Lobster Pot Gear Configurations in the Gulf of Maine

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Consortium for Wildlife Bycatch Reduction

MAINE Lobstermen's Association

New England Aquarium
Protecting the blue planet

Photo: H. Tefreault

Photo: K. McClellan

Introduction

Maine lobstermen represent a vital sector of New England's commerce and culture who take pride in advancing the environmental sustainability of their business. In 2010, US landings of American lobster *(Homarus americanus)* were valued at nearly $400 million, with Maine lobstermen responsible for 83 percent of the total catch. Maine lobstermen use fishing techniques intended to maintain continued availability of their target catch, such as immediately returning to the sea any short, over-size and egg-bearing lobsters hauled up in their traps. Egg-bearing females also get marked with a "v-notch", a signal to any lobsterman who might later haul them up that they must not be retained but instead returned to the sea where they have an opportunity to reproduce again.

Ropes used by fixed-gear trap (also known as pot) fishermen from Canada and the East Coast of the United States occasionally entangle large whales, including the endangered North Atlantic right *(Eubalena glacialis)* and humpback whales *(Megatera novaengliae)*, which sometimes results in serious injury or mortality to these species. Examination of gear from whale entanglements in which the type of gear could be determined showed that 53 percent of the cases involved pot and 36 percent involved gillnet gear, with lobster gear making up the majority of cases attributed to pots (Johnson, 2005).

Gulf of Maine lobstermen are regulated under the Atlantic Large Whale Take Reduction Plan, which is administered by the National Oceanic and Atmospheric Administration (NOAA) and was established as a mandate under the Marine Mammal Protection Act. Since its adoption in 1997, lobstermen have implemented a variety of measures to reduce the risk of entanglements such as keeping lines as knotless as possible, not fishing floating line at the surface, hauling gear a minimum of every 30 days, and adding surface system weak links and vertical line gear marking. In 2009, the plan was expanded to mandate a shift from floating to sinking groundlines (the ropes that connect lobster traps deployed at the sea bottom) along the Atlantic coast. This regulation has reduced the amount of rope from fixed gear in the water column and should minimize the risk of whales becoming entangled in groundline. Lobstermen comply with whale regulations that restrict them from fishing in certain locations, such as within the Cape Cod Bay Critical Habitat area, and during particular seasons. An exemption line exists along the near-shore Maine coast, inside of which some rules under the plan do not apply.

The Maine Lobstermen's Association (MLA) and the Consortium for Wildlife Bycatch Reduction are working collaboratively to identify innovative fishing gear and methods that are practical for fishermen but that reduce the frequency and severity of large whale entanglements from vertical lines (the ropes that extend from the ocean surface to the trap). A major challenge in achieving this objective has been a dearth of information on the dynamics of whale entanglements. How do they occur? What are the characteristics of these entanglements? How can we improve our understanding of these rare events so that we can identify the most promising modifications to fishing gear or methods? Among the wide diversity of lobster fishing methods, are there existing ones that might pose lower risk of severe entanglement?

This publication documents for the first time the range of fixed-gear lobster fishing methods in the Gulf of Maine. It provides new data and illustrations on how lobster trap gear is configured and deployed by season and location. It fills a major gap in our understanding of the characteristics of trap gear, and is intended to help fishery managers better understand the fishery and evaluate the relative impacts of potential regulatory changes involving lobster gear. It is also a tool for further engaging lobstermen in constructive dialogue about the kinds of gear and fishing methods that may pose the lowest risk to whales from rope entanglements.

Project Methods

In January 2010, the MLA began a process to identify the variety of lobster trap fishing configurations in the Gulf of Maine. The project focused mainly on lobstermen in Maine because they comprise the largest and most valuable lobster fishery in the region, but also included Massachusetts and New Hampshire lobstermen.

The Maine coast is divided into seven lobster management zones, A through G, running from east to west. The fishing harbors in each zone are grouped into 66 representative districts. The MLA contacted district representatives by mail and phone for guidance on where to hold a series of meetings with lobstermen so that there was full representation for the Maine coast. The MLA conducted 35 meetings, including four with offshore lobstermen, and held numerous one-on-one interviews with lobstermen from February 2010 to June 2011 (Fig. 1). In addition to the harbor meetings held in Maine, regional meetings were held in Maine, New Hampshire and Massachusetts. Through these meetings and interviews, the MLA compiled information on lobster gear configurations, deployment location and seasonality, and other fishing characteristics associated with particular local conditions and customs.

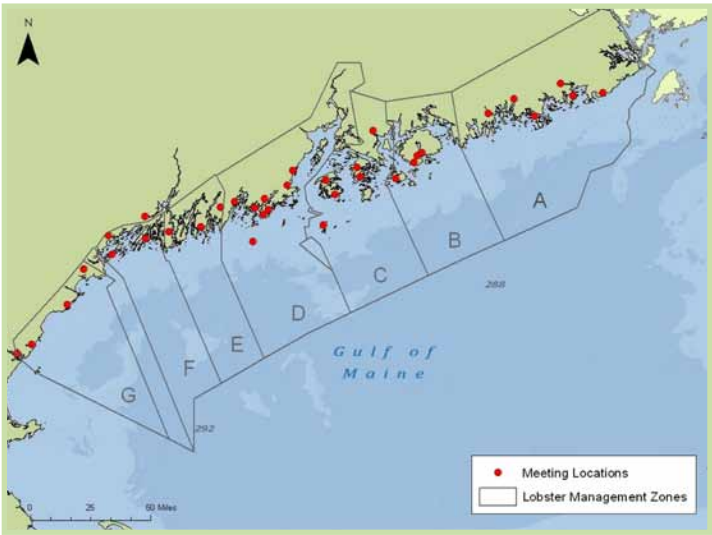

Figure 1. Meeting locations in Maine to collect data on gear configurations

More than 150 lobstermen participated in these meetings and follow-up interviews. Each meeting involved small groups of fishermen, between two and 10 individuals, who characterized the typical gear used in their area and mapped the spatial distribution of lobster gear fished by their community during different seasons. At the start of the meetings, MLA presented large whale population statistics, entanglement data and the regulations implemented to reduce severe entanglements. Lobstermen then described their lobster fishing practices.

The MLA asked lobstermen to describe how they rig and deployed their gear, and talk generally about how, where and when they fish as a community. Focusing on community-wide methods rather than personal ones avoided compromising any fisherman who did not want to divulge strategic information about individual fishing practices. Lobstermen indicated on NOAA maritime area charts where specific gear configurations are fished by their community, and during which particular months. The majority of lobstermen also provided rough sketches depicting their individual methods of rigging lobster gear (Fig. 2).

The MLA collected gear sketches from 115 lobstermen: 10 in Zone A, 9 in Zone B, 23 in Zone C, 28 in Zone D, 3 in Zone E, 15 in Zone F, 19 in Zone G and 8 in Massachusetts. Fishermen documented the individual components and rigging of both the lobster gear bottom and surface systems. Documentation of the bottom system included size, weight and ballast of lobster traps; type, brand and size of ropes; and specific methods of connecting these components together. Documentation of the surface system included the number, type and size of flotation devices; type, brand and size of ropes; and methods of connecting surface system components.

Characterizing each area's fishery included a discussion of local environmental conditions such as tides, currents, and bottom habitat; length of the active fishing season; average number of nights between hauling traps (soak time); number of traps tied together to form a trawl; number of buoy lines (also known as endlines); average vessel size; and number of crew.

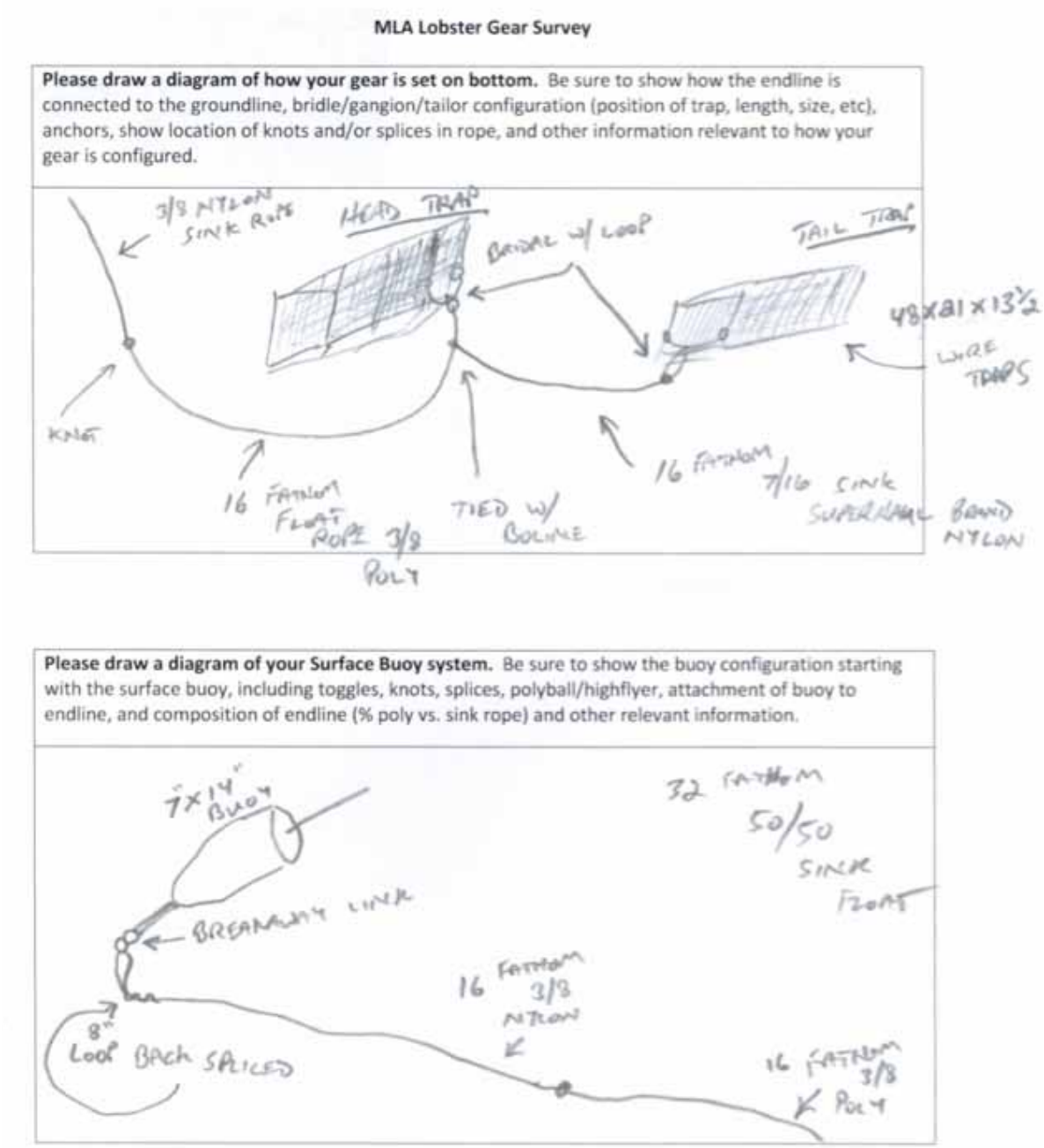

Figure 2. Example of the sketches provided by lobstermen of bottom gear and surface buoy configurations

Once compiled, this information was reviewed by individual lobstermen, including the MLA's Board of Directors, and fishing gear experts to ensure that data were interpreted, summarized and illustrated accurately.

Data sources for lobster licenses, trap tags and landings are the Maine Department of Marine Resources Landings Program (sent via email to MLA on 10/21/11), the New Hampshire Department of Fish and Game (sent on 10/27/11) and the Massachusetts Division of Marine Fisheries Statistics Project (sent on 11/22/11). Information on sea bottom type is from Barnhardt et al. (1996), and tides (except where indicated) is from NOAA's "Tides and Currents" online page provided through its Center for Operational Oceanographic Products and Services (CO-OPS) (http://tidesandcurrents.noaa.gov/).

Lobster Fishing in the Gulf of Maine

Photo: K. McClellan

Similar to lobsters themselves, lobstermen are known to be solitary and territorial. The Gulf of Maine lobster fishery occurs year-round, though fishing effort and landings largely mirror the lifecycle of the lobster. The majority of landings occur over five months from July through November, when lobsters are active and molting in inshore waters. Landings are generally lowest from January through April, when lobsters are relatively inactive, and begin to pick up in May and June. A survey by the Gulf of Maine Research Institute found that only 30 percent of Gulf of Maine lobstermen were active from January through March, 75 percent from April through June, 100 percent from July through September and 90 percent from October through December (Market Decisions, 2006). The seasonal distribution of landings has remained largely unchanged over the years, even as landings have increased significantly (Thunberg, 2007).

The Gulf of Maine lobster fishery concentrates on catching newly molted, or "shedder" lobsters, as they emerge from their shelters to feed after molting. The molt occurs during the summer months in a south to north progression as waters warm. Many areas of the Gulf of Maine experience a second shed in the fall months. Coastal waters are subject to large fluctuations in temperature as the seasons change. Lobsters therefore migrate from shallow coastal waters to deeper, more consistently warm waters during the fall. Lobstermen set their traps in order to follow the lobsters; they will concentrate their traps in coastal waters during the summer, shift to deeper offshore waters in the fall, and then return to shallower waters during late spring.

The fleet is composed mainly of small vessels averaging 32 feet in length, which make day trips within 3 miles from shore (Market Decisions, 2006). Most lobster vessels operate with sophisticated equipment such as hydraulic haulers, bottom depth sounders and GPS. Many keep live tanks on board in which to store their catch. The size of the vessel and its equipment significantly influence the depth and distance from shore that can be safely fished, as well as the size of gear configurations. For example, smaller vessels do not have the space onboard to safely fish multi-trap trawls and typically fish with only the captain aboard. Larger vessels are able to handle higher numbers of traps and longer gear configurations, and may carry one or two crew. The 25 percent of Gulf of Maine lobstermen who hold federal permits will fish as far as 12 miles from shore; a smaller number of vessels will fish even farther.

Although methods of rigging lobster trap gear have many commonalities throughout the Gulf of Maine, there are also distinctive techniques associated with particular geographic locations, fishing conditions and local customs. Lobster gear consists of traps and associated components deployed on the sea floor where the lobsters are caught, and a surface system used to identify it, facilitate fisheries enforcement and minimize conflict between fishermen. Surface systems include a flotation device marked with unique colors and the lobsterman's fishing license number. Lobstermen are required to display their buoy colors onboard their vessel. Inshore lobstermen typically fish Styrofoam buoys, while offshore lobstermen are known to fish double Styrofoam buoys or deploy larger inflated plastic buoys known as polyform buoys or polyballs.

