

Currents

• A Quarterly Newsletter of the Casco Bay Estuary Project •

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This newsletter focuses on the scientific and technical studies underway at the Casco Bay Estuary Project. Since its inception the Project has looked at a number of issues--how the Bay functions, what levels of contaminants already exist, what the most important current sources of pollution are, and what the most likely historical sources of pollution were.



UNDERSTANDING CASCO BAY – A CIRCULATION STUDY

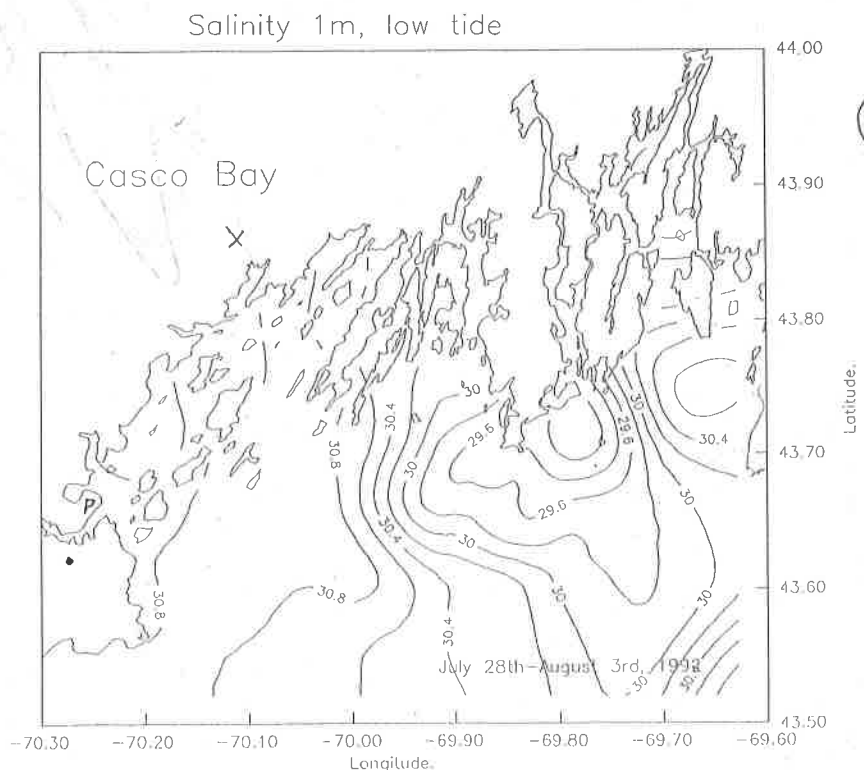
One of the fundamental aspects to understanding Casco Bay is understanding how the water moves in the Bay. Professors Bryan Pearce and Neal Pettigrew from the University of Maine are helping the Project gain this understanding. With their graduate students, Pearce and Pettigrew are developing a computer model of the circulation of Casco Bay.

A general model will show the effect of tides, rivers, and water densities on water movement. The more detailed model of Maquoit and Middle Bays will estimate how long water stays in the bays (flushing time), and how much of the same water gets sloshed back and forth in and out of these bays.

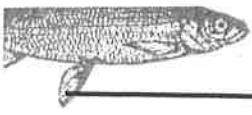
Understanding circulation patterns will help answer basic questions about the Bay. Already, early results are proving interesting. For example, it appears that fresh water from the Kennebec pools near Cape Small and the mouth of the New Meadows River during flood tides. It moves down the coast in pulses of fresh water as the water flows southwest toward New Hampshire and Massachusetts Bay. However, work is continuing to see if these early results hold up to scrutiny.

Though the entire model needs a large main-frame computer to run, the results will be visually displayed on a personal computer (MacIntosh). This graphics program allows one to see how the water moves during different weather conditions and to see how water from one area moves and disperses over several tidal cycles. The circulation study should be completed early this summer.

A public lecture to present the findings is scheduled for June 9 (see lecture listing in this newsletter).



This figure shows the influence of fresh water from the Kennebec River on salinity distribution within Casco Bay



Managing Casco Bay for the Future: Who Should Be Responsible for Protecting Casco Bay?

