

Action Plan 17. Preventing Oil Pollution

Problem

This action plan addresses the most conspicuous and discreet discharges of oil to Buzzards Bay and its surrounding watershed⁹³. Chronic and catastrophic discharges of petroleum products have degraded Buzzards Bay and its watershed. Unless we reduce pollution risks, future catastrophic discharges will likely occur. Managers and first responders can minimize future threats by improved navigation protocols and more effective responses. Chronic discharges continue through various point and non-point sources of pollution, but these releases may be reduced or eliminated through the implementation of Best Management Practices, more effective recycling programs, or the improved treatment or elimination of discharges.

The 2003 Buzzards Bay oil spill resulted in the passage of the 2004 Massachusetts Oil Spill Prevention Act and companion legislation. The Act, required among other things, pilots and tug escorts for certain oil shipments in Buzzards Bay. The federal government and Commonwealth have fought over these navigation rules in state waters, and this matter needs to be resolved.

Goals

Goal 17.1. Reduce the amount of petroleum hydrocarbons entering Buzzards Bay.

Goal 17.2. Minimize the occurrence of oil spills in Buzzards Bay, both large and small.

Goal 17.3. Minimize the environmental effects from oil inputs to Buzzards Bay.

Objectives

Objective 17.1. To promote a regional strategy for preventing oil spills and hydrocarbon discharges.

Objective 17.2. To promote a coordinated regional strategy for responding to large oil spills.

Objective 17.3. To implement a source-reduction plan for chronic inputs of hydrocarbons into Buzzards Bay.

Objective 17.4. To provide adequate facilities for the collection of waste oil from cars and boats.

Objective 17.5. To take enforcement actions against the illegal discharge of oil.

Solutions

To reduce future hydrocarbon discharges and impacts to Buzzards Bay will require reducing the likelihood of catastrophic spills, improving the cleanup effectiveness and response time when spills do occur, and reducing chronic hydrocarbon release, like those associated with stormwater discharges and vessel operation in Buzzards Bay.

Future oil spills will be minimized with improved navigation aids and tracking. To reduce future impacts of oil spills that do occur, the presence of escort tugs, increased local availability of response equipment, improved training and coordination among municipalities, and continued improvements and evaluation of strategies contained in response strategies are all needed measures. Completion, by NOAA, of a water circulation model for Buzzards Bay will greatly improve predictions of the location of oil landings after a major spill. Installation of a navigation buoy system like that in Narragansett Bay will also assist with navigation and spill response. The state also needs to develop an oil spill damage assessment monitoring plan in collaboration with local universities and research centers to establish a protocol to speedily collect data essential for the environmental damage assessments after a spill.

With respect to chronic discharges of oil, the most important action to reduce illicit discharges in New Bedford Harbor and Buzzards Bay is the construction of a bilge water collection and oil separation facility to process bilge water from commercial vessels in the harbor. Increased use of 4-stroke engines will minimize hydrocarbon discharges from recreational boats, and municipalities can set an example by using 4 stroke engines for harbormaster vessels. Reduction in stormwater related hydrocarbon discharges is addressed in the municipal stormwater plans as described in Action Plan 3.

Costs and Financing

The greatest single local cost under this action plan is the construction of the bilge water oil separation facility for New Bedford Harbor, which might cost \$500,000 to build and \$50,000 per year to operate. These costs could be funded with the Oil Spill Act.

Measuring Success

The effectiveness of measures to prevent and to remediate catastrophic spills will take a decade to evaluate. Quantities of oil recovered at a bilge water oil collection facility would be an easier measure to track, as would be allowable limits of hydrocarbons in permitted discharges. Reductions of non-point sources of hydrocarbon can only be evaluated programmatically.

⁹³ The stormwater management and toxics reduction action plans compliment the goals and objectives of this action plan.

Background

Catastrophic Spills

Most past catastrophic discharges relate to the fact that Buzzards Bay is a major transit route for small tanker and barge traffic transporting heating and industrial oil and gasoline into Boston and northern New England markets. The Army Corps of Engineers reported that during 2005, 1189 cargo vessels passed through the Cape Cod Canal. Among those vessels were tankers and tank barges that transported 8,534 short tons or roughly 2.1 billion gallons⁹⁴ of petroleum products, equaling 78% of the total commodity tonnage passing through the canal (Figure 90).

During that same year, vessels transported 235 tons or 75 million gallons of petroleum products in and out of the port of New Bedford. In past decades, oil commodity transport through Buzzards Bay was as much as 50% greater than these totals.

From this level of activity, it is therefore not surprising that Buzzards Bay has been the site of several large oil spills (Table 39). The largest of these spills was the 1969 Florida spill off West Falmouth, spilling 189,000 gallons⁹⁵ of No. 2 fuel oil. Most recently, in April 2003, the Bouchard No. 120 tank barge ran aground near the entrance of Buzzards Bay, spilling an estimated 98,000 gallons of No. 6 fuel oil (summarized to the right). This latter spill prompted important changes in state laws and federal navigation regulations.

Oil spills impact mobile and stationary organisms, sensitive species, and vulnerable life stages, including eggs, larvae, and juveniles. If a spill occurs in a small, confined embayment so that oil is unable to escape, damage is heavier than with offshore spills. Winds and currents can push oil into any harbor or embayment, exacerbating environmental impacts. Bathing beaches and nearshore shellfish areas are often among the most vulnerable areas.

Immediately after a spill, certain species may exhibit high mortality. For organisms that survive, short-term stress and impaired metabolism may affect the ability of populations to reproduce and maintain themselves. Long-term impacts on populations and ecosystems have been observed if toxic hydrocarbons persist. Thirty-five years after the 1975 West Falmouth oil spill, oil residues have been identified and effects still observed in salt marsh sediment (Peacock and Reddy, 2007).

⁹⁴ This is an approximate estimate based on a weighted average of the volumes reported of various constituents like gasoline (350 gallons per ton), residential fuel oil (307 gallons per ton) and other heavier constituents.