In the regulated waters under the Atlantic Large Whale Take Reduction Plan (ALWTRP), lobstermen are required to fish a 600-pound breakaway on all floatation devices to facilitate the gear breaking free if encountered by a whale; the offshore requirement is a 1,500-pound breakaway and a 500-pound breakaway within the Cape Cod Critical Habitat Area (Higgins and Salvador, 2010). Buoy lines themselves must be marked with a red tracer in nearshore waters or black tracer in offshore waters midway down their lengths. All lobstermen are required to configure the buoy line so that no rope lays at the ocean surface, and they therefore typically rig the top portion of the line with non-buoyant sinking rope spliced into a section of floating line that extends to the bottom system. They are also required to keep ropes as knot-free as possible and to haul gear at least once every 30 days.

The bottom system consists of lobster traps and the rope used to connect them. In some areas there may also be an anchor incorporated into the ends of the trawls. Lobstermen use a variety of knotting and splicing techniques to connect the buoy line to the traps and on the ropes between traps. Several different components are used to attach a lobster trap to the groundline, including typically a section of rope known as a gangion that is tied to a shorter section of rope know as the bridle (or becket). The use of separate components in the bottom system allows lobstermen flexibility in reconfiguring gear. Lobster traps are typically 3 or 4 feet in length and weigh between 45 and 60 pounds. Lobstermen in Massachusetts and New Hampshire are universally required to use sinking rope for groundlines, while Maine lobstermen are required to use it in waters outside the exemption line. Gear fished in water equal to or greater than 280 fathoms are exempt from the sinking line requirement (Higgins and Salvador, 2010).

Inshore fisheries predominantly use trap deployments that range from a single to as many as three traps attached to one buoy line. However, there are many exceptions of inshore lobstermen fishing longer trawls such as in Massachusetts and Casco Bay. Smaller trap deployments are preferred in inshore areas because it provides lobstermen more flexibility to strategically target holes and crevices in areas with rocky bottoms and reduces the risk of traps being caught and lost due to rope snags on rocks. Lobstermen generally use only one buoy line when fishing single traps or strings of up to five traps; they will incorporate a second buoy line for trawls with more than five traps. There are exceptions to this such as in Zone A where some deploy up to 10 traps on a trawl with only one endline and in Zone G where some fish three traps per trawl with two endlines.

The number of traps on a trawl generally increases as lobstermen fish farther from shore. This corresponds with increasing water depth and a transition from rough, rocky bottom to more expansive areas of gravel, mud and cobble. Overall fishing effort and trap density also decrease as lobstermen move offshore. Under the ALWTRP, deployment of single traps is prohibited in federal waters outside of three miles, and only trawls with more than five traps can incorporate a second buoy line. Federal regulations require lobster gear to be marked with highflyers in waters beyond 12 nautical miles from shore to minimize gear conflicts with mobile gear.

Downeast Maine - Zone A

Area: Eight districts spanning the easternmost portion of the Maine coast from Eastport to Gouldsboro

Number of licenses and tags (2010): The Maine Department of Marine Resources issued 1,147 lobster licenses and 639,000 trap tags, of which 61% (694) of licenses and 77% (490,800) of tags reporting landings greater than 1,000 pounds.

Landings (2010): Nearly 20 million pounds of lobster or 20% of Maine's lobster landings

Vessel length: 25 to 50 feet, with both open and closed sterns

Crew: Most lobstermen fish with one or two sternmen.

Tides: Eastern Zone A is characterized by easterly flood tides, extremely strong bottom currents and bathymetry that drops quickly from the shore to deeper water with depths averaging 90 to 120 fathoms. The tides rise and fall more than 25 feet, ranging from -3 feet at low tide to 23 feet at high tide. Bottom currents off Jonesport at an approximate depth of 300 feet had measured velocities greater than 30 cm/s (.58 knots) and a maximum of 70 cm/s (1.36 knots) (GOMLF, 2007).

Bottom habitat: There is mostly hard and gravel bottom with some mud and sand inshore. Nearly half (49%) of the bottom is primarily rock (DMR, 2008).

Fishing season: Lobstering typically begins in April and ends in December, with a large portion of the fishery taking place away from the shore in deeper waters.

Soak time: The average time is between three and seven nights, but inclement weather in the spring and winter can result in longer soak times.

Preferred rope brands/diameters: Include *Everson, Atlantic Polysteel's Hydropro*, and *Hyliner's Steeliner*, and a range of diameters including 11/32 inch, 3/8 inch, 7/16 inch, and some 1/2 inch diameter in offshore areas.

Gear configurations: Zone A lobstermen deploy their lobster traps as trawls ranging from 3 to 15 traps offshore (Fig. 3). Some lobstermen fish up to 10-trap trawls with one endline; most, however, use two endlines. Trawls of less than six traps are rarely fished. The average length of groundline between individual traps is 10 fathoms.

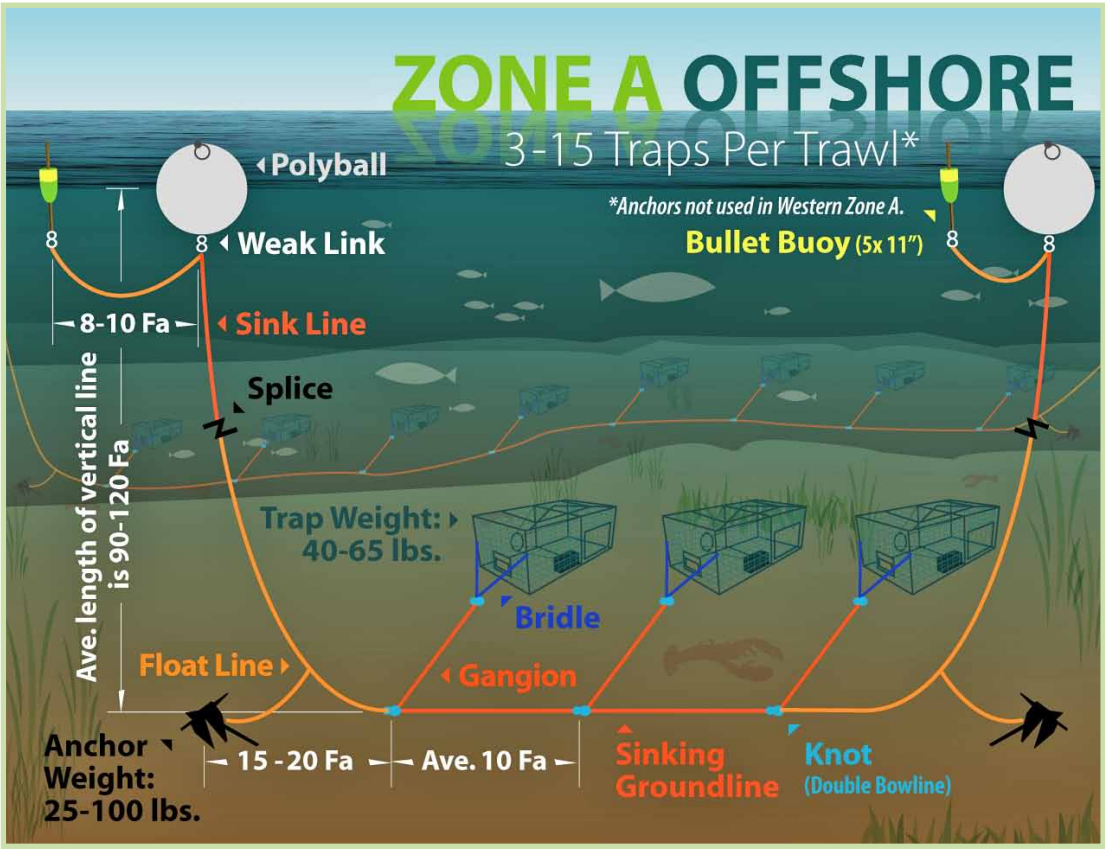

Figure 3. Zone A offshore gear configuration

Inshore, lobstermen commonly fish trawls with 3 to 12 traps (Fig. 4). Those who fish closest to shore and around the islands on hard bottom deploy gear as singles, pairs or triples with one endline (Fig. 5). These traps, which are unanchored, weigh at least 60 pounds so that they remain immobile under strong tides and currents. Because they are lighter than anchored trawls, lobstermen are more likely to move them during the season to follow the lobster migration. Lobstermen use floating line between traps when fishing inside the exemption line.

The combination of strong tides, bottom currents and hard bottom makes this area unique within the Gulf and significantly influences the type, configuration, rigging and movement of lobster gear. Due to strong tides and bottom currents in eastern Zone A, lobstermen deploy their trawls with two or more anchors weighing from 25 to 100 pounds each, to prevent gear from shifting on the bottom. Anchors are attached to the first trap using 15 to 20 fathoms of floating rope. Lobstermen typically use large diameter ropes tied to polyballs at the surface to help carry the strain and weight of the anchors and keep the gear in place. Due to the high strength of the rope, anchors are known to bend before the rope gives out.

In eastern Zone A where anchors are used, most lobstermen do not relocate their gear over the course of the season due to the difficulty of moving the heavy anchoring system. It is different in the western part of the zone, where lobstermen are more likely to move their unanchored gear away from the shore to follow the migration of lobsters.

Because of the extreme tidal range, lobstermen require significant scope on the buoy line to prevent buoys from being pulled under water or breaking free from the surface system. In the shallow water closest to shore, lobstermen fish buoy lines that are 40 to 60 percent longer than the water depth. For example, lobstermen fishing at a depth of 25 fathoms will fish buoy lines that are 35 to 40 fathoms in length. In deeper waters, the length of the buoy line is usually equal to double or triple the depth of the water. Lobstermen may even require additional scope in very deep water.

To keep the gear visible at the surface throughout the range of tides, lobstermen in the eastern portion of Zone A typically fish with polyballs that range from 26 to 30 inches in diameter. In western Zone A, two 5-by-11-inch Styrofoam buoys are commonly used. Zone A lobstermen fishing in offshore waters deploy polyballs as large as 60 inches in diameter. Most lobstermen in Zone A rig their surface system with the addition of a tide buoy deployed up to 10 fathoms off the main buoy system. This allows lobstermen to gaff the smaller tide buoy first in order to get the rope into the hauler before experiencing the full weight and strain of the gear. Lobstermen may also fish with additional buoys or toggles below the polyball along the top portion of the buoy line to help keep the surface system from becoming submerged, and to displace the weight of the gear when hauling.

Shrimp, scallop, urchin and quahog fishing using mobile trawl gear occur in many of the same areas where lobstermen set their traps. These fisheries take place from January to March. There is minimal conflict with lobster gear since most lobster gear is not actively fished during these months.

The offshore fishery is spatially limited, particularly in the easternmost portion of the zone, due to the international boundary with Canada. Lobstermen there share disputed waters with Canadian lobstermen, a 110-square-mile area known as the gray zone. Canadian lobstermen fish in these waters under a less restrictive management system which does not include whale protection measures.

Many lobstermen report abandoning some traditional fishing bottom since the sinking groundline requirement came into effect. In a region characterized by jagged rocks and strong tides and bottom currents, they cite increased snagging and chaffing of ropes combined with higher gear loss.