Almost 120 people turned out to discuss "Managing Casco Bay for the Future: Who Should Protect Casco Bay?" at two public forums held on November 4th in Freeport and November 10th in Gorham. As the Management Committee considers what needs to be done to protect the resources of Casco Bay, it is critical to think about how recommended actions will be implemented. The forums were held to discuss possible management options and gather responses from local government officials, business owners and industry leaders, fishermen and others who depend on the Bay's resources for their livelihood. Farmers, environmental conservation groups, and concerned citizens were also invited to attend.

Charles Colgan, Associate Professor with the Edmund S. Muskie Institute at the University of Southern Maine, presented an overview of management alternatives.

While the possible management alternatives are infinite, those discussed at the forums ranged from a new re-

gional institution with regulatory power that would replace the existing multi-agency oversight of Casco Bay, to a regional agency that would provide technical assistance to homeowners and businesses in the watershed but have no regulatory authority, to a networked system of existing regulatory agencies and technical assistance providers.

Each forum participant was asked to voice their opinions about a regional management. Concerns about a regional approach to managing Casco Bay included:

- *Loss of local control*
- *The addition of another layer of government*
- *Duplication of existing efforts*
- *Need for more funding to establish a regional agency*
- *The political unacceptability of a regional approach*

Advantages cited included:

- More effective and efficient protection of the Bay's resources
- Better information transfer to the public and other agencies
- One-stop shopping for permits and technical assistance

When asked to select a preferred management option most chose either the regional agency with regulatory power, or the regional agency which would provide technical assistance but have no regulatory authority.

"Many participants said they need more information on the severity of the threats to Casco Bay before they can make a final decision on the best management system," says Jeff Jordan, Management Committee member. "It's clear, however, that people are concerned that the existing system is not protecting the Bay's resources effectively and that some change is needed."

The next step for our staff is to prepare detailed reports on the threats to Casco Bay. The reports will define the problems and summarize the data that is currently available on each issue, and help direct management recommendations.

How do we best manage the Bay?

Do we...
Create a centralized agency with regulatory authority?

Centralized agency with limited regulatory power?

Centralized agency that just provides coordinated technical assistance and public education?

Committee with policy-making power only?



Current Pollution Sources Maquoit Bay Study

When there's a pipe discharging pollution from a city treatment plant or an industry, it's easy to know where to look to figure out what pollution is entering Casco Bay. But in rural areas -- areas that represent most of Maine -- it's harder to know what pollution is entering Casco Bay. What are the most important sources of pollution in rural settings?

Answering this question is the purpose of the Maquoit Bay Study being conducted by Horsely Witten Inc. The study's goal is to determine the biggest sources of nutrients (nitrogen and phosphorus, pollutants that at certain levels can cause algae blooms -- blooms that can ultimately cause fish kills) and pathogens (bacteria and viruses that can cause illnesses when people swim in or eat shellfish from contaminated waters). The study is designed to serve as a model for other towns so that they can identify current pollution sources.

The first step in determining the most important pollution sources is to identify the activities that produce these pollutants. For example, farms and homes use lawn fertilizers which can wash into water bodies, and residential septic systems which are not maintained or are located in poor soils can contribute bacteria and excessive nutrients.

Land use maps developed by the town of Brunswick and the Casco Bay Estuary Project will help identify activities. Estimates of the amount of pollutants from different activities will be determined.

To verify these estimates, water samples will be taken at or near these activities to determine actual level of pollutants. Because many pollutants wash off land during rain storms, many of the water samples must be collected during rainstorms -- making sample collection a logistical nightmare of coordinating people with weather forecasts.



The outcome of the study should tell us what activities and structures -- farming, lawn care, septic systems, roads, wildlife, playing fields, etc. are the most significant sources of pollution to Maquoit Bay. The results will direct future recommendations developed by the Project and by towns, especially with regard to shellfish areas.



View of upper Maquoit Bay

Fact Sheets on Casco Bay

The Casco Bay Estuary Project has produced a watershed poster and a series of fact sheets to better inform the public about the Project itself, and threats facing Casco Bay. Included with this newsletter is "A Clean Bay Begins At Home" offering tips to homeowners on protecting the Bay. Other fact sheets available include "What is the Casco Bay Estuary Project?" and "Nonpoint Source Pollution".