⁹⁵ The volume of the Florida No. 2 fuel oil spill was repeatedly misreported in a number of publications during the 1960s and 1970s because of conversion errors. The final volume reported to Congress in a 1975 report was 4,500 barrels. see <http://www.buzzardsbay.org/pastspills.htm>.

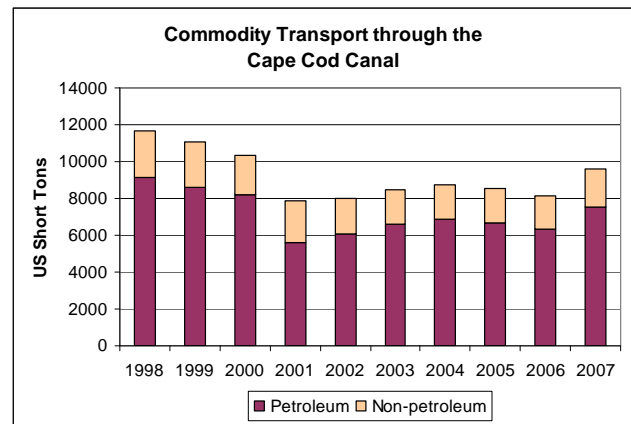


Figure 90. Commodity transport through the Cape Cod Canal.

Source: Prepared by the Buzzards Bay NEP from data posted by the Waterborne Commerce Statistics Center at <http://www.iwr.usace.army.mil/ndc/wcsc/wcsc.htm>.

Overview of the Bouchard 120 oil spill

On Sunday April 27, 2003, the Tank Barge Bouchard No. 120 struck rocks south of Westport, MA, when it passed on the wrong side of a navigational marker at the entrance of Buzzards Bay. The resulting 12-foot gash on the bottom of the hull released an estimated 98,000 Number 6 fuel oil in Buzzards Bay. The vessel was on route to deliver oil at the Mirant electricity generation facility located on the Cape Cod Canal.

A large fraction of the released oil washed ashore at Barneys Joy beach in Dartmouth the next day, but because of shifting winds and rough seas in the days following the spill, oil continued to wash ashore for more than two weeks eventually landing on more than 90 miles of shoreline. The spill impacted a variety of natural resources, including wildlife (mostly birds, with 500 found dead, including Roseate terns, a U.S. endangered species), salt marshes, rocky shorelines, recreational beaches, and shellfish beds, which were closed for many months after the spill to protect human health.

The U.S. Coast Guard, which oversaw the emergency response phase of the cleanup, terminated this phase of the cleanup in September 2003. Non-emergency cleanup activities continued after that date under the Massachusetts hazardous waste spill laws, through a required Massachusetts Contingency Plan (see our Cleanup Status page). Most areas were cleaned pursuant to the Massachusetts law by 2004, but cleanup activities continued at a small number of difficult sites through the fall of 2007.

Separate from the state and federal clean-up activities (estimated to have cost more than \$40 million dollars), and separate from the \$9 million dollars in fines levied by the federal government in 2004 (as part of a criminal liability settlement), the Natural Resource Damage Assessment (NRDA) has been ongoing, and has involved state and federal scientists reviewing all the data associated with the spill to determine the full extent of environmental impacts and damages. Based on the findings of the NRDA, additional environmental restoration actions will be required by the responsible party, the Bouchard Transport Company. The NRDA process is expected to be complete in 2012.

Table 39. Past oil spills in Buzzards Bay.

Date	Location	Type	Volume (gallons)	Comments
1940s	Western Buzzards Bay, Westport (at Hen and Chicks?)	No. 2 Fuel Oil	unknown	
1963	Near Nyes Neck, North Falmouth	No. 2 Fuel Oil	unknown	came ashore during the winter
16-Sep-69	Fassets Point, West Falmouth	No. 2 Fuel Oil	189,000	Florida Fuel Barge. Final estimate was 4,500 barrels spilled.
9-Oct-74	Cleveland Ledge (near canal entrance)	No. 2 Fuel Oil	11,000 to 37,000	Bouchard 65 barge grounded. Was towed to an anchorage off Wings Neck. Oil came ashore in North Falmouth and Bourne.
28-Jan-77	Cleveland Ledge	No. 2 Fuel Oil	81,144	Bouchard 65 barge grounded, oil on iced over bay, some burned. Final estimate was 1,932 barrels spilled.
10-Jun-90	Cleveland Ledge	No. 6 Fuel Oil	7,500	Bermuda Star cruise ship went aground, impacts to Naushon
18-Jun-90	Cleveland Ledge	Diesel oil or heating oil	100 or 200	Bouchard 145 fuel barge
7-Aug-92	Sow and Pigs Reef, Cuttyhunk	No. 6 Fuel Oil	50	Queen Elizabeth II cruise ship. Residual from empty fuel tank that was ruptured.
27-Apr-03	Rock reef west of green can #1 BB entrance, Westport	No. 6 Fuel Oil	98,000 (best estimate final)	Bouchard No. 120 fuel barge
Smaller spills of gasoline and fuel oil have occurred every few years in the Bay or in the Cape Cod Canal.				

The type of oil released greatly influences ecosystem response and human impacts. The Bouchard No. 6 oil spill killed hundreds of birds, and affected more than 93 miles of coastline, but had little impact on fish and invertebrates in the water or in subtidal areas. In contrast, the No 2 oil spilled in Falmouth 35 years earlier released many highly toxic compounds in the water, and killed many fish and invertebrates, but this oil affected fewer birds (Figure 91).

Chronic spills and discharges

Although not as conspicuous in the mind of residents and politicians, the cumulative discharge of hydrocarbons from point and non-point sources, may, on average, exceed most catastrophic spills in Buzzards Bay⁹⁶. These discharges are associated with smaller land spills and water-based spills as well as chronic discharges associated with stormwater, CSOs, industrial discharges, boat fueling facilities, improper waste oil disposal, and oil and fuel contamination of boat bilge compartments may be appreciable. While industrial pretreatment programs, and more stringent limits in NPDES permits have

reduced contributions from point source, cumulative discharges from non-point sources remain sizable.