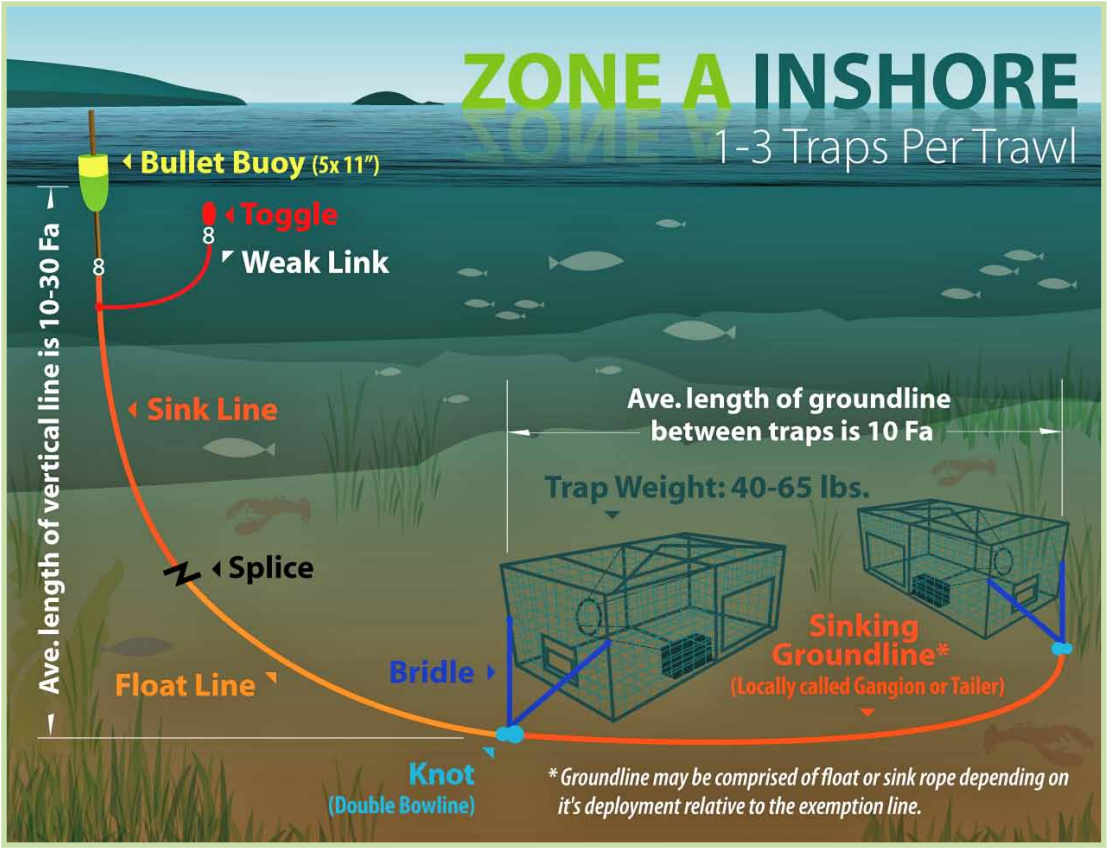

Figure 4. Zone A inshore gear configuration

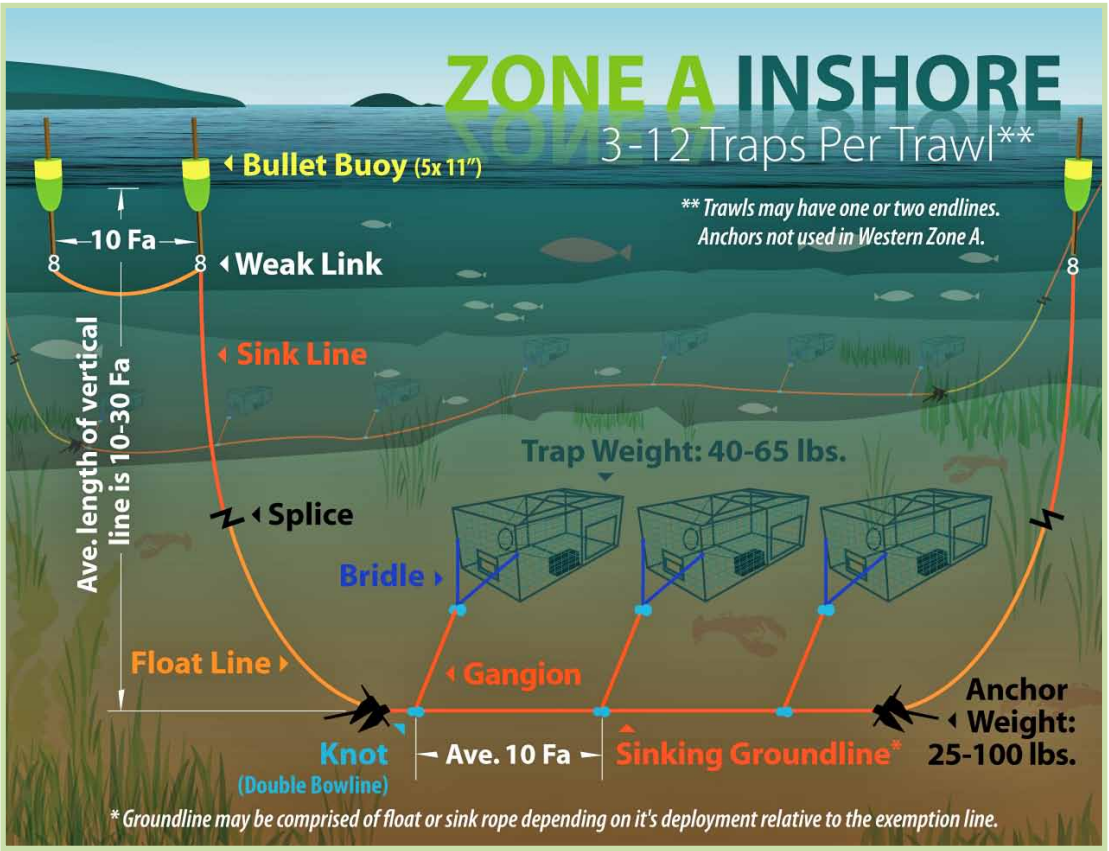

Figure 5. Zone A inshore trawl configuration

Downeast Maine - Zone B

Area: Zone B including seven districts spanning the downeast Maine coast from Gouldsboro on the Schoodic peninsula to Southwest Harbor on Mount Desert Island, including several offshore islands such as Swans Island and Frenchboro.

Number of licenses and tags (2010): The Maine Department of Marine Resources issued 646 lobster licenses and 308,000 trap tags with 63% (408) of licenses and 85% (263,350) of tags reporting landings greater than 1,000 pounds.

Landings (2010): 12 million pounds of lobster or 13% of Maine's lobster landings

Vessel length: Average 35 feet with a closed stern

Crew: Most boats carry at least one sternman.

Tides: Zone B is characterized by large tides of more than 15 feet in height, ranging from -2 feet at low to 14 feet at high tide, strong bottom currents and storm surges.

Bottom habitat: The bottom habitat is a mix of hard bottom and mud, with areas of deep water. More than half of the bottom (53%) contains rock (DMR, 2008). Lobstermen indicated that areas with deep water are mostly mud, while shoal areas are characterized by hard or broken bottoms.

Fishing season: The peak lobster fishing season in Zone B occurs during the summer and fall, though some lobstermen are active in the lobster fishery year round. Lobstermen who fish during the winter months fish less often. Lobster gear is shifted regularly during the season to follow lobster migration.

Soak time: The average soak time in the summer is three nights. This increases to one to two weeks in the winter and spring, depending on weather conditions.

Preferred rope brands/diameters: *Polysteel Atlantic* brand ropes with diameters of 3/8 inch, 11/32 inch and 1/2 inch.

Gear configurations: State regulations prohibit lobstermen from fishing strings of gear longer than three traps per trawl in state waters and in much of the zone's federal waters. State regulations also restrict each Swans Island lobsterman to a maximum of 450 total traps. Lobstermen typically fish triples inshore, or sometimes fish singles or pairs (Fig. 6). In federal waters, lobstermen are allowed to fish multiple traps per trawl.

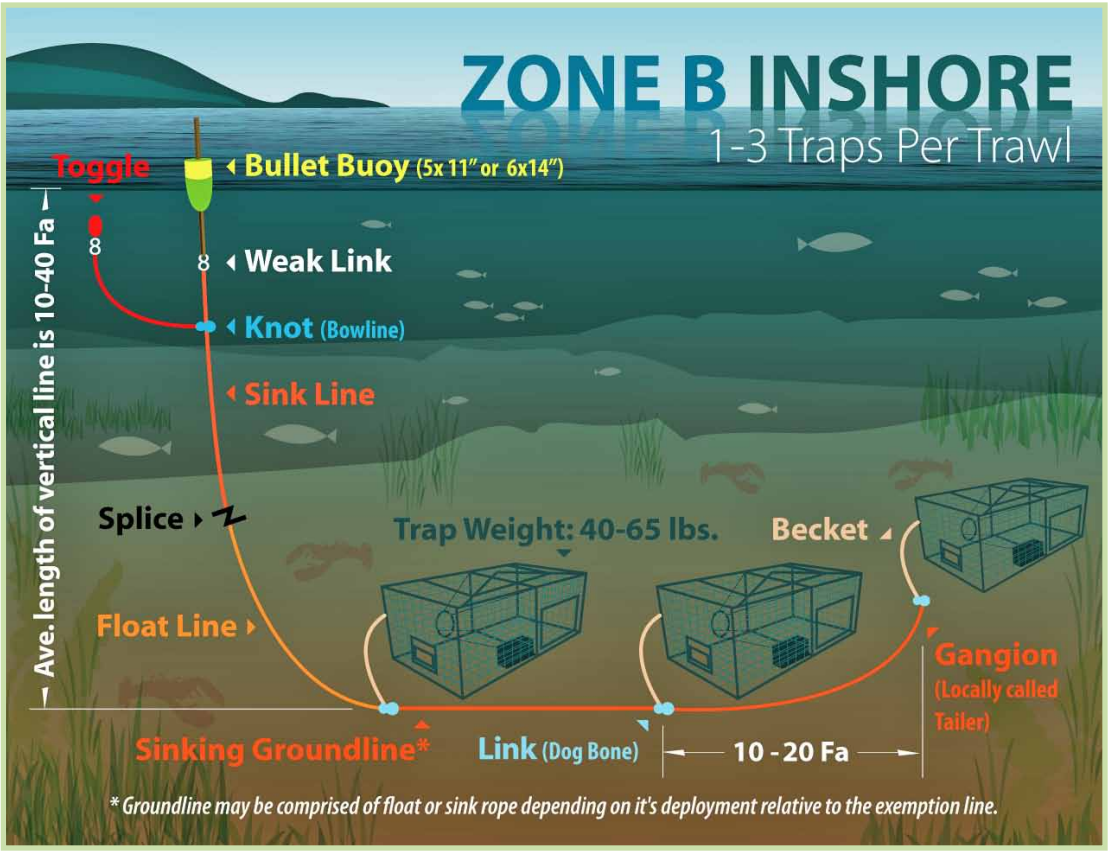

Figure 6. Zone B inshore gear configuration

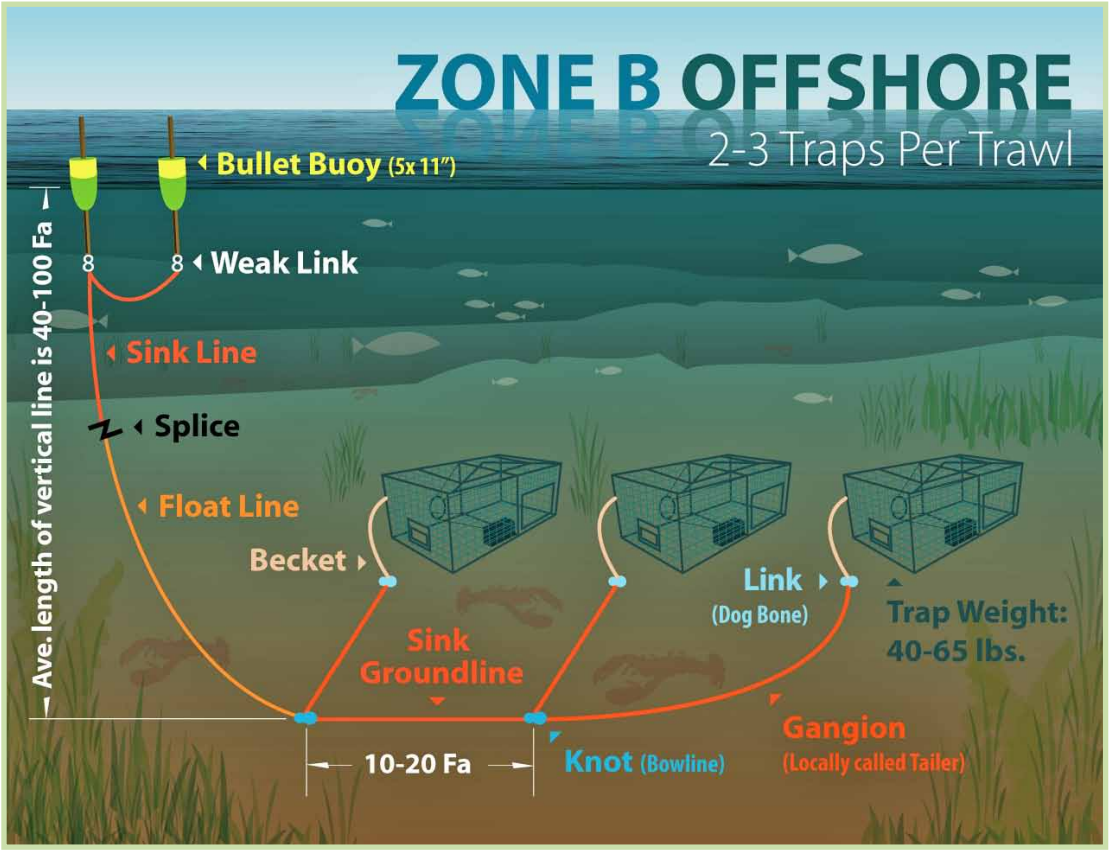

Figure 7. Zone B offshore gear configuration

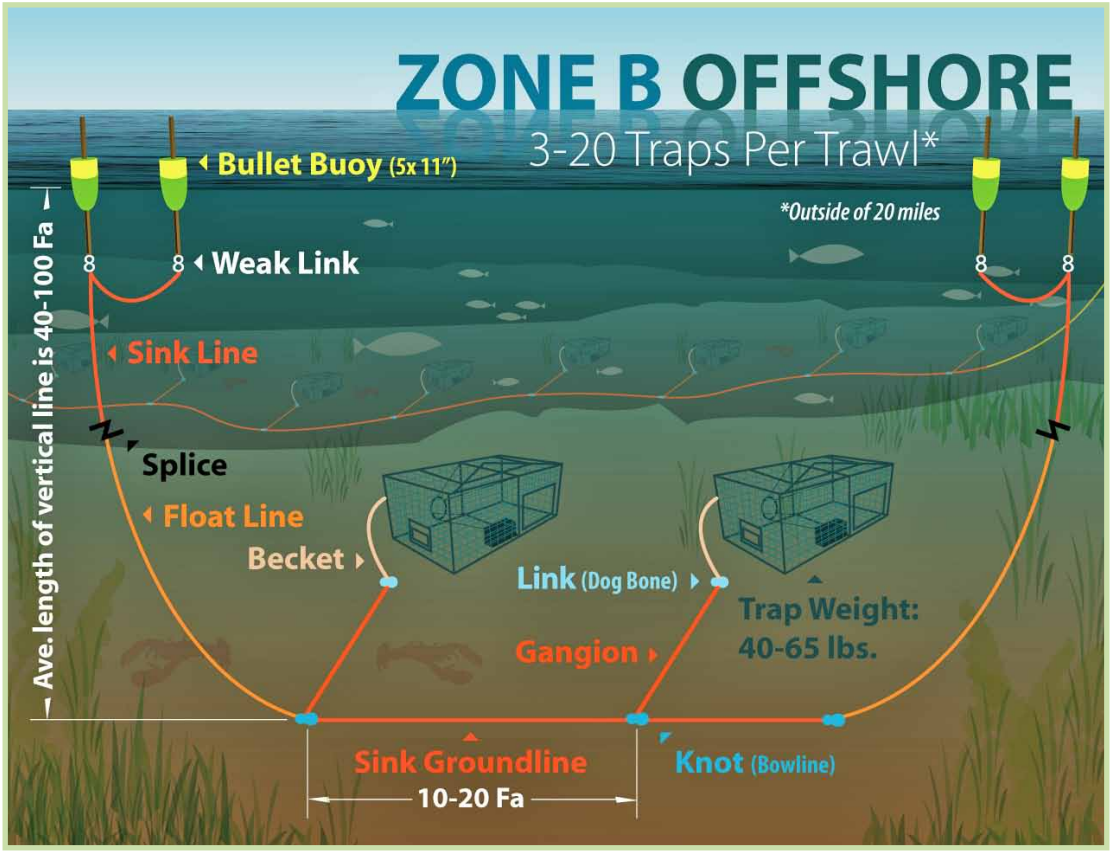

Figure 8. Zone B offshore gear configuration

The Zone B fishery is characterized by trawls of five traps or less, with some larger trawls of up to 20 traps fished 20 miles from shore in federal waters (Figs. 7 and 8). Deployment methods vary by location, for example, lobstermen fishing north of Mount Desert Rock fish pairs and triples, while in the area south of Mount Desert Rock, lobstermen fish mostly three to five traps per trawl. A limited number of 10-, 15- and 20-trap trawls are deployed 20 miles from shore with two endlines. Regardless of fishing location, most Zone B lobstermen use between 10 and 20 fathoms of groundline between each trap.