Do you want to know more about harbor seals, great blue herons, piping plovers, lobsters, bald eagles, pogies, striped bass, or black ducks? Information about these important fish and wildlife species are available for free through the Project, courtesy of the US Environmental Protection Agency. Teachers may find them particularly useful.

Call or write the Casco Bay Estuary Project for your free copies.



Five Ways You Can Help Protect Casco Bay

- ① Pet waste contains bacteria and viruses that can contaminate shellfish and swimming areas. Don't use beaches for your pet's rest room.
- ② Pet wastes on pavements will be carried by stormwater into local water; walk your pets in undeveloped or grassy areas.
- ③ A single quart of motor oil can contaminate thousands of gallons of water. Never dump motor oil, antifreeze, transmission fluid or other automobile chemicals into road gutters, storm drains, or catch basins.
- ④ Store used motor oil in a container (old plastic jugs are excellent for this purpose) and then dispose of properly at your town's collection site, or call the League of Women Voters Used Motor Oil Information Line at 775-0957.
- ⑤ Do not mix waste oil with gasoline, solvents, or other liquids. This contaminates the oil which may be reused, increases the volume of waste, and may form a hazardous chemical.

Existing Pollutants Sediment Contamination Study

In 1989 the *Troubled Waters* report by the Conservation Law Foundation caused widespread concern about severe pollution in Casco Bay. To address these concerns, the first technical work undertaken by the Casco Bay Estuary Project was to study levels of contaminants in the sediments of Casco Bay (see winter 1993 *Currents*). Texas A & M University was contracted to do the study.

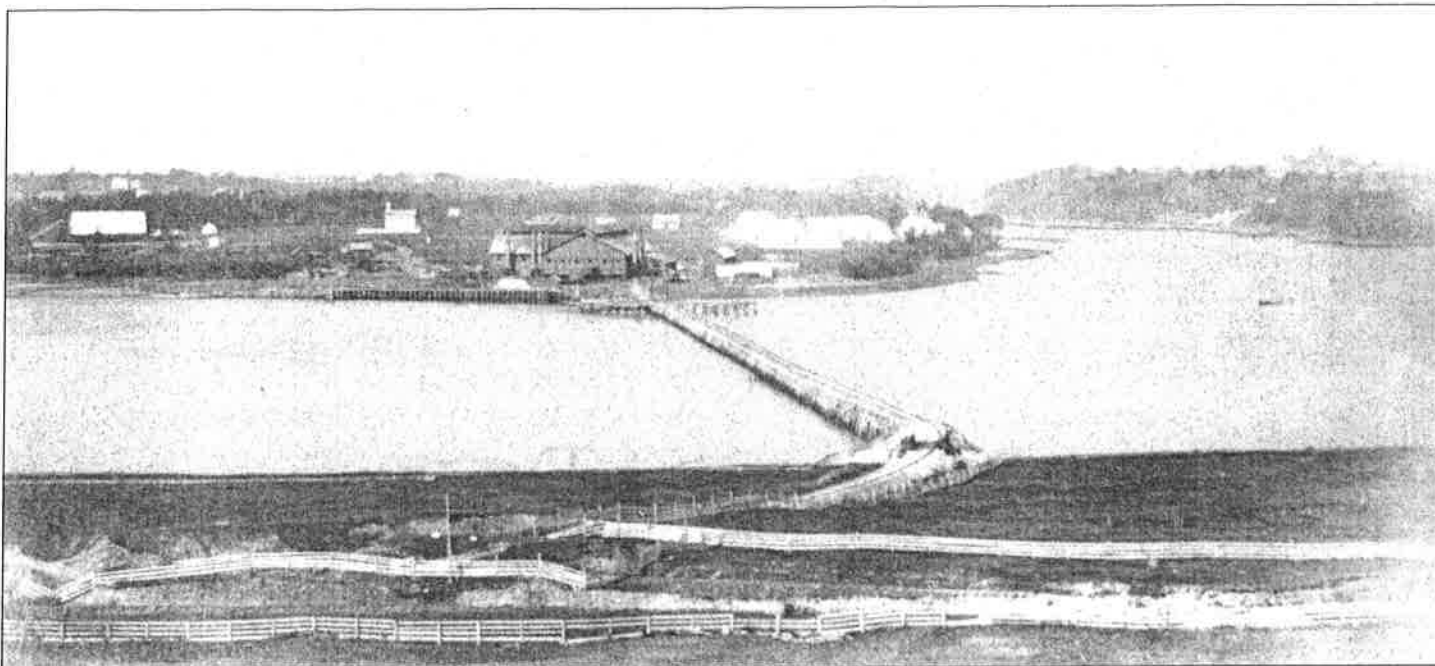
The Casco Bay study found that while pollutants could be detected throughout Casco Bay, most of the Bay has levels of pollutants far below national averages and well below levels that are thought to have toxic effects on fish and other living resources. The study did, however, identify a few areas of concern.