Successes since the 1991 CCMP

Various entities implemented many of the oil spill recommendations in the 1991 Buzzards Bay CCMP during the 1990s (next page). The grounding of two large vessels in Buzzards Bay in 1990 to some degree prompted the 1991 CCMP oil spill action plan and initiated actions to plan for and minimize future spill. The first of these was the grounding of the 617-foot luxury ocean liner the Bermuda Star on June 10 at Cleveland Ledge, releasing 6000 gallons of No. 6 fuel oil. The second near disaster occurred on June 18, when the Bouchard tank barge No. 145, carrying 5.3 million gallons of No. 2 oil, grounded in the same area.

These events, together with the 1993 grounding of the Queen Elizabeth II, led The Buzzards Bay Coalition to advocate for changes in federal and state navigation requirements, and the Buzzards Bay Action Committee to establish a mutual aid agreements. The BBAC also began oil spill coordination meetings among Buzzards Bay municipalities, and the Buzzards Bay NEP, through its municipal grant program, began to fund the purchase of oil spill containment equipment and training classes. After the January 1996 grounding of the barge North Cape off Moonstone Beach and its disastrous effects on Rhode Island waters, concerns about oils spills and the need for local oil spill preparedness continued to prompt action by all three Buzzards Bay groups. Table 40 summarizes these activities.

⁹⁶ Based on an assessment of oil pollution in the 1991 Buzzards Bay Comprehensive Conservation and Management Plan, between 1969 and 1989, more than 1600 tons of petroleum entered Buzzards Bay from oil spills. During the same 20-year period, it was estimated that more than 2,000 tons of hydrocarbons were discharged into Buzzards Bay from other sources including sewage effluent, stormwater runoff, and industrial effluent. Since 1989, both chronic discharges and catastrophic discharges have declined dramatically, and there has not been a new evaluation of these sources.

Original 1991 Action Plan: Preventing Oil Pollution

Goals

1. Reduce the amount of petroleum hydrocarbons entering Buzzards Bay.
2. Minimize the occurrence of oil spills in Buzzards Bay, both large and small.
3. Minimize the environmental effects from oil inputs to Buzzards Bay.

Objectives

1. To promote a regional strategy for preventing and managing oil spills.
2. To implement a source-reduction plan for chronic inputs of PAHs to Buzzards Bay.
3. To provide adequate facilities for the collection of waste oil from cars and boats.
4. To take enforcement actions against the illegal discharge of oil.

CCMP Commitments

The Coastal Zone Management Office (CZM)

1. CZM will provide technical assistance to Buzzards Bay communities developing contingency plans in each municipality.
2. CZM will encourage the satisfactory completion of oil spill contingency plans by each municipality.

The Buzzards Bay Action Committee (BBAC)

1. BBAC will ensure that each municipality appoints an oil spill coordinator responsible for overseeing maintenance and deployment of equipment and for directing response activities.
2. BBAC will develop a mutual aid protocol that will govern the purchase and use of oil spill equipment by the towns.
3. BBAC will develop model regulations that will: a) require all boatyards and marinas to maintain oil containment and cleanup equipment on site; and b) manage the appropriate fueling of vessels.

The U.S. Coast Guard

1. The Coast Guard will conduct training sessions on the use of oil spill equipment and other contingency plan activities for all Buzzards Bay towns once a year.
2. The Coast Guard will review and approve each municipality's contingency plan and utilize those plans in the event of a spill.
3. The Coast Guard will advise municipalities on the appropriate spill equipment that should be maintained.

Buzzards Bay Municipalities

1. Falmouth, Bourne, Wareham, Marion, Mattapoisett, Fairhaven, New Bedford, Dartmouth, and Westport have appointed oil spill coordinators, some of whom are developing local contingency plans.
2. Marion (through its Marine Resources Commission) is working with the boatyards and marinas to ensure they maintain adequate oil response equipment.
3. The Buzzards Bay Coalition will continue to work with state legislators to refile a bill in December 1991 that addresses oil spill prevention including: pilot accountability language, better pilot testing and training including recertification on a regular basis, and pilotage requirements in the upper portions of Buzzards Bay and the Cape Cod Canal. An early version of the bill was filed in December 1990 but was not voted upon.

Other Recommended CCMP Actions

1. To reduce the impact of future spills, DEP should coordinate annual regional oil spill response drills for Buzzards Bay communities on land, to ensure preparedness and proper interface between themselves and local personnel.
2. All other communities should require all boatyards and marinas to have specified response equipment on site.
3. All levels of government should adopt a policy to minimize or reduce oil entering the bay.
4. Municipalities should require performance standards for catch basins that remove oil and grease and implement a maintenance program.
5. Enforcement Task Force of the Executive Office of Environmental Affairs should enforce proper storage and disposal of oil.
6. Buzzards Bay communities should adopt regulations managing fueling of vessels; regulations should include a provision requiring booms and absorbent material available at all fuel loading facilities.
7. The state should develop a policy and criteria for the use of dispersants in Buzzards Bay during oil spills.
8. DEP should adopt a policy for treating stormwater by requiring oil and gas traps, absorbent pads, and regular catch-basin maintenance.
9. The Coast Guard should install a more effective navigational system at the western entrance of the Cape Cod Canal.



Figure 91. Heavy viscous oils, like the No. 6 fuel oil that spilled from the Bouchard Tank Barge 120 into Buzzards Bay in 2003, primarily killed birds, plants, and animals by physical contact.

Left photo shows dead cormorant. In contrast to the Bouchard spill, the No. 2 home heating oil that spilled in 1974 from the Bouchard Tank Barge 65 in Buzzards Bay was far more devastating to aquatic species (right photo fish and invertebrates like worms, crustaceans, and mollusks) because of toxic soluble compounds in the oil. Photo credits left: Joe Costa, right: George Hampson).

Collectively, these actions likely helped minimize the frequency of catastrophic accidents in Buzzards Bay, and helped ensure a high degree of success in local first responders minimizing impacts to the 2003 Bouchard 120 oil spill. But despite these successes, the 2003 Bouchard spill illustrated that such accidents can and will continue to happen because of human error or negligence, and that many navigational and response issues remain.