Ballast is used to keep gear in place on the bottom and usually consists of four to five cement bricks placed in the traps. Because lobstermen relocate their gear throughout the season, gear is reconfigured often to adapt to changes in depth and bottom type. When shifting gear to deeper water, lobstermen adjust the length of the buoy line by adding a section of rope or completely swapping out the buoy line with a longer one. Lobstermen in Zone B keep significant scope on their buoy line due to strong tides. The length of the buoy line is usually 25 percent longer than the depth of the water in offshore areas.

Zone B lobstermen typically use buoys that range in size from 5-by-11 to 6-by-14 inches. Most Zone B lobstermen rig the surface system with an additional buoy, referred to as a top float, tied 5 to 12 fathoms off the main buoy. Lobstermen gaff the top float first in order to get the rope into the hauler before experiencing the full strain of the gear. Some lobstermen choose to put three to four buoys on the top float line in order to offset the pull of the tide.

In response to the sinking groundline requirement, lobstermen reported moving away from fishing grounds in and around Bar Harbor and shortening their groundlines to minimize chaffing and gear loss, especially for triples fished in areas of hard and broken bottom.

Figure 9. Zone C inshore gear configuration

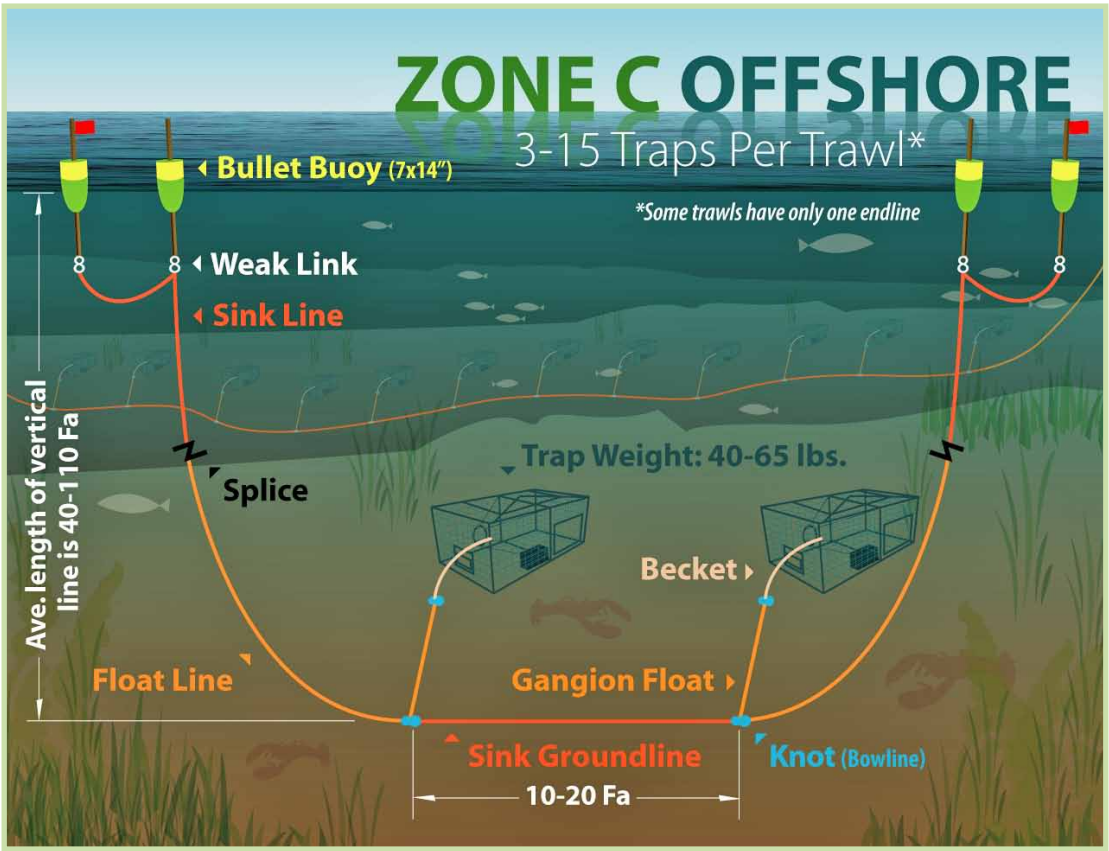

Figure 10. Zone C offshore gear configuration

Downeast Maine - Zone C

Area: This area includes nine districts spanning the Downeast coast from the Blue Hill peninsula to Deer Isle-Stonington, including offshore islands such as Vinalhaven and Matinicus. A significant number of Zone C lobstermen live on islands.

Number of licenses and tags (2010): The Maine Department of Marine Resources issued 947 lobster licenses and 530,000 trap tags, with 69% (652) of licenses and 83% (437,500) of tags reporting landings greater than 1,000 pounds.

Landings (2010): 23 million pounds of lobster or 24% of Maine's lobster landings

Vessel length: Averages 35 feet with vessels up to 50 feet and closed sterns

Crew: Most lobstermen fish with one or two sternmen.

Tides: Similar to Zone B, Zone C has large tides of approximately 15 feet, ranging from -2 feet at low to 15 feet at high tide with moderate to strong bottom currents.

Bottom habitat: There is mostly hard and broken bottom with some mud and sand. Nearly half (48%) of the bottom is predominantly rock (DMR, 2008).

Fishing season: The length of fishing season varies locally. It typically begins in March or April and ends in December. However, there are lobstermen from Vinalhaven and Matinicus, as well as from a few mainland communities, who fish year round. Gear fished in the winter months is hauled less often. Lobstermen shift gear regularly from shallow inshore waters in the summer to deeper waters in the fall, and even farther offshore in the winter and spring.

Soak time: The average soak time for gear in the summer and fall is three to five nights. In the winter and spring, this increases to one to two weeks depending on weather conditions.

Preferred rope brands/diameters: *Polysteel Atlantic's Esterpro* and *Highliner* brand rope, commonly 3/8 inch and 11/32 inch in diameter.

Gear configurations: Zone C lobstermen are restricted by state regulations to fish no more than three traps per trawl in most of the zone's state waters (Fig. 9). In inshore waters around the islands, lobstermen fish pairs and triples. Traps are connected at the bottom with 6 to 10 fathoms of rope. Following the implementation of the sinking groundline rule, some lobstermen have reported breaking down their pairs and triples to fish single traps on the hard bottom around the islands. Lobstermen who fish in waters around the islands are extremely territorial and prevent mainland lobstermen from fishing within their area. As a result, many mainland Zone C lobstermen fish farther from shore, beyond these islands.

In the offshore deeper waters of outer Penobscot Bay, lobstermen fish up to 15-trap trawls (Fig. 10). In the western end of outer Penobscot Bay, the gear ranges from 4- to 15-trap trawls. In general, trawls with more than five traps are fished with two endlines and have 10 to 20 fathoms of sinking groundline between each trap. Lobstermen have significant scope on the buoy line, typically using an endline length double that of the water depth where the gear is deployed.

Ballast is used to keep traps in place by inserting four to five cement bricks each. Lobstermen will reconfigure their gear often throughout the season, such as by swapping out endlines to accommodate changes in depth and bottom type.

Surface buoys range in size from 5-by-11 to 7-by-15 inch bullet-style buoys. When fishing offshore or in deeper water, lobstermen commonly place two buoys on one stick. Many lobstermen also fish a tide buoy deployed five fathoms off the main buoy. In inshore waters, some Zone C lobstermen also deploy toggles approximately five fathoms down the buoy line.

Similar to lobstermen in other zones, Zone C lobstermen reported moving away from traditional fishing grounds, changing gear configurations and dealing with other operational difficulties due to fishing with sinking groundlines.

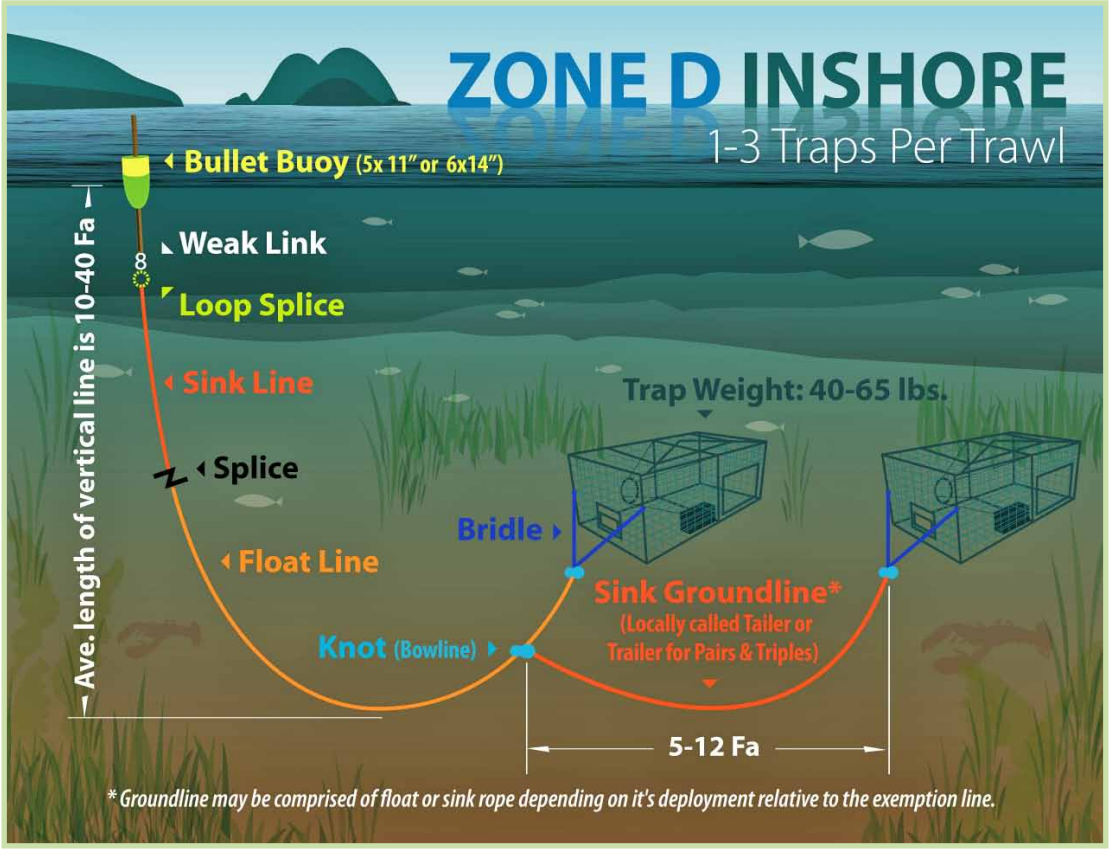

Figure 11. Zone D inshore gear configuation

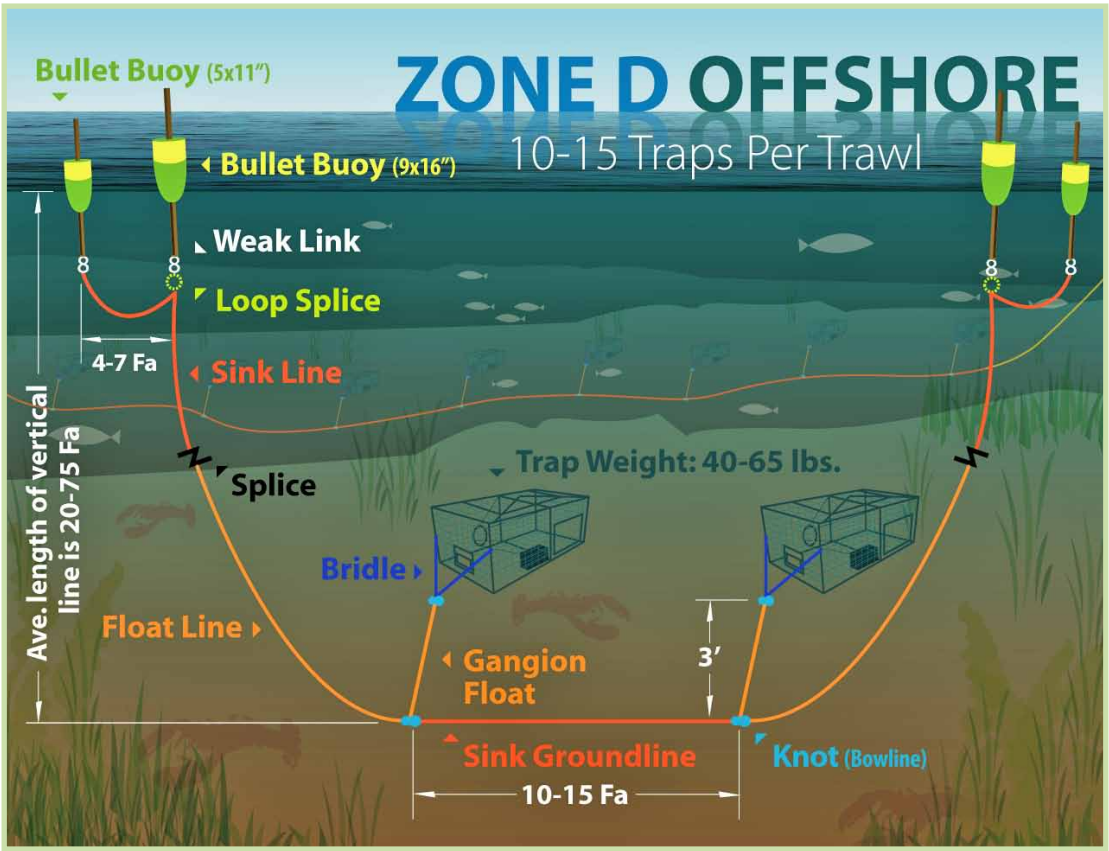

Figure 12. Zone D offshore gear configuraiton

Mid-coast Maine - Zone D

Area: Zone D includes twelve districts from Cape Rosier to New Harbor along mid-coast Maine.

