. The end of the gundalow era marked the final transition to a consumer based economy. Today, local communities are no longer dependent on the Estury for economic survival and the dominant use of Estuarine waters today is recreational. In the 1930's, there was a move to dam Great Bay and make it into a recreational lake. This plan, which would have cut off tidal flow into Great Bay and devastated the ecology of the Estuary, fortunately never came to fruition. Popular recreational activities today include shellfishing, in particular oystering, waterfowl hunting and sailing. There is also still some limited commercial fishing in the Estuary, such as lobstering in Little Bay and the Piscataqua.

The publication "The Piscataqua Gundalow: Workhorse of a Tidal Basin Empire" by R. Winslow, 1983, was a source of information for this fact sheet, and is highly recommended (and interesting) reading.

The paper is funded by a grant from the National Oceanic and Atmospheric Administration through the N.H. Coastal Program. The views expressed herein are those of the author(s) and do not necessarily reflect the views of NOAA or any of its sub-agencies.

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