State and local government and industry have reduced chronic discharges of petroleum products as well. In the 1990s, the City of New Bedford implemented an industrial pretreatment program to reduce inflows of oils, PAHs and other toxic compounds to its wastewater treatment system and combined sewer overflow infrastructure. The effectiveness of these programs has been documented by the dramatic declines in toxic contaminant levels in the City's effluent discharges including petroleum products. The fact that DEP has reclassified the sludge from the wastewater facility from Class 3 to Class 1, enabling its use for fertilizer and soil amendments in public areas, illustrates the success of these programs.

Another area identified as a problem in the 1991 Buzzards Bay CCMP has met with less success. Commercial fishing vessels, which operate mostly out of New Bedford but also Westport, usually have their engine oil changed (10-120 gallons per boat) after practically every trip. It is believed that the inconvenience and the expense (at the time about 30 cents per gallon, today one dollar or more) of safely disposing of waste oil or contaminated bilge water, has resulted in a number of boat operators blatantly dumping oil into the bay or offshore waters. Although this is illegal, it is difficult to docu-

ment violations and hence take enforcement actions against the appropriate fishing boats. The Coast Guard and DEP believe that contaminated bilge water is the principal cause of the sometimes daily sheens that appear in New Bedford Harbor. Convenience and expense in disposing of waste oil may also be a problem for the general boating public but oil changes in small launched boats is much less common.

To address this problem, the City of New Bedford adopted some policy changes in the early 1990s prohibiting the storage of waste oil in barrels on docks, and to require locks on dumpsters, as well as promoting oil reclamation education through the fishing coop. These actions helped, and the fishing coop's actions helped increase the volume of waste oil collected in the Harbor. Nevertheless, much waste oil, particularly oil accumulating in bilge compartments was presumably still dumped at sea.

In the 1990s, the Buzzards Bay NEP renewed calls to the City to provide adequate facilities and provide further incentives for the collection of waste oil and contaminated bilge water. In 1998 the Buzzards Bay NEP, in partnership with the City of New Bedford, and with enthusiastic support from the fishing industry, wrote grant proposals and obtained funding from DEP's 319 grant, CZM's CPR program, and from the Massachusetts Environmental Trust to build a bilge oil reclamation facility for New Bedford Harbor. Initially regulators delayed the project because of prohibitions against siting a bilge oil reclamation facility away from the harbor, and because of issues related to the transport of the oil, which is classified as a hazardous material. The City agreeing to find a new site on the waterfront overcame this issue. However, by the time the City of New Bedford acquired

the site, it had second thoughts about the long-term costs of operating the facility and canceled the project, despite the ongoing need for such a facility in the harbor.

This action plan primarily addresses oil spills and oil from stormwater discharges. We address industrial and municipal discharges of oil and other toxics in the toxics reduction and managing sewage treatment facilities action plans.

Oil Spill Response and Framework

Today, the Oil Pollution Act (OPA) of 1990 largely defines how the federal government responds to oil spills. This law, prompted in part by the Exxon Valdez oil spill in Alaska, both streamlined and strengthened the federal government's ability to prevent and respond to catastrophic oil spills. It also levied a tax on oil to establish a trust fund to provide funds to hire immediately personnel to respond to these disasters, including when the responsible party is incapable or unwilling to do so. The law also phased in a timeline of requiring double hull oil transport vessels by 2015 and imposed requirements relating to vessel manning, training, alcohol and drug screening, standards for foreign tankers, vessel traffic and communications systems, and oil spill contingency plans for oil spill haulers and storage facilities.

One of the most important aspects of OPA is that it established and defined the response and responsibilities of government and the party responsible for the spill, and addresses a number of issues including liability and compensation. The Act also requires that the Coast Guard--the federal agency that is the lead for ocean spills-- maintain a computer file of available spill containment and cleanup equipment, and to create Area Contingency Plans.

In related legislation, under the U.S. Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) in effect since 1986, those who spill hazardous substances, including oil, must pay cleanup costs. The federal government and the states, in their roles as trustees, can claim damages for injuries to natural resources.

Massachusetts' companion spill cleanup legislation is found in the Massachusetts Oil and Hazardous Material Release Prevention and Response Act (MGL 21E), and supporting regulations (310 CMR 40). This law essentially picks up cleanup issues where the federal laws and regulations jurisdiction ends. Whenever there is a spill of oil or hazardous material in Massachusetts, regulations known as the "Massachusetts Contingency Plan" outline how cleanup actions will proceed, and establish cleanup "endpoints". The Massachusetts Department of Environmental Protection (DEP) enforces the cleanup process defined in the Massachusetts Contingency Plan (MCP). An important provision of the Massachusetts Statute (Chapter 21E and regulations in the MCP) require the responsible party to hire an envi-

Table 40. 1991 Oil Spill Action Plan Accomplishments up to the 2003 Bouchard oil spill

1990-1994. Coalition for Buzzards Bay makes calls for new regulations, pilotage requirements and better navigation aids for Buzzards Bay.

1991. Buzzards Bay NEP begins awarding funds for oil spill containment equipment; BBAC forms a workgroup of oil spill first responders.

1993. BBAC fulfills a key CCMP recommendation of increased coordination of first responders by the signing of a Buzzards Bay mutual aid agreement among Buzzards Bay communities. Oil spill coordinators beginning holding oil spill response training.

1993. Coalition supports federal shipping rule change to require pilots on foreign vessels.

1994 BBAC organizes hazmat training sessions for all oil spill responders.

1994. The Massachusetts legislature amends Section 28 of Chapter 103 of the Massachusetts General Laws, as called for by the Buzzards Bay Coalition and Buzzards Bay municipalities, to require pilots on foreign vessels, to require pilots 10 miles in advance of the Cleveland Ledge (the site of many accidents), require pilots aboard vessels (prohibiting onshore pilotage), and raising fines from \$50 to \$10,000.