Number of licenses and tags (2010): The Maine Department of Marine Resources issued 1,183 lobster licenses and 637,000 trap tags in Zone D, with 61% (717) of licenses and 79% (505,480) of tags reporting landings greater than 1,000 pounds.

Landings (2010): More than 20 million pounds of lobster or 21% of Maine's lobster landings

Vessel length: Averages 35 feet, with vessels up to 45 feet in length and closed sterns

Crew: Most lobstermen fish with one or two sternmen.

Tides: Zone D has tides of 14 feet, ranging from -2 feet at low to 14 feet at high tide. The zone incorporates Penobscot Bay, an area known for the convergence of the eastern and western Maine coastal currents. Although the flood tide is not problematic because of the convergence of the coastal currents, the ebb tides run hard in this area.

Bottom habitat: There are areas of hard and broken bottom, 46% of the bottom is predominantly rock with some sand and mud (DMR, 2008). Less than 25% of the bottom fished lies in inshore shoal water.

Fishing season: The Zone D lobster fishing season varies by location. Most areas of Zone D are fished seasonally, from March or April until December or January. Lobstermen from Tenants Harbor down to Friendship Harbor fish year round, but reduce the amount of gear used and hauling frequency in the winter. A large shrimp trawl fishery and a smaller shrimp trap fishery are active in these waters during the winter months. In the summer and fall, lobstermen fish the inshore waters. Monhegan Island has a state-mandated fishing season that runs from October through June; each lobsterman on that island is currently limited to a total of 300 traps.

Soak time: The soak time for gear in the summer and fall averages three to five nights. During winter and spring, the soak time increases to 12 nights.

Preferred rope brands/diameters: *Everson* and *Polysteel Atlantic*, with some lobstermen using *Hyliner*. The most common rope diameters are 3/8 inch and 7/16 inch.

Gear configurations: State regulations limit lobstermen to no more than three traps per trawl within state waters. Due to the location of islands, state waters in this zone extend more than 12 nautical miles from the mainland. Lobstermen fish singles, pairs and triples with one endline in inshore waters (Fig. 11). Lobstermen typically have 5 to 12 fathoms of groundline between each trap. Offshore, lobstermen deploy trawls of 10 to 15 traps with two endlines, though some lobstermen fish shorter strings of triples (Fig. 12). Lobstermen typically use 10 to 15 fathoms of groundline to link each trap in these offshore trawls.

Lobstermen weight their traps with three cement bricks or cement runners located on the bottom of the trap to stabilize them during strong tides and rough weather. Buoy lines are typically 3 to 5 fathoms longer than the depth of water. In offshore waters, lobstermen typically use a buoy line that is as long as the water depth plus an additional 25% of scope.

Lobstermen use buoys that range in size from 5-by-11 to 9-by-16 inches. Very few use toggles along the top portion of the buoy line, with the exception of Muscongus Bay where they are preferred. Most lobstermen rig their surface system to include a single tide buoy deployed three to five fathoms off the main buoy system. Highflyers are also used in offshore rigs.

As in Zones A, B and C, lobstermen have abandoned fishing in some areas now that they use sinking groundline, and more often will fish singles on hard bottom inside and around the islands as well as shorten the length of groundline between traps.

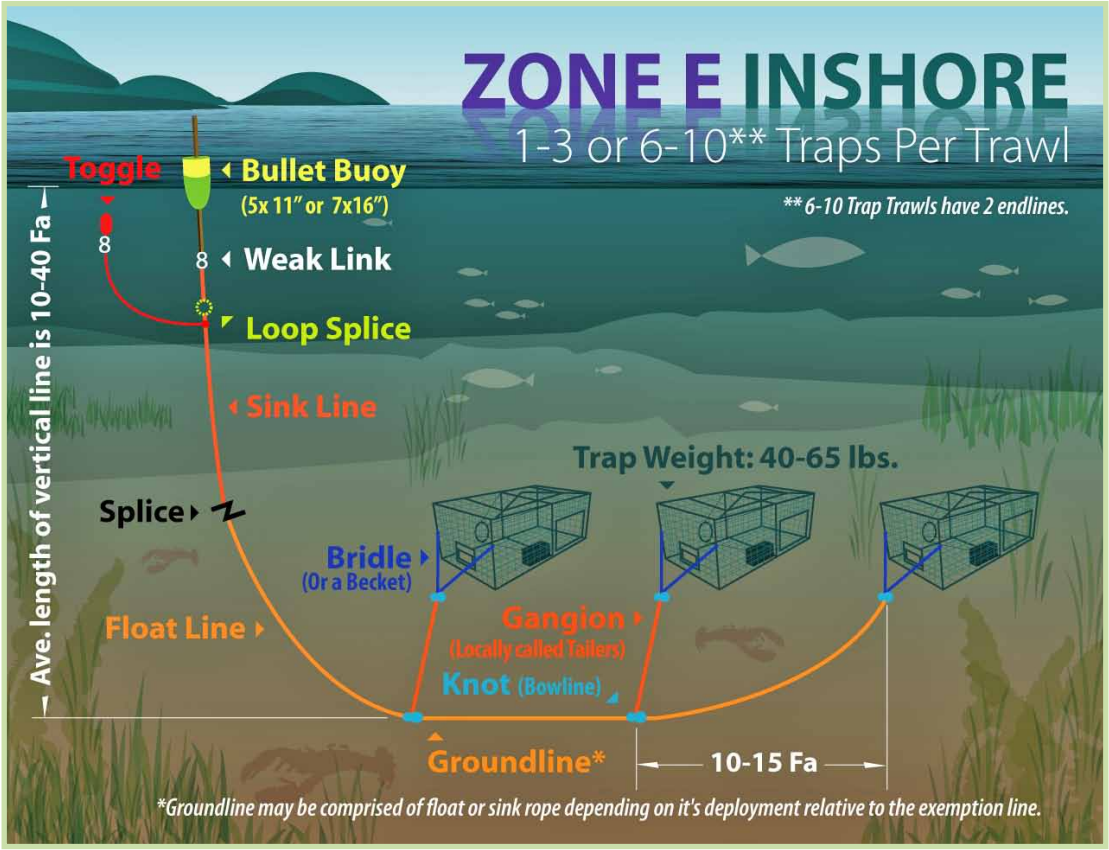

Figure 13. Zone E inshore gear configuration

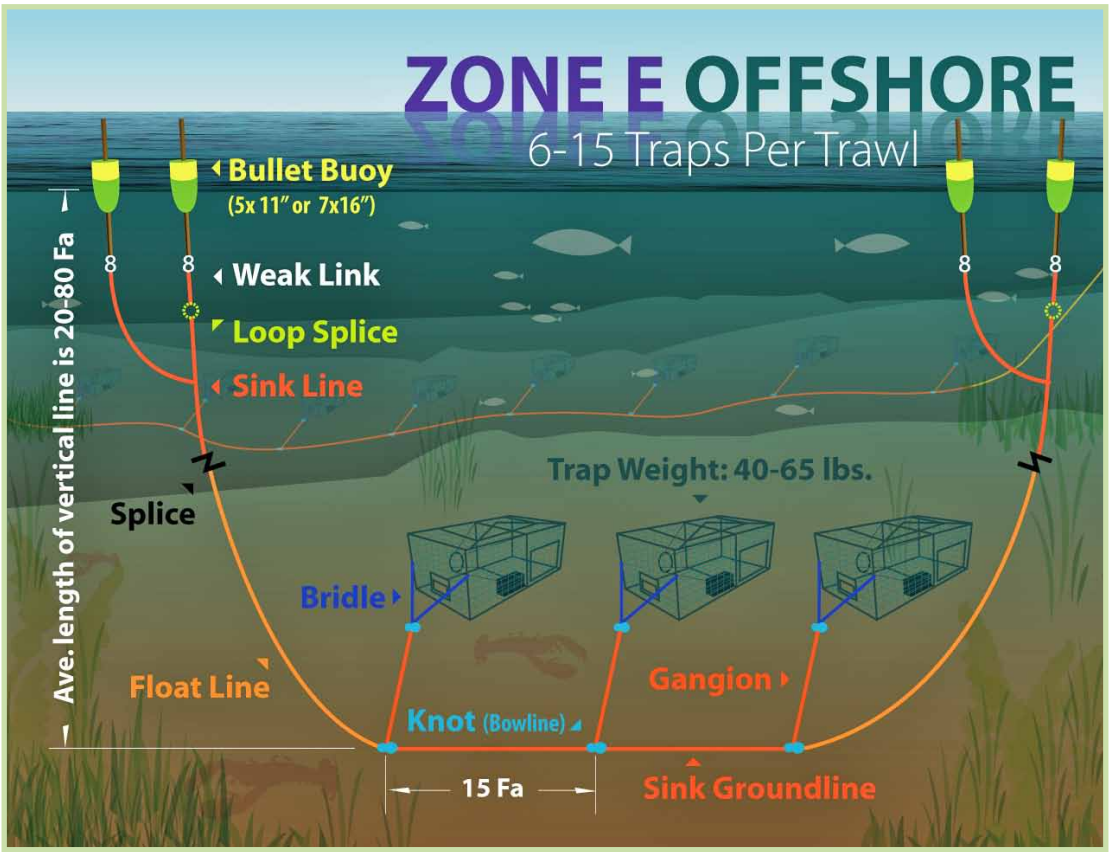

Figure 14. Zone E offshore gear configuration

Mid-coast Maine - Zone E

Area: This area includes ten districts from Pemaquid Point to Small Point in mid-coast Maine.

Number of licenses and tags (2010): The Maine Department of Marine Resources issued 543 lobster licenses and 214,800 trap tags in Zone E, with 54% (295) of licenses and 74% (158,560) of tags reporting landings greater than 1,000 pounds.

Landings (2010): Nearly six million pounds of lobster, accounting for 6% of Maine's lobster landings

Vessel length: Averages 30 to 40 feet in length with closed sterns

Crew: Lobstermen generally fish alone or with one sternman.

Tides: Zone E experiences tides of 13 feet, ranging from -2 feet at low tide to 11 feet at high tide.

Bottom habitat: Mostly hard, with 60% containing rock (DMR, 2008) interspersed with areas of sand and mud

Fishing season: The Zone E season runs from April through December. Approximately one quarter of licensed lobstermen fish year round.

Soak time: The soak time for gear averages one to five nights in the summer and fall, but increases to seven to 12 nights during the winter and spring.

Preferred rope brand/diameter: The most common rope diameters are 7/16 inch and 3/8 inch, but lobstermen did not identify preferred brands of rope.

Gear configurations: State regulations prohibit fishing with more than three traps on a trawl in a small section of Zone E between Pemaquid and Robinson's Point, a small area in the Sheepscot River, and around Sequin Island. There is a small area in Linekin Bay where lobstermen are limited to no more than two traps on a trawl. Zone E lobstermen have a more stringent zone trap limit than other zones, capped at 600 traps.

In the eastern half of the zone, lobstermen fish singles, pairs, and triples inshore (Fig. 13). In the western half, they commonly fish six- to 10-trap trawls with two endlines. The length of groundline between traps is typically 10 to 15 fathoms. In offshore deeper waters, lobstermen fish six- to 15-trap trawls with two endlines, and typically have 15 fathoms of groundline between each trap (Fig. 14).

Lobstermen weight their traps using three cement bricks inside the trap or with cement runners rather than the typical wooden runners placed outside the bottom of the trap. To maintain buoy visibility, Zone E lobstermen require only a small amount of additional scope on the buoy line, typically adding only 5 fathoms more than the water depth on gear fished inshore. When shifting gear from shallow to deeper waters, Zone E lobstermen increase the length of line as they change depths by adding a section or changing out lines, and typically do not coil extra rope under the buoy. Most Zone E lobstermen typically add an additional 10 to 20 percent more line length than the depth fished.

Zone E lobstermen fish bullet buoys at the surface that average 7-by-16 inches; a few lobstermen also incorporate toggles below the surface near the top of the buoy line. Some lobstermen use a second tide buoy at the surface, located 2 to 3 fathoms from the bullet buoy.

There are both shrimp trawl and shrimp trap fisheries operating during the winter months. Dragging occurs between January and March, and lobstermen will remove gear from known locations of shrimp tows to avoid gear loss.

Zone E lobstermen reported that they have adapted well to using sinking groundline, in large part due to the predominant use of singles and pairs in inshore waters and the absence of extreme tides and bottom currents that tend to increase rope chaffing.