Two types of areas of concern exist. The first are areas where levels of one or more contaminants are at levels that are thought to have a toxic effect on biological resources. The PCB (polychlorinated biphenyls) concentrations at one site and PAH (polynuclear aromatic hydrocarbons) concentrations at another site in the inner Fore River were at a levels where toxic effect may be occurring.

The second type area of concern are places where concentrations of contaminants are considered high when compared to other estuaries nationwide. The PCB and PAH sites mentioned above are in this category. Sites in inner Casco Bay including the Presumpscot River estuary and Back Cove have PAH levels that are considered high nationally, as did nine additional sites in the eastern Bay (near Cape Small and New Meadows River) and two sites in outer Casco Bay. Lead, cadmium, and mercury concentrations in Back Cove are considered high nationally as are lead and mercury in the inner Fore River. Lead concentrations in the Presumpscot River estuary and cadmium concentrations at one site in eastern bay (Quahog bay) are considered high.

This year the Casco Bay Estuary Project will follow up the original study by measuring two additional pollutants that were not included originally because high analysis costs (approximately \$1500 - \$2000 per sample). The two are dioxin, a chemical by-product of manufacturing processes that use chlorine (such as the bleaching process in paper production) and tributyl tin, a metal used in some marine paints to retard growth of barnacles and other marine life. This study will be less extensive than the original study but will fill an important gap.

Together, these studies will provide a comprehensive picture of the levels of contaminants in Casco Bay. The results will be used to prioritize areas for protection. They will also be used as the benchmark against which future studies can measure trends in the Bay to determine whether efforts to protect Casco Bay are being successful.



*View from Portland's West End across the Fore River to the Portland Rolling Mills in Ligonía Area (now South Portland tank farm) in the late 1800's. A second Ligonía railroad bridge was built at a later date, and still exists parallel to the Veterans' Memorial Bridge. Portland Rolling Mills produced bar iron, rails, and other items that needed to be heated, rolled, shaped and cut. Hydrochloric acid would have been used in the pickling acid baths in the rolling mill to remove oxidized scale on the surface of the iron or steel. Water used in acid baths was no doubt discharged in the Fore River. Other pollutants associated with metal working sites include copper, zinc, tin, lead, in addition to aluminum, cadmium, and chromium in the 20th century.
Photo: Sullivan Photo and Train, Portland.*

Investigation Completed on Historic Sources of Pollution in Portland Harbor

When we think of pollution in Casco Bay, we tend to focus on industrial activities of the last forty years. But what about Portland harbor in 1850? Or 1930? Where were the tanneries, foundries, machine shops, ship yards, soap-making factories, and forgotten gasoline stations of yesteryear, and what wastes did they send into Casco Bay?

An unusual study recently conducted for the Casco Bay Estuary Project provides, for the first time, comprehensive data on historic sources of pollution. This may help explain the pollutants and their levels found in recent sediment studies in Casco Bay.

"Historic Sources of Pollution in Portland Harbor" documents pollution sources and likely pollutants from 1840 to 1970 in Portland Harbor, the Fore River, Back Cove, and South Portland.

Historian Edward L. Hawes, Ph.D., painstakingly reviewed the 1876 Bird's Eye Map of Portland, Sanborn insurance maps, old photographs, and other historic records. The four areas covered in this study were divided into a total of 20 Historic Development Districts. Twenty-seven types of polluting sites were identified, and each site is designated on a computer-based GIS map.