1995. Coalition and shipping industry fight against the proposed closure of the Buzzards Bay light tower by the U.S. Coast Guard. The Coast Guard agrees to instead replace it with a new tower, Congressman Studds helps allocate \$1.2 million dollars for its upgrade.

1996. DEP develops policies on the use of oil spill dispersants, effectively prohibiting their use in Buzzards Bay.

1994-1996. Coalition pushes for pilot requirement for transport through the Cape Cod Canal by foreign vessels, which are exempt from the requirement.

1997. BBAC proposes new legislation relating to fueling of vessels, but legislation does not advance.

1998. Buzzards Bay NEP hires Massachusetts Maritime Academy to help train local first responders.

2001. The BBAC updates its 1998 Buzzards Bay Municipal Oil Spill Response Manual identify protocols, contacts, and access points for Buzzards Bay first responders.

By 2003, Buzzards Bay NEP grants for oil spill containment equipment and training approach \$100,000. Municipalities use most of this equipment in the April 2003 oil spill. In 2004, the Buzzards Bay NEP suspends funding grants in this category when DEP agrees to pay for this training, and provide oil spill containment equipment and trailers for each Buzzards Bay coastal community out of fees collected in the 2004 Massachusetts Oil Spill Act.

ronmental specialist called a Licensed Site Professional (LSP) to direct assessment and cleanup activities in response to a release to the environment.

Once a spill has occurred, the principal factor in minimizing environmental damage is speed of response. Oil spreads rapidly, dispersing through the water column, making clean-up efforts more difficult, and eventually contaminates sediments. Cleanup effectiveness diminishes over time as weather disperses the oil. Most often, emergency responders recover not more than 10-20% of the spilled oil. In the case of the World Prodigy spill in Narragansett Bay, which was generally considered a successful operation, only 10% of the spilled product was recovered. In this spill, most of the lighter hydrocarbons evaporated, but substantial amounts entered coastal sediments, beaches, flats and marshes. Without adequate technology to recover greater percentages of the spill, emphasis should be on prevention and speedy response. It is vital that the logistics be in place so that when an incident occurs, it is clear who to call, where equipment is located, and which cleanup methods are appropriate.

Response to the problem of oil spills generally falls into three categories: prevention, early response, and mitigation. As long as oil is used as an energy source, spills will not be eliminated. Therefore, policy makers should pursue a dual effort of reducing the occurrence of spills and preparing to limit their damage. Mandating safety procedures and safety features on equipment used for storage, transport, and handling of oil may reduce the number of spills.

Separate from the emergency response and cleanup actions of an oil spill, state and federal agencies conduct an after-the-fact evaluation of spill impacts on the environment referred to as the Natural Resources Damage Assessment (NRDA). The Oil Pollution Act of 1990 established the NRDA process. The objective of this process is to restore coastal and marine resources injured by releases of oil, and to obtain compensation for the public's lost use and enjoyment of these resources. The law requires the assessment of both environmental and indirect economic impacts.

After an oil spill, the state and federal government establish a board of trustees to oversee the NRDA process (state and federal agencies, any Indian tribes, etc.). These trustees guide scientists, economists, restoration experts, and attorneys on the collection of data during the emergency phase of the spill and after, until the damage assessment is finalized. The trustees will use this data for the damage assessment, and to protect resources during cleanup or remediation activities. Collectively the trustees utilize this data to determine the full extent and magnitude of environmental injuries and lost services, and to define the type and scope of restoration best suited to address these injuries and lost services. These trustees also oversee and approve implementation

Town of Harwich Fueling Regulations

3.04: FUELING AREA REGULATIONS

All boats must fuel at a legally operated fuel dock or at a place where fueling has been authorized by the fire chief. The only exception to this rule is the fueling of commercial vessels having offloading permits, who shall only take fuel from tank trucks (diesel only) with a permit to fuel at designated areas. Any other fueling operations will be unlawful and violators will be subject to arrest.

SMOKING IS ABSOLUTELY PROHIBITED IN A FUELING AREA.

TO ALL SERVICE STATIONS 527 CMR 5 AND 8.

1. No smoking will be enforced while gasoline is being pumped. This applies to occupants of the boats as well as those outside. Signs must be posted in accordance with State requirements.

2. All motors shall be shut off while refueling.

3. All portable containers must be approved by the State Fire Marshall's Office. At present U.L. Standard 30 and F.M. Standard 6051 and 6502 meet the requirements.

4. No portable container shall have more than 7 gallon capacity and the total gallons must not exceed 21 gallons, unless a permit has been issued for transportation of Class A liquids.

5. Class A products may only be transported in an open vehicle or in a compartment of a closed vehicle separated from the passengers.

6. Attendants will have complete control when dispensing flammable liquids.

7. All extinguishers and fire suppression systems will have annual inspection.

8. In the case of a leak or spill the Fire Department will be notified. No leaks are to be washed away. Speedy dry will be used to pick up any spills.

9. Self-service operations are not allowed on the water.

10. No hold open devices may be used on self-service nozzles. Flow must be maintained by hand contact on the part of the person filling the vessel.

Any person who knowingly violates any rule or regulation made by the board of fire prevention shall, except as otherwise provided, be punished by a fine of not less than one hundred dollars nor more than one thousand dollars (GL 148 S10 C.).

of restoration activities. The responsible parties can undertake proposed restoration activities projects, or they can "cash out" and provide funds to the trustees to implement those agreed upon restoration efforts.

After the 1996 North Cape oil spill in Rhode Island, officials in that state discovered that important information about the impacts of the oil spill was not collected in a meaningful way for use in the NRDA process. This is a common problem with catastrophic spills because government officials are initially focusing on containing the extent and impact of the spill during the emergency re-

sponse phase of a spill, and they are less focused on systematically documenting the physical extent of oil landings or inventorying invertebrate and vertebrate species mortality in a systematic and scientifically meaningful way. Key information, like hydrocarbon concentrations in the water column are not collected because state managers, who might not have worked on a catastrophic spill, do not realize that this information is invaluable in the months or years of the subsequent NRDA process. In the absence of such data, scientists must instead use computer models to estimate mortality of aquatic species such as fish and crustaceans, including their planktonic juvenile forms.