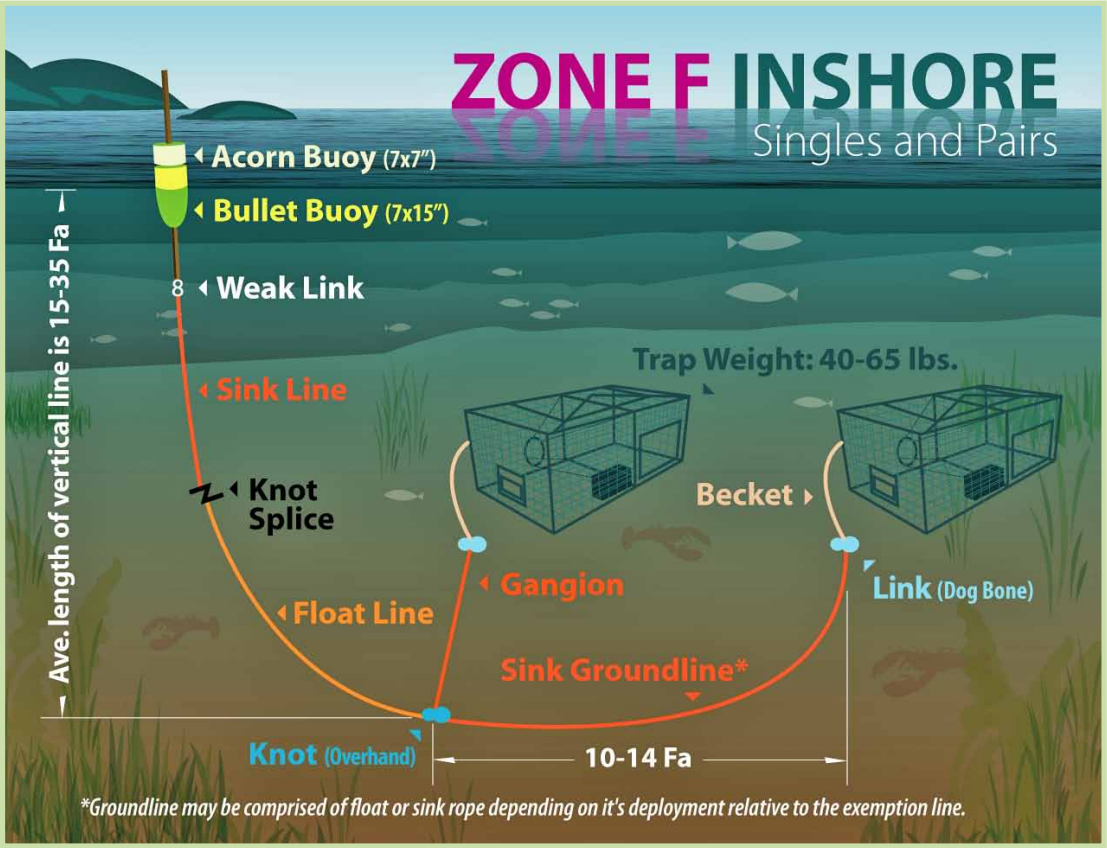

Figure 15. Zone F inshore gear configuration

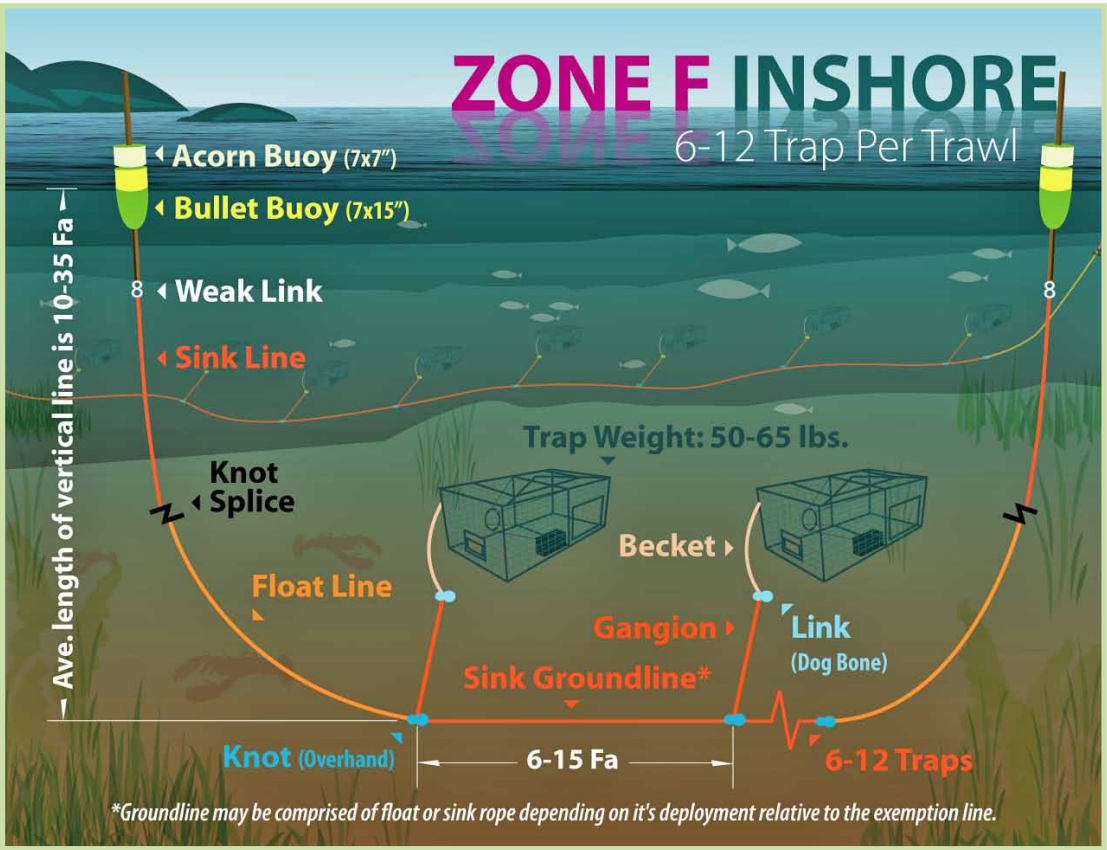

Figure 16. Zone F Casco Bay inshore gear configuration

Southern Maine - Zone F

Area: This area includes nine districts along the southern Maine coast from Small Point to Cape Elizabeth, including an area of overlap with Zone G at the western boundary.

Number of licenses and tags (2010): The Maine Department of Marine Resources issued 935 lobster licenses and 464,000 trap tags in Zone F, with 52% (486) of licenses and 70% (324,670) of tags reporting landings greater than 1,000 pounds.

Landings (2010): 11.5 million pounds of lobster or 12% of Maine's lobster landings

Vessel length: Vessels range from 18 to 40 feet, with smaller vessels owned by part-time and inshore fishermen. Approximately one third of the vessels in Zone F have open sterns.

Crew: Most lobstermen fish with at least one sternman.

Tides: Zone F has tides of nearly 15 feet, ranging from -2 feet at low to 13 feet at high tide.

Bottom habitat: The bottom is a mixture of mud, sand, gravel and rocky bottom. More than half of the bottom (57%) contains some rock (DMR, 2008).

Fishing season: Most active from April to December, although some lobstermen fish year round. Lobster gear is reconfigured and moved regularly throughout the season. Fishing takes place inshore in the summer and moves offshore and to areas around Jeffreys Ledge, located in Zone G, in the fall and winter.

Soak time: The average soak time during the summer and fall is two to three nights, increasing to approximately one week during the winter and spring.

Preferred rope brand/diameter: Zone F lobstermen did not report a preference for specific brands of rope. The most common rope diameters were 3/8 inch and 7/16 inch, with some 1/2 inch fished offshore.

Gear configurations: In some inshore shoal areas, lobstermen fish singles and pairs (Fig. 15). In western Casco Bay, state regulations permit a maximum of 12-trap trawls inside state waters. It is also illegal to fish trawls with more than three traps within a small area located in the western portion of Zone F where it overlaps with Zone G.

In the Casco Bay area, lobstermen typically fish six- to 12-trap trawls with two endlines (Fig. 16). Owing to currently high numbers of traps in the bay, some lobstermen who historically fished 10-trap trawls have now split them into five-trap trawls. This allows them to fish the same number of traps while minimizing conflicts with other lobster gear. Lobstermen use 6 to 15 fathoms of groundline to connect their traps, but with longer lengths on longer trawls.

In the deeper offshore waters in the western portion of Zone F, lobstermen fish trawls of up to 40 traps with two endlines, while in the eastern part of Zone F offshore lobstermen fish on average 10- to 20-trap trawls (Fig. 17). However, the length of the trawl is limited by vessel size. Lobstermen often double their inshore trawls to create offshore trawls, tying two eight-trap trawls together or two 20-trap trawls. Offshore trawls are typically rigged with 15 fathoms of sinking groundline between each trap.

Lobstermen weight their inshore traps with three bricks and their offshore gear with four to five bricks or use cement runners. They add a few extra fathoms of line for scope to the buoy line when fishing inshore, and often coil extra lengths of rope below the buoy to allow the buoy line to be lengthened when shifting gear into deeper waters. This avoids the necessity of swapping out endlines. In offshore waters, lobstermen use a length of endline that is 50 percent longer than the water depth.

Due to high gear density and long trawls, lobstermen fishing inside Casco Bay occasionally set their gear over that of someone else. This causes the gear to become tangled when hauled. As a result, inshore buoy lines typically show telltale knots where the line was cut and then tied back together during the process of disentangling gear.

Zone F lobstermen mark inshore gear with bullet buoys that range in size from 5-by-11 to 7-by-15 inches, commonly doubled up on the line. Alternatively, they may use a 7-by-7-inch acorn-shaped buoy in combination with a bullet buoy. Offshore, lobstermen will deploy a tide buoy about 5 fathoms off of the main buoy. In federal waters outside of the 12-mile line, lobstermen use highflyers in combination with 9-by-16-inch bullet buoys.

The majority of lobstermen who fish in Casco Bay have traditionally fished trawls with sinking groundline in order to minimize gear conflicts caused by the congestion in the bay. Little adjustment therefore has been necessary in adjusting to the sinking groundline regulation.

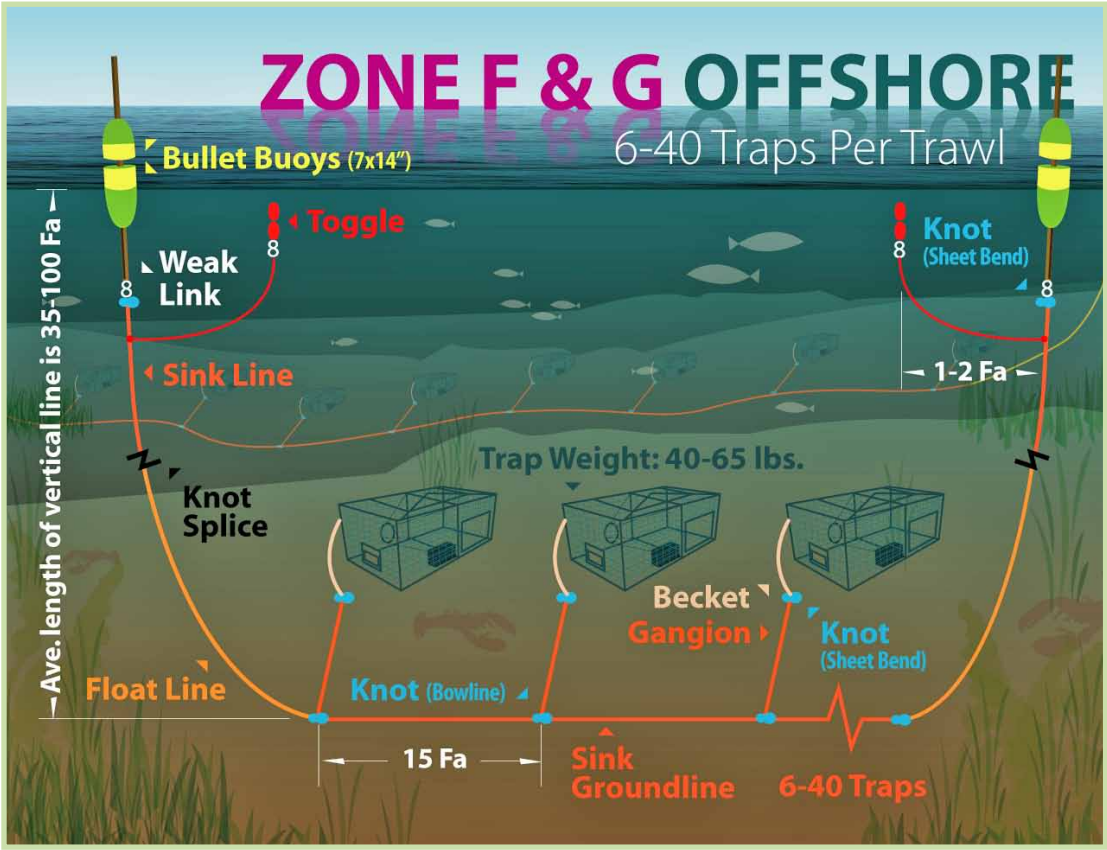

Figure 17. Zone F and G offshore gear configurations

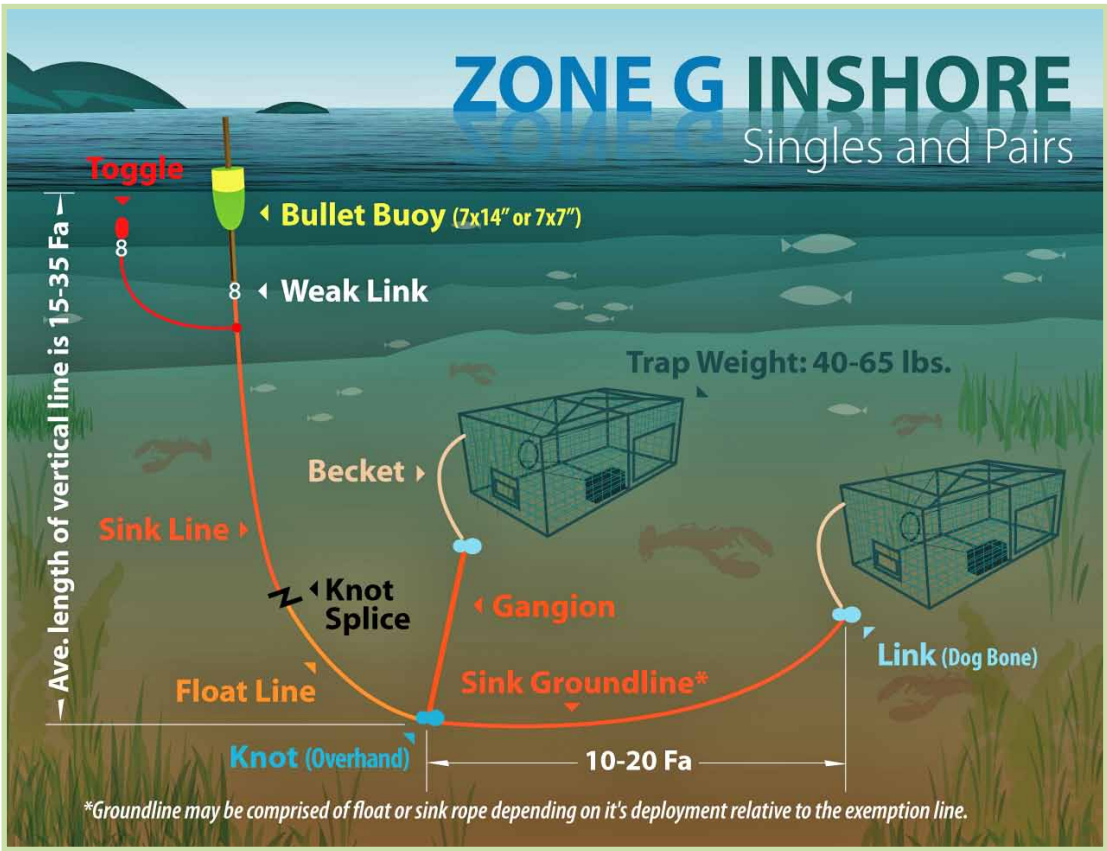

Figure 18. Zone G inshore gear configuration

Southern Maine - Zone G

Area: Zone G includes eleven districts along the southern Maine coast from Cape Elizabeth to Kittery, including an area of overlap with Zone F on the eastern boundary.