"Industrialization and resulting pollution began in the Portland/South Portland region in the 1840's, with the establishment of the Grand Trunk Railroad, the Portland Company (locomotive construction) and coal gas works in Portland, and major foundries in Ferry Village in South Portland", says Ed Hawes. "For many industries, access to water was vital. They not only needed process water, but also needed to dispose of waste and did just so either in sewers or directly into streams, rivers, coves, or the harbor."

Program Coordinator Lee Doggett plans to apply the investigation to sediment contamination research in Casco Bay. "It will help point to possible origins of sediment pollution, and may help focus some future research directions. It will provide useful data for scientists, environmental managers and municipal officials, planning boards, and conservation committees. People interested in learning how to do a "dirty history" in their town are encouraged to call us."

Copies of the report will be at the Portland Public Library, South Portland Public Library, University of Southern Maine library, the Maine Historical Society, Bowdoin College Library, and the State Library in Augusta. Ed Hawes will also be giving a presentation on his investigation on April 21 at USM (see Lecture Series listing in this newsletter).

A BETTER CASCO BAY
begins with understanding the Bay

SPRING 1994 LECTURES AND ACTIVITIES

Organized by the Casco Bay Estuary Project

Are you eager to learn more about Casco Bay? Come hear from experts about the issues and threats Casco Bay faces as we move into the 21st century. Attend a lecture, take a Casco Bay cruise - get to know this beautiful and valuable resource! All events are free.

The Drowning of Casco Bay: 10,000 Years of Geologic History

March 13, Sunday, 1:00 - 2:00 PM

Location: DiMillo's Floating Restaurant, Commercial St., Portland

Sponsors: Casco Bay Estuary Project and Portland Downtown District's "Aucocisco: A Celebration of Maine's Casco Bay Region"

Research shows that water levels are on the rise in Casco Bay. Should we be concerned? Join Dr. Joe Kelly, Director of Marine Geology at the Maine Geological Survey, for a fascinating overview of Casco Bay's "recent" geologic history and a discussion of what scientists think will happen in Casco Bay in the coming centuries. Dr. Kelly will show slides of Casco Bay's sea floor (did you know it has a canyon?) and talk about shoreline changes in response to the rising sea level.

The Winter World of Casco Bay

March 19, Saturday, 9:00 AM departure, return at noon

Location: Casco Bay Ferry Terminal, Commercial St., Portland

Sponsors: Casco Bay Estuary Project and Friends of Casco Bay

Cost: FREE but reservations required. Call Casco Bay Estuary Project at 828-1043

Do you ever wonder what birds and wildlife live out on Casco Bay in the winter? Here's your chance to spend three hours on the Bay with experts and learn more about our feathered, finned, and furred friends who call this place home in these chilly months. We'll observe numerous migratory waterfowl and sea birds (Casco Bay supports one of the most important waterfowl populations on the Maine coast), look for seals, and enjoy the splendid scenery. Bring your binoculars. Boat (sheltered, heated) courtesy of Casco Bay Lines.

A Working Waterfront of Casco Bay - Past, Present, and Future

March 19, Saturday, 12:15 - 12:50, lecture; 1:00 - 3:00, boat trip

Location: Casco Bay Ferry Terminal, Commercial St., Portland

Sponsors: Casco Bay Estuary Project, Friends of Casco Bay, and Casco Bay Lines

Cost: FREE but reservations required. Call Friends of Casco Bay at 799-8574

Portland harbor has teemed with different types of activity for centuries. How has it changed over the
(over)

years? Who is doing what, and where? How are scallops, finfish, and lobsters caught? See the current uses, and learn how to identify the five types of fishing boats. Join Casco Bay's Baykeeper, Joe Payne, and other harbor experts for a lively and informative 2-hour boat tour of Portland's working harbor. Boat (sheltered, heated) courtesy of Casco Bay Lines.

Dirty History: Historic Sources of Pollution in Portland Harbor

April 21, Thursday, 7:00 - 8:30 PM

Location: Luther Bonney Auditorium, University of Southern Maine, Portland

Sponsors: Casco Bay Estuary Project and USM Chi Tau Honors Biology Society

Pollution in Portland harbor has a long history. Where were the tanneries, foundries, machine shops, ship yards, and forgotten gas stations of yesteryear, and what wastes did they send into Casco Bay? An unusual study conducted for the Casco Bay Estuary Project provides, for the first time, comprehensive data on historic sources of pollution from 1840 to 1970. Historian Ed Hawes will present his findings and give us a fascinating look into the dirty history of Portland harbor.