Because of this issue, the Rhode Island Department of Environmental Management brought together scientists to identify and develop recommendations to address this problem. In 1996, after the North Cape oil spill in Rhode Island, the Rhode Island state legislature created the Oil Spill Prevention Administration and Response Fund⁹⁷. One of the uses of these funds was to prepare documents outlining what each state agency must do in the event of a spill to ensure that the state collect the right scientific information for the damage assessment. One documented objective was to "collect and document

Timeline of Legal Actions on The MA Act

- August 4, 2004: Governor signs legislature's MA Oil Spill Prevention Act into law
- January 18, 2005: the United States (later joined by international shipping companies) files a lawsuit against Massachusetts claiming that the United States has the exclusive authority to regulate oil tanker shipping
- July 24, 2006: Federal District Court rules that certain elements of Massachusetts Oil Spill Prevention Act are invalid. MA Attorney General and The Buzzards Bay appealed this decision
- June 21, 2007: First Circuit Court reverses the District Court's decision and remand it back to the District Court with guidance.
- October 29, 2007: United States requests a preliminary and permanent injunction in federal district court
- November 16, 2007: Attorney General's Office and Buzzards Bay Coalition vigorously opposed the United States' request.
- On January 2008, Massachusetts files a counterclaim asserting the Coast Guard Rule is invalid.
- On June 6, 2008, the District Court recommends a preliminary injunction in favor of the U.S.
- In August 2008, the Massachusetts legislature passes work-around legislation, using an increase in oil delivery fees to fund the state paying for escorts.

⁹⁷ The fund receives a 5 cents per barrel fee on petroleum products received at marine terminals in Rhode Island. The purpose of fund in part is to help the state promptly respond to contain and remediate oil spills, as well as to take prevention measures.

needed ephemeral data during the first few days after the spill, that might be overlooked or lost otherwise."⁹⁸

The Bouchard 120 spill had some similar problems. In the absence of actual measured hydrocarbon concentrations in the water column, the Aquatic Resources Technical Workgroup had to rely on computer models of toxicity. These models were inadequate to evaluate toxicity of oil in shallow nearshore areas however. Similarly, the shoreline technical workgroup had to estimate the extent of the area of stranded oil (footprint) on beaches because the initial assessment teams focused on identifying oiled areas to deploy cleanup crews, not calculate the area of stranded oil on sandy beaches.

Aftermath of the 2003 oil spill

In the aftermath of the Bouchard No. 120 oil spill, the Governor of Massachusetts appointed an oil spill commission that eventually recommended important changes in state law. Most importantly, in 2004 the Commonwealth of Massachusetts passed the Oil Spill Act ([Chapter 251 of the Acts of 2004](#)) that, among other things, imposed a delivery fee of 2 cents per barrel on oil delivered to Massachusetts ports in order to establish a \$10 million oil response fund. The law also required pilots and tug escort for tankers and tank barges in Buzzards Bay. The requirements under the law were spelled out in [314 CMR 19.00 Regulations: Oil Spill Prevention And Response](#).

In January 2005, the United States Department of Justice brought suit in U.S. District Court claiming that the following provisions of the Massachusetts Oil Spill Act are preempted by Federal law: state pilotage requirements, personnel and manning requirements, tank vessel design requirements, drug and alcohol testing provisions, tugboat escort provisions, mandatory vessel routing requirements, and the certificate of financial assurance requirement. That year the U.S. Coast Guard also proposed changes to navigation requirements, but these were not to be finalized until November 2007. Meanwhile the merits of the 2004 state law were still the subject of litigation.

In 2006, the District Court held that the challenged provisions of the Oil Spill Act were preempted and unconstitutional under the Supremacy Clause of the U.S. Constitution. The District Court permanently enjoined Massachusetts from enforcing those seven provisions.

Massachusetts appealed the District Court decision. In June 2007, the U.S. Court of Appeals for the First Circuit found that the District Court erred in concluding that the Federal law preempted the Oil Spill Act, and erred in entering a permanent injunction. The First Circuit Court remanded the matter to the District Court to hear additional evidence. On August 20, 2007, the

⁹⁸ ASA 2003. Protocols for Oil Spill Modeling. Prepared for RIOST RI Oil Spill Science Team.

First Circuit Court issued a mandate lifting the permanent injunction, pending further District Court proceedings, as the injunction relates to three provisions: personnel and manning requirements; tug escort provisions; and the certificate of financial assurance requirement. The personnel and manning requirements, tug escort provisions and certificate of financial assurance requirements remained in force.

Finally in the summer of 2008, in an effort to skirt the federal-state legal battle, the Massachusetts legislature passed a law (signed by the Governor on August 11, 2008) that had the state providing escort services for double hull vessels at its expense, funding the service with an increase of oil delivery fees from 2 cents to 5 cents a barrel.

Another outcome from the 2003 spill is that in 2007 the USCG implemented a Vessel Movement Reporting System (VMRS) requirement for Buzzards Bay. The VMRS provides for improved communication and positional awareness for all mariners. The system is helping shipping use the Recommended Vessel Routes (so-called "green lanes") by commercial vessels, especially tug/barge combinations. Captains not using the Recommended Vessel Route⁹⁹ are required to notify the VMRS control center ("Buzzards Bay Control").

Major Issues

With respect to catastrophic spill prevention, the 2003 Buzzards Bay spill had many consequences, the most important of which was the passage of the 2004 Massachusetts Oil Spill Act, and its 2008 amendments. The Act, required, among other things, pilotage and tug escorts for oil shipments in Buzzards Bay, and a fee imposed on oil shipments to Massachusetts to fund a trust fund to pay for equipment, training, and tug escort service. Since passage of the Oil Spill Act, the federal government and Commonwealth of Massachusetts have been at odds over whether the state has the authority to require navigation rules in state waters. This matter needs to be resolved. The most contentious issue is that the federal rules only require an escort tug and federally licensed pilot for single hull barges carrying 5,000 or more barrels of oil or other hazardous material¹⁰⁰. The differences in the law could be resolved by making changes in federal shipping regulations to match those adopted by the Commonwealth. The shipping industry

⁹⁹ At the west entrance to Buzzards Bay, the VMRS zone is bounded by a line extending from Sakonnet Point, Rhode Island, to the Buzzards Bay Entrance Light, and then to the southwestern tip of Cuttyhunk Island. At the east entrance to Buzzards Bay, the VMRS boundary is the same as the boundary for the Cape Cod Canal, which is 1.6 statute miles seaward of the Canal Breakwater Light. Tugs/barges should take appropriate action early to ensure they are escorted, with a Federal pilot aboard the primary tug, before entering the VMRS zone.