Number of licenses and tags (2010): The Maine Department of Marine Resources issued 510 lobster licenses and 216,740 trap tags in Zone G, with 47% (241) of licenses and 75% (161,880) of tags reporting landings greater than 1,000 pounds.

Landings (2010): 3.5 million pounds of lobster or 4% of the state's lobster landings

Vessel length: Vessels average from 32 to 40 feet. The fleet in Kittery consists mostly of boats with open sterns, while closed sterns are more common in the rest of Zone G.

Crew: Most boats operate with at least one sternman.

Tides: Zone G has tides of 13 feet, ranging from -2 feet at low to 11 feet at high tide. Bottom currents cause little disruption to fishing gear. The area in and around the Piscataqua River, however, has the region's most severe tides and bottom currents, causing surface systems to be pulled under water and limiting the amount of time lobstermen have to haul gear on any given day.

Bottom habitat: A mix of mud, sand, gravel and rocky bottom, with 47% of the bottom containing rock (DMR, 2008)

Fishing season: The majority of the Zone G lobster fishery takes place from April through November, although there is some fishing year-round. Lobstermen from the eastern part of the zone often fish a portion of their gear in Zone F during the spring and summer months. Lobstermen who fish in the winter and spring move their gear offshore into deeper water beginning in the fall.

Soak time: The average is three to six nights in the spring and summer, and seven to 10 nights in the fall and winter.

Preferred rope brands/diameters: Lobstermen did not identify a preferred brand of rope and most commonly fish with rope diameters of 3/8 inch, 11/32 inch and 7/16 inch.

Gear configurations: State regulations limit Zone G lobstermen to no more than three traps per trawl in most of the state waters (Fig. 18). In Kittery, lobstermen are limited to a maximum of 10 traps on a trawl in order to minimize the amount of gear lost to high boat traffic (Fig. 19). Outside Kitts Rock off of Kittery Point, singles, pairs and triples are the most common configurations, with the length of groundline between traps averaging 10 to 20 fathoms long. Lobstermen operating offshore fish on average 16- to 20-trap trawls with two endlines (Fig. 17). In recent years however, a few larger boats of over 45 feet in length have entered this fishery and use trawls with up to 40 traps and two endlines (Fig. 17). Ten to 14 fathoms of sinking groundline are typically used to connect each trap in offshore trawls.

Lobstermen place four to five bricks in the traps or fish with cement runners on the bottom of the traps for ballast. In the Piscataqua River, up to 10 bricks are used to ensure stable placement of the gear due to the strong tides and currents. Some lobstermen also use two endlines on triples due to the risk of gear loss from heavy boat traffic. In inshore waters, lobstermen usually make buoy lines 50 percent longer than the water depth, such as fishing a 30-fathom endline in 20 fathoms. This increases to 60 to 75 percent additional line in deeper nearshore and offshore waters. Buoy lines fished offshore are often knotted because lobstermen will tie together shorter endlines that were previously used inshore. Lobstermen also coil endline below the buoy to provide the additional length needed when relocating gear to deeper waters.

In inshore waters, lobstermen mark their gear with 7-by-7-inch acorn buoys or 7-by-14-inch bullet buoys. In some cases, two buoys are combined on one endline. In waters less than 10 fathoms deep over rocky bottom, some lobstermen use toggles tied half way down the buoy line to keep the gear from getting hung down. In waters beyond 12 nautical miles from shore, lobstermen typically use a surface system that includes a highflyer connected to either a polyball or two 9-by-16-inch bullet buoys connected by two fathoms of sinking line.

Zone G has an active winter shrimp fishery on soft and mud bottom. Most lobstermen therefore fish on the hard bottom during the shrimp season, usually December through March, to avoid interaction with the shrimp trawlers.

Some lobstermen reported relocating their gear from their traditional fishing grounds to mud or sandy bottom areas after switching to sinking groundline due to concerns about chaffed rope and lost gear. Lobstermen complained about rope chaffing most often between the first and second traps.

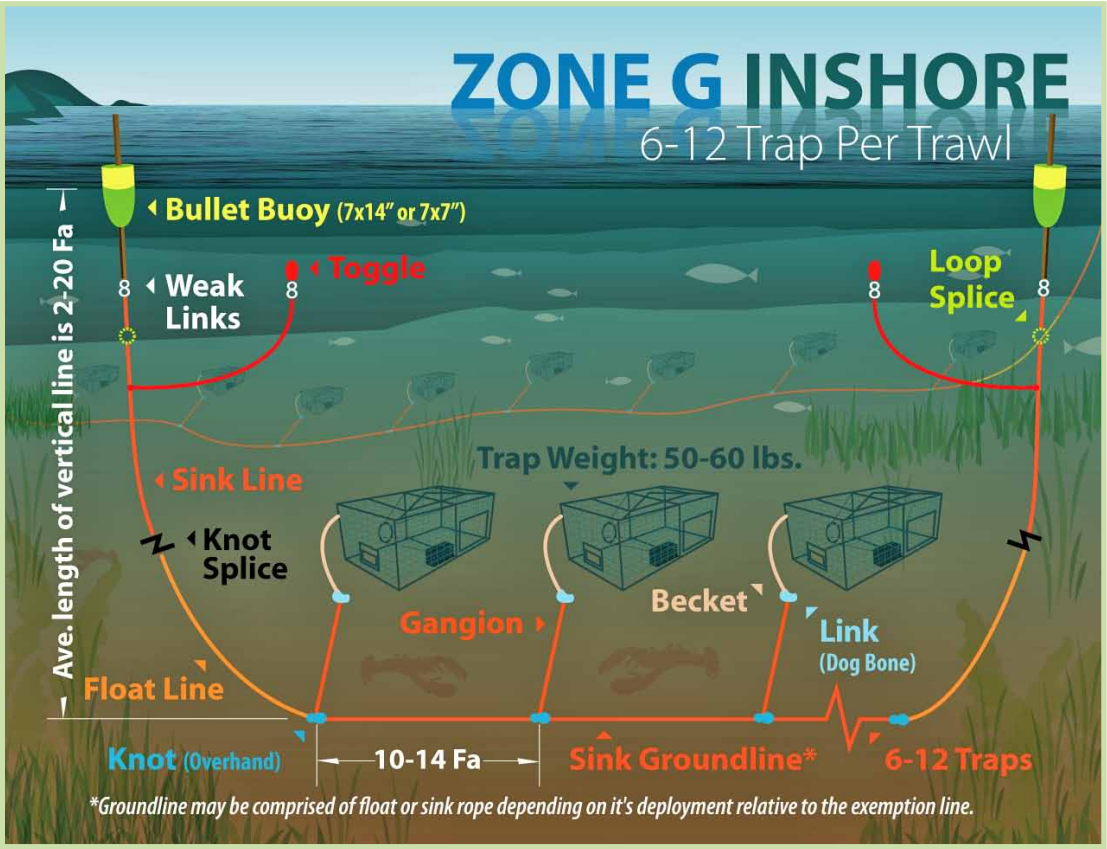

Figure 19. Zone G Kittery gear configuration

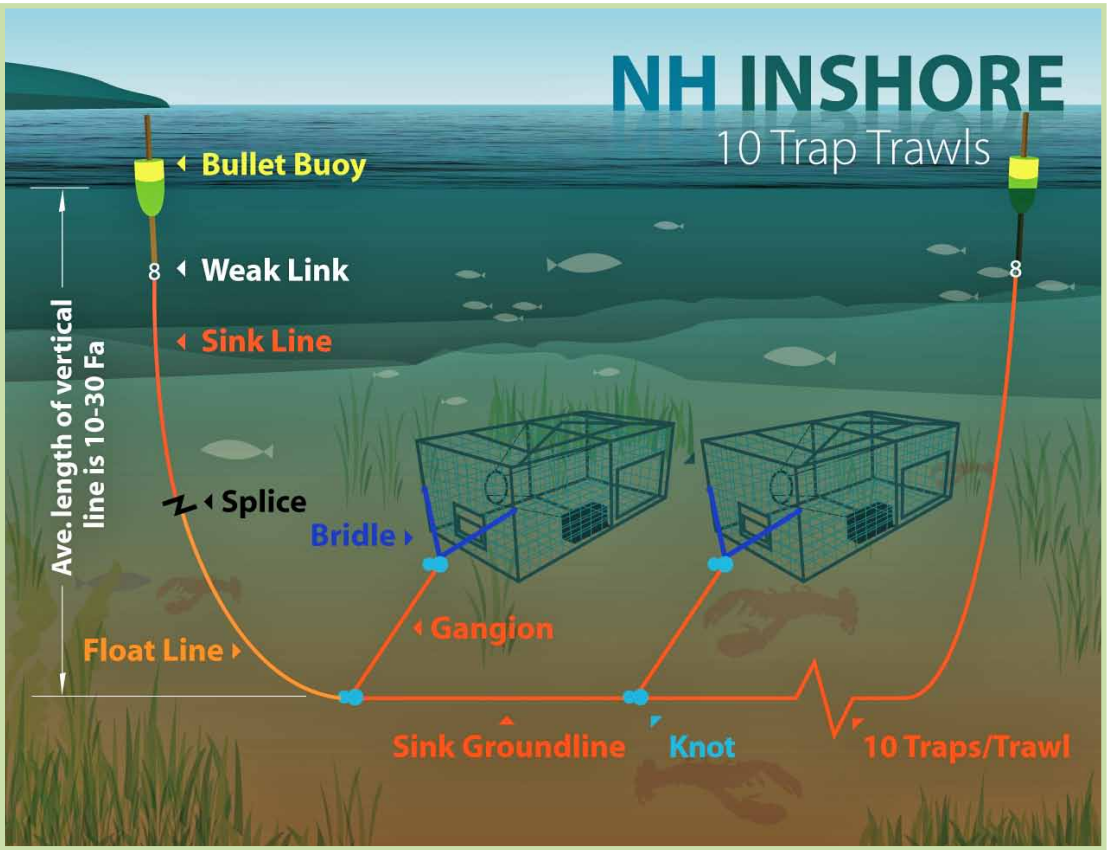

Figure 20. New Hampshire inshore gear configuration

New Hampshire

Number of licenses and tags (2010): The New Hampshire Fish and Game Department issued 347 lobster licenses. Only 23% (80) of licenses reporting landings greater than 1,000 pounds. New Hampshire issues commercial licenses for either 1,200 or 600 traps, each of which has qualifying criteria, and an open license for 100 traps. There are 15 lobstermen who hold the 1,200 trap license which allows them to fish 1,200 traps in state waters and shift up to 800 of those into federal waters.

Landings (2010): 3.7 million pounds of lobster

Vessel length: Vessels average 32 feet or less in length, which limits trawl length to a maximum of 20 traps. Lobstermen permitted to fish up to 1,200 traps typically fish in vessels larger than 36 feet in length.

Tides: New Hampshire has moderate tides of 12 feet, ranging from -2 feet at the low to less than 11 feet at high tide.

Bottom habitat: A mixture of gravel and hard bottom with areas of mud, similar to that of southern Maine

Fishing season: In New Hampshire, the lobster season begins in April or May and continues through January. Most lobstermen fish mainly inshore during the summer months on hard bottom. Lobstermen who continue fishing in the winter from November through January fish in deeper water, as far out as Jeffreys Ledge.

Preferred rope brands/diameters: New Hampshire lobstermen did not identify preferred brands of ropes. They fish ropes similar in size to the Zone G fishery, commonly with diameters of 3/8 inch, 11/32 inch and 7/16 inch.

Gear configuration: A limited number of lobstermen fish singles and doubles with one endline within shallow waters inside the 40-fathom depth contour. The majority of these lobstermen fish with a small number of traps in depths of less than 10 fathoms. Close to shore, five-trap trawls with two endlines are common. However, the majority of New Hampshire lobstermen fish 10-trap trawls with two endlines in both state and federal waters; some fish 20-trap trawls with two endlines in federal waters (Fig. 20).

Endlines are typically 20 fathoms long, but increase when gear is shifted into deeper federal waters. Approximately half of New Hampshire lobstermen use endlines that combine sinking and floating rope, while the remainder use only sinking rope.

Lobstermen in state waters fish a simple surface buoy system consisting of a single buoy at the top of the endline because they do not contend with extreme tides or bottom currents, except in the Piscataqua River. In federal waters, gear is configured with a highflyer or a double buoy attached to a wash buoy for gaffing. Lobstermen rarely weigh their traps down with ballast.