Pollution in Casco Bay Today: How Contaminated is the Bottom of Casco Bay?

May 12, Thursday, 7:00 - 8:30 PM

Location: Room 165, Science Building, University of Southern Maine

Sponsors: Casco Bay Estuary Project and USM Chi Tau Honors Biology Society

In 1989 the Troubled Waters report by the Conservation Law Foundation caused widespread concern about severe pollution in Casco Bay. In response, the Casco Bay Estuary Project has conducted a study of the sediment at the bottom of Casco Bay to determine how much contamination exists. Do we need to be concerned? Come hear Texas A & M University scientist Chuck Kennicutt, senior research scientist on this project, explain the results and answer your questions about the health of Casco Bay.

Following the Flow of Casco Bay

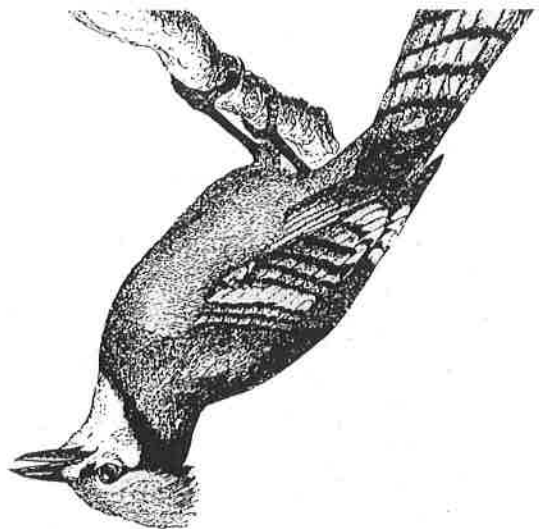
June 9, Thursday, 7:00 - 8:00 PM

Location: Machine Tool Building Auditorium, Southern Maine Technical College, South Portland

Sponsors: Casco Bay Estuary Project, Clean Casco Bay, Inc., and SMTC Marine Science Dept.

Casco Bay is a dynamic, constantly moving body of water that stretches from Cape Elizabeth in the west to Cape Phippsburg in the east. How water moves influences the essential health of the Bay. Scientists at the University of Maine have developed an exciting new tool to help better understand and manage Casco Bay: a computer program that can track the complex water circulation patterns of the Bay. This program provides a dynamic picture of the Bay. It provides a way to track oil spills and respond to them; determine which clam flats are susceptible to pollution, and help towns determine which areas are sensitive to development. Join oceanography professor Neal Pettigrew for a fascinating look at how Casco Bay moves, and learn just how valuable this information will be for future management of Casco Bay.

The mission of the Casco Bay Estuary Project is to preserve the ecological integrity of Casco Bay, and to ensure compatible human uses of the Bay's resources through public stewardship and effective management. The Project is dedicated to giving citizens an informed voice in the future of Casco Bay. For more information about the Project or Casco Bay call 828-1043.

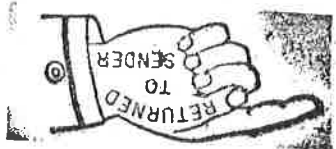


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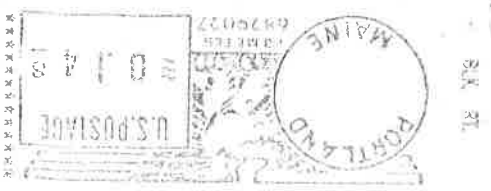
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Casco Bay Estuary Project



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Editors note: In the Fall 1993 Currents the article about the Friends of Casco Bay's water quality monitoring program was authored by Paula Palmer, not Sarah Werner.

WE'RE LISTENING!

The Public is invited to attend Citizen's Advisory Committee (CAC) meetings to help us develop a Casco Bay management plan which not only works for the resources of Casco Bay and its' watershed, but for the people too. We need your input! Attend out next CAC meetings:

April 5 Yarmouth Community House

June 7 Yarmouth Community House

All meetings are held in the evening between 7:00 - 9:00. For more information call the Casco Bay Estuary Project at 828-1043.