¹⁰⁰ This includes liquids like ethanol.

and oil transporters have strongly opposed such a move however.

In Massachusetts, the response to marine and inland oil spills is the regulated and overseen by the Department of Environmental Protection (DEP). The U.S. Coast Guard has federal authority over spills in marine waters and has oil spill response capability through the National Strike Force, but the primary response is by private contractors. In fact, both the Coast Guard and DEP have standing contracts with private firms to contain and cleanup spills. If responders cannot contain the spill with locally available equipment, DEP contacts the National Strike Force. The strike team for the east coast is located in Fort Dix, New Jersey. In a practical sense these private contractors cannot be deployed as quickly as locally trained municipal first responders, which are generally fire department personnel and harbor masters. For this reason, the continued training and outfitting of these municipal first responders must remain a priority.

Actions taken by town personnel in the initial hours and days of an oil spill can greatly minimize local impacts. One lesson learned from the response to the Bouchard 120 oil spill was the inability to integrate quickly local first responders into cleanup activities, and the municipalities were in fact taking actions independently for several days. This problem occurred in part because local government did not have adequate access to the unified command structure. Oil spill response decisions are made through consensus of three parties: the U.S. Coast Guard, Massachusetts DEP, and an agent of the Responsible Party. NIMS ICS guidelines for incident command allow for input to the unified command structure, through a liaison officer and better use of this mechanism could have minimized conflicts between the federal government and the municipalities.

Another issue that developed from the 2003 oil spill was that the Coast Guard did not immediately use the expertise or incorporate information or resources from municipal first responders. In 1998, the BBAC had developed a general response plan and equipment inventory, and they updated this plan in 2001. Although the BBAC provided this oil spill response manual to the U.S. Coast Guard, and it was available on-line, it was not used initially by the Bouchard 120 Incident Command. The federal officials were also not coordinating with municipal first responders until two days after the spill.

After the 2003 oil spill, the Coast Guard recognized the need to better integrate local needs and expertise into area contingency plans. DEP also provided funding to the Buzzards Bay Coalition to work with area oil spill coordinators to develop a geographic oil spill response plan (GRP) for Buzzards Bay that includes specific boom deployment strategies and tie off locations in the event of various oil spill scenarios. The Buzzards Bay Coalition hired a contractor to complete a Buzzards Bay GRP in 2005. With funding from DEP, the Coalition has

since met with oil spill responders and local officials to update the GRP.

In 2005, DEP established a Massachusetts Oil Spill Act Advisory Committee to help target uses of funds collected under the state Oil Spill Act. Currently coastal communities have received oil spill response trailers, but many inland municipalities also want similar equipment to deal with land-based and inland spills. DEP has not decided upon the frequency and levels of funding needed for training of local officials.

The need for a bilge oil facility to serve commercial vessels in New Bedford Harbor remains. The Buzzards Bay NEP and others have been discussing reviving the project with the City of New Bedford. DEP could help bring this project to fruition by funding its operation with Oil Spill Act funds.

There is still a need to improve fueling regulations at marinas. Either the state or municipalities can accomplish this task (see Town of Harwich Fueling Regulations inset.)

Unified Command and Hazmat Responders may utilize a General NOAA Oil Modeling Environment (GNOME) computer model to quickly predict oil landing sites, but such a model was not available to predict the movement of oil in Buzzards Bay during the 2003 spill¹⁰¹. Models of this type are only as accurate as the input of variables such as real time tidal, wave, and wind conditions.

The GNOME model is more predictive than the Physical Oceanographic Real-Time System (PORTS) that is in place in some ports. The PORTS system provides real-time oceanographic data about wave, wind, and current conditions with the primary purpose of improving navigation safety, but is also helpful when a spill occurs. NOAA and the Coast Guard have implemented the PORTS and GNOME model for neighboring Narragansett Bay (an NEP also), but PORTS has not been installed in Buzzards Bay.

Management Approaches

To reduce future hydrocarbon discharges and impacts to Buzzards Bay will require reducing the likelihood of catastrophic spills, improving the cleanup effectiveness and response time when spills do occur, and reducing chronic hydrocarbon release, like those associated with stormwater discharges and vessel operation in Buzzards Bay.

Future oil spills will be minimized with improved navigation aids and tracking. To reduce future impacts of oil spills that do occur, the presence of escort tugs (which have some spill response equipment), increased local availability of response equipment, improved train-

ing and coordination among municipalities, and continued improvements and evaluation of strategies contained in response strategies are all needed measures. Completion by NOAA of a water circulation model for Buzzards Bay will greatly improve predictions of the location of oil landings after a major spill. Installation of a navigation buoy system like that in Narragansett Bay will also assist with navigation and spill response. The state also needs to develop an oil spill damage assessment monitoring plan in collaboration with local universities and research centers to establish a protocol to speedily collect data essential for the environmental damage assessments after a spill.

With respect to chronic discharges of oil, the most important action to reduce illicit discharges in New Bedford Harbor and Buzzards Bay is the construction of a bilge water collection and oil separation facility to process bilge water from commercial vessels in the harbor. Increased use of 4-stroke engines will minimize hydrocarbon discharges from recreational boats, and municipalities can set an example by using 4 stroke engines for harbormaster vessels. Reduction in stormwater related hydrocarbon discharges is addressed in the municipal stormwater plans as described in Action Plan 3, Managing Stormwater Runoff, and other strategies to reduce hydrocarbon release to the environment are discussed in Action Plan 17, Reducing Toxic Pollution.