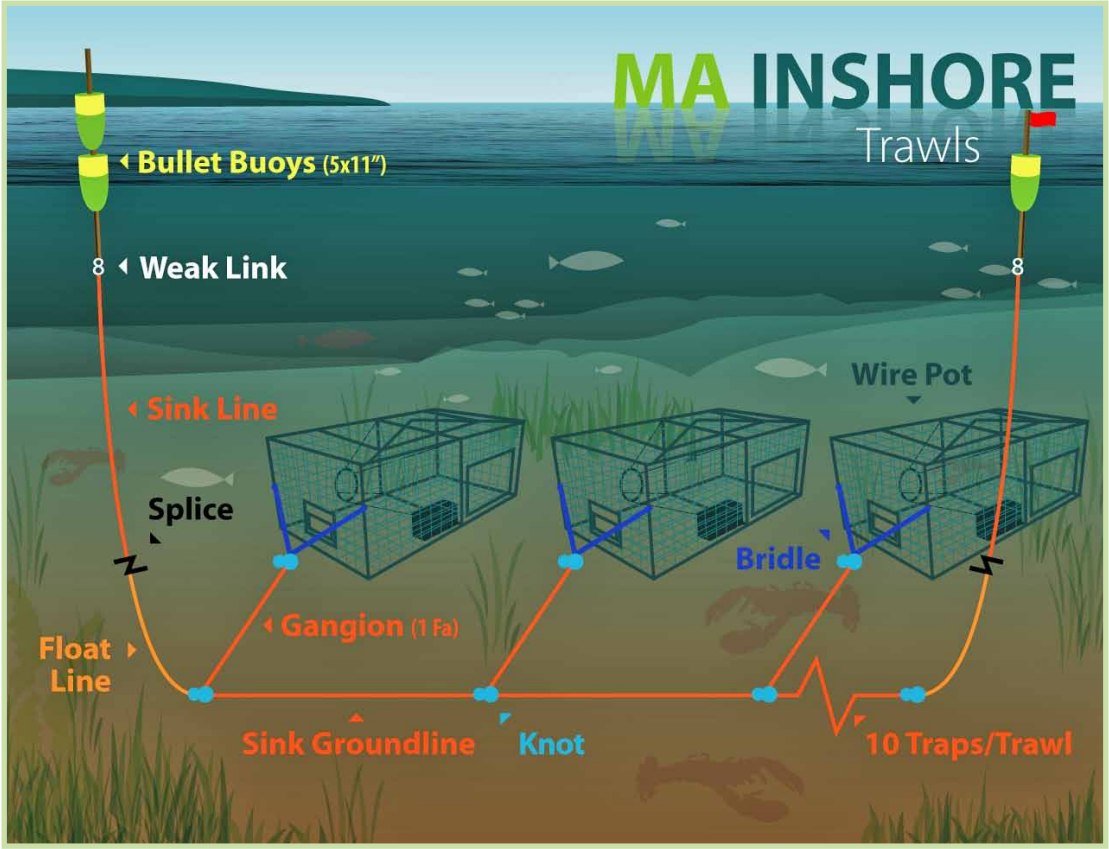

Figure 21. Massachusetts inshore gear configuration

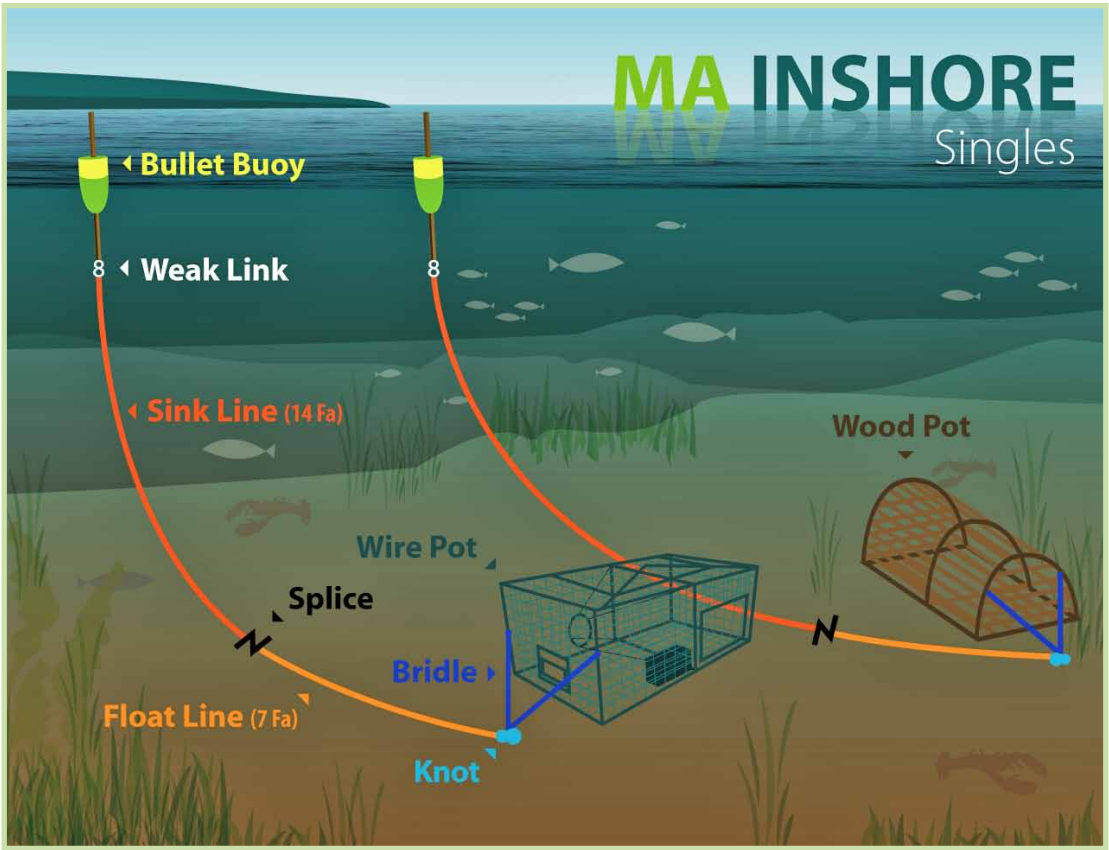

Figure 22. Massachusetts inshore and Cape Cod Bay gear configurations

Massachusetts

Number of licenses and tags (2010): The Massachusetts Division of Marine Fisheries issued 11,675 lobster licenses for Area 1 and the Outer Cape and 896,999 trap tags, with 49% (571) of licenses and 51% (436,300) of tags reporting landings greater than 1,000 pounds.

Landings (2010): 12.7 million pounds of lobster

Vessel length: 18 to 45 feet, with the average length between 30 and 35 feet

Tides: The tides average 13 to 15 feet, ranging from -2 feet at the low to nearly 15 feet at high tide.

Bottom habitat: The bottom habitat is a uniform mix of sand, mud and gravel. The state's north shore area is slightly rockier, similar to areas described in the Zone G portion of southern Maine.

Fishing season: The season runs from April through December, with some continuing through January. Lobstermen set their gear close to shore in the summer and then move offshore to chase migrating lobster as the season progresses.

Soak time: Lobstermen haul their gear every three nights in the summer and fall, and increase the soak time to one week in the winter.

Preferred rope brands/diameters: Lobstermen reported no preference for any particular brand of rope, and typically fished with 3/8 inch line.

Gear configurations: In state waters, lobstermen fish mostly 10- to 15-trap trawls. In Boston harbor, trawl length increases to 20 to 25 traps (Fig. 21). Trawls of up to 40 traps are fished in offshore waters. Therefore, lobstermen may fish with as few as 40 endlines when fishing the maximum 800 traps. Around inner and outer Cape Cod Bay, Elizabeth Islands and Buzzards Bay, lobstermen fish singles (Fig. 22). Outer Cape lobstermen contend with stronger tides and currents.

Lobstermen use three to four bricks or cement runners for ballast. Some use machined metal ballast, but this is not common. Old wooden traps were once fished with cement poured into them to create ballast. This practice is no longer common except in the Outer Cape, where wooden traps are still used. The inshore fishery occurs within the 100-foot depth contour. Lobstermen typically use vertical lines 10 percent longer than the depth fished.

State regulations require a single buoy with a flag to mark the north (or west) end of the trawl and a double buoy on the south (or east) end. The double buoy can be two buoys tied together or can be two buoys on a 3- to 4-foot-long stick. Lobstermen fishing singles around Cape Cod Bay do not use flags or buoy sticks. Lobstermen use 5-by-11-inch bullet buoys. In deeper waters, a few lobstermen use highflyers, but this is not common.

Summary

Photo: T. Werner

Despite many commonalities, Gulf of Maine lobster fishing practices and gear configurations vary according to different local environmental conditions and traditional practices. These differences are important for managers to keep in mind because they often have evolved as a means to safely fish under specific local situations.

In the Gulf of Maine, lobster fishing usually begins around April and goes through the end of December. The peak fishing times are the summer and fall. Lobstermen operate farther offshore if they fish during the winter months, and will haul their gear less frequently.

Vessel size, sophistication of equipment, bottom type and distance from shore are the main predictors of the number of traps fished per trawl. In some cases, the number of traps per trawl is restricted by state regulations. In general, lobstermen fish shorter trawl configurations inshore and increase the length as they move to deeper water. Inshore areas characterized by softer bottom such as mud, sand or gravel, however, also feature longer trawls. Trawl fisheries of five or more traps are generally found in areas of smoother, softer bottom. Because hard bottom is the preferred habitat for lobster, lobstermen logically want to fish on hard bottom.

Fishing hard bottoms carries an increased risk that ropes will chafe more or become stuck, leading to breaks and loss of gear. In most areas of Maine, lobstermen report that this risk has increased since the sinking groundline rule was implemented in 2009. Some report giving up traditionally fished hard bottoms and now fish at their periphery or on mud, intending to catch lobsters as they migrate. Others have switched from fishing pairs and triples to fishing singles, and shortening the length of groundline between traps to minimize chaffing on the rope and the potential for gear loss.

As a general rule, fishing singles, pairs and triples are preferred in areas of jagged, irregularly rocky bottom. Pairs and short trawls fished in these areas traditionally incorporated floats on the groundline and now use floating groundline to help avoid rope “hangdowns” and excessive trap loss.

In areas of high gear density where the possibility of gear becoming entangled with other gear is higher, lobstermen agree among themselves to set gear in a predefined manner, for example, with the tide or in a north-south direction.

The number of traps per trawl increases offshore, resulting in a decrease in endlines relative to the number of pots fished. The offshore bottom habitat

is predominantly mud and gravel, with areas of hard bottom. Longer trawls work more effectively in offshore waters because reduced gear density decreases gear conflicts and larger vessels are better equipped to safely handle longer strings of gear and more severe weather conditions.

The type of surface gear configurations and anchoring used are highly dependent on local tides and currents. The stronger the tides and currents, the harder it is for lobstermen to keep their gear from moving on the bottom and buoys visible at the surface. Lobstermen in Zone A use heavy anchors tied to large polyballs at the surface to keep their gear both stable and visible throughout the full tidal range. In zones where tides and bottom currents are less intense, lobstermen are able to use small buoys and only a few bricks to weight their traps. Additional surface buoys and a surface line are used throughout the fishery, helping lobstermen to gaff their gear more easily and get lines into the hauler without bearing the full strain of the gear and tidal forces.

Lobstermen have developed different methods for connecting components of the surface system using different knots, splices and rope combinations. They also vary how lobster traps are tied to groundlines using beckets, bridles or gangions. In some areas, certain brands and sizes of rope are commonly preferred, primarily due to the reputation for reliable rope performance under local conditions. Lobstermen generally fish the smallest diameter of rope that will support their gear to minimize both cost and the overall weight of the gear. However, with the sinking groundline requirement some lobstermen now use larger diameter groundlines in order to prolong the life of the rope.

Although this report is focused on the commercial lobster fishery, there are abundant recreational lobster fisheries in Maine, New Hampshire and Massachusetts. These fisheries generally take place very close to shore with limited trap numbers. For example, Maine issues approximately 2,000 recreational lobster licenses, each limited to five traps, while Massachusetts issues approximately 10,000 non-commercial lobster permits limited to 10 traps a piece. Each state regulates its recreational permit holders, but in general they must abide by the same conservation standards as commercial lobstermen.

Acknowledgments

For the generosity of their time and up-front sharing of information on their fishing practices, we thank lobstermen from throughout the Gulf of Maine. Their commitment to collaborating on this project attests to the seriousness with which they take their stewardship of the biologically rich and productive waters of the Gulf of Maine. We especially would like to acknowledge several of the Director's of the Maine Lobstermen's Association for their assistance and support: Kristan Porter, Jim Dow, Tad Miller, Bob Baines, Mark Jones, Lawrence Pye and Elliot Thomas. In addition, many people provided significant input and review, including: Laura Ludwig from the Gulf of Maine Lobster Foundation, Bill Adler from Massachusetts Lobstermen's Association, Bonnie Spinazzola from the Atlantic Offshore Lobstermen's Association and Bobby Nudd of New Hampshire. Lastly, we would like to acknowledge Tim Werner and Kate McClellan from the Consortium for Wildlife Bycatch Reduction and Melissa Waterman from the Maine Lobstermen's Association for their help writing and editing this report.

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Glossary of Terms

Becket – A link that connects the gangion and groundline to one corner of the short end of the trap, usually three rows down from the top.

Breakaway or weak link – A link below the buoy intended to break under a forced of 600 pounds as required by the ALWTRP in nearshore Gulf of Maine. Weak links may be an off-the-shelf plastic device or a loop of rope secured with hog rings.

Bridle – A rope that connects the gangion and groundline to each side to the short end of the trap.

Buoy line/Vertical line/Endline – These refer to the line that connects traps to surface buoys, typically consisting of 1/3 sinking rope at the top and 2/3 floating rope closest to the bottom.

Cement runners – (See Trap runners)

Closed stern – Indicates that the back end of the boat is closed off

Dogbone – A plastic figure eight-shaped piece often tied between the bridle and the gangion to prevent rope from spinning due to tides and currents. The dogbone spins with the tides and currents, preventing the rope from loosening and becoming untwisted.

Double/Pairs – This refers to the deployment of two lobster traps connected by a groundline at the bottom, and marked at the surface with a single buoy line.

Exemption line – This is the line created along the Maine coast by the National Marine Fisheries Service in the Atlantic Large Whale Take Reduction Plan, in which waters on the landward side are exempt from the requirements of the federal whale plan but must comply with its universal requirements which prohibit wet storage of gear for more than 30 days and prohibit floating line at the surface. State of Maine regulations further require lobstermen fishing inside the exemption line to implement one of three options: 1) attach a buoy with a 600 pound weak link; or 2) make all buoy lines entirely of sinking line; or 3) use all groundlines that consist entirely of sinking line.

Eye splice – A splice made by turning the end of a rope back on itself and interlacing the strands, thereby forming a loop

Fathom – A unit of length equivalent to 6 feet

Gangion – The piece of rope that connects the groundline (sometimes called the tailer or trailer) to the trap. It may connect directly to the trap or to a becket or bridle that is connected to the trap.

Ghost gear – Lost fishing traps or gear that sometimes continue to catch or entangle marine life

Groundline – The line connecting traps in configurations of lobster trawls. In some areas it is referred to as the tailer or trailer.

Highflyer – A highflyer consists of multiple buoys on a large stick with reflectors, as required in waters outside of 12 miles from shore.

Marker buoy, Tide buoy or Wash buoy – Buoys usually deployed 5 or more fathoms from the main buoy in a surface system

Open stern – A lobster boat lacking a back railing

Shank – The extra coil of line found beneath the buoy to more conveniently lengthen the buoy line when moving lobster gear from shallow to deeper water

Single – One trap with a single buoy line attached

Sinking line – This is a line with a specific gravity equal to or greater than seawater so that it does not float. Sinking line as required under the Atlantic Large Whale Take Reduction Plan (ALWTRP) is defined as rope having a specific gravity of 1.03 or greater.

Soak time – The amount of time gear is left submerged between deployment and hauling

Tailer warp or Trailer warp – This is another term for groundline. It most commonly refers to the rope that connects the last trap of a pair or triple trawl.

Toggle – A small float, generally less than 5 inches in diameter, deployed on a short gangion off the buoy line to prevent gear from getting snagged on