In 2004, the Buzzards Bay Coalition collaborated with the Coast Guard and twelve other local, state, federal, and private organizations to create the Buzzards Bay Geographic Response Plan for Oil Spill Mitigation. This plan is posted online¹⁰² and should remain so to facilitate its distribution during an oil spill emergency. Because many of the strategies laid out in the plan were conceptual, as part of local training efforts, the towns, DEP and the USCG should test and evaluate specific deployment strategies included in the plan to evaluate them and improve upon them. This approach is recommended in the OSA Strategic Plan. Funding of these trainings could be included in a future update of the GRP, and could be by Oil Spill Act funds. A contractor could update the existing plan and GIS files, hold meetings to develop consensus, with the final product being completion of a revised GRP. The cost of revising an existing plan and existing GIS files may be nominal.

The U.S. Coast Guard should continue to update the area oil spill contingency plan every five years to ensure that current state and municipal priorities are included in the plan, as well as key elements of the Geographic Response Plan for Buzzards Bay. The U.S. Coast Guard should update the navigation rules in Buzzards Bay to match the oil spill act requirements adopted by Massachusetts, including requiring pilotage and escorts for oil tankers and tank barges through all of Buzzards Bay.

¹⁰¹ GNOME is the oil spill trajectory model typically used by NOAA's OR&R Emergency Response Division (ERD) responders during an oil spill.

¹⁰² Available at:
<http://www.savebuzzardsbay.org/document.doc?id=13>

This is currently subject to an ongoing legal battle between the state and federal government.

It would be highly advantageous to managers in Buzzards Bay if NOAA developed a GNOME oil spill trajectory model for Buzzards Bay. NOAA would need to provide funding in a budget authorization, and such a task might cost \$100,000 for a contractor to do the work for NOAA. When developed, it should be made available on line. This is a onetime effort but the model could be evaluated after 5 years.

Similarly, NOAA and the USCG could implement a PORTS technology real time buoy tidal condition system to compliment the VRMS system and GNOME model. This too would need to be budgeted, and this is a considerable expenditure, totaling \$20 million for buoy system plus \$1 million in annual maintenance and operation costs. This real time online network of data collection buoys would likely take several years to implement.

CZM and DEP will work with Buzzards Bay municipalities to ensure that local priorities and needs are included in the USCG area contingency plan.

DEP should fund the testing of deployment strategies included in the Geographic Response Plan for Buzzards Bay as directed by the statewide OSA Strategic Plan. This might cost \$20,000 for contractual services, and could be paid by Oil Spill Act funds. DEP should continue to work with the USCG and Buzzards Bay municipalities to coordinate and fund regional oil spill response drills for Buzzards Bay communities to improve preparedness, and better utilize oil spill response equipment and the Geographic Response Plans to enhance coordination of local, state and federal response agencies. DEP should continue to use oil spill fund fees to ensure adequate equipment to both coastal and inland communities in the Buzzards Bay watershed to provide first response to land and ocean based spills. This is a policy and management decision. Estimated costs: \$50,000 for annual training contractual services. Inland communities may require tens of thousands of dollars for similar cleanup equipment to help minimize spills to waterways from road tanker accidents. Potential funding could come from the Mass. Oil Spill Act Funds as well.

DEP should initiate an inspection of the oil spill response trailers provided to Buzzards Bay municipalities to ensure the adequate condition and maintenance of the equipment and replacement of expendable supplies. This could be achieved through Oil Spill Act Funds if needed. Equipment inspection could be included as part of local training efforts.

EEA with assistance from DEP should establish a Oil Spill Damage Assessment Response Panel to develop protocols for the collection of data in the hours and days after a spill that will be used in later damage assessment evaluations. This effort could use as a model similar work undertaken in Rhode Island around 2000. Estimated costs: \$50,000 one time cost to hire a scientific

contractual analyst to organize the panel, hold meetings, and develop consensus damage assessment protocols. Potential funding: Mass Oil Spill Act Funds.

The New Bedford Harbor Development Commission, the USCG, and Mass DEP and should work together to establish a bilge water/waste oil collection facility in New Bedford Harbor. Estimated costs: \$500,000 one time cost to build the facility then \$50,000 annually for a part time operator.

In the 1990s, the BBAC updated an oil spill mutual agreement. If there is a desire among municipalities, the BBAC could work with Mass. DEP to review and update the protocols adopted in the 1990s based on experiences with the 2003 oil spill and the availability of oil spill trailers provided to each community by DEP. If the BBAC remains involved with this effort, the BBAC could annually update its first responder contact list and equipment inventory for Buzzards Bay communities and provide this information to the USCG and DEP to make sure their information is up to date. This work would be undertaken by the BBAC Executive Director communicating with local oil responder leads. The municipal contacts should be listed online. If desired, municipalities of Buzzards Bay could enact new Mutual Aid agreements.

Financial Solutions

The most expensive state costs are those associated with maintaining pilotage and escort costs associated with the Oil Spill Prevention Act. Ironically, the delays caused by law suits have eliminated shortfalls that might have occurred because of escorts needed for the still widespread use of single hull vessels. These rules were reimposed in 2011. These shortfalls may be avoided because, as required under OPA 1990, all single hull tank vessels, including barges will be phased out by 2015.

The greatest single local cost under this action plan is the construction of the bilge water oil separation facility for New Bedford Harbor, which might cost \$500,000 to build and \$50,000 per year to operate. These costs could be funded with the Oil Spill Act Trust funds.

Monitoring Progress

Spills of oil greater than 1,000 gallons are uncommon in Buzzards Bay, and the effectiveness of measures to reduce these rare events could only be evaluated perhaps after a decade or more. Quantities of oil recovered at a bilge water oil collection facility would be an easier measure to track, as would be allowable limits of hydrocarbons in permitted discharges. Reduction of non-point sources of hydrocarbon loading could only be evaluated through implementation of programmatic measures such as those implemented under municipal stormwater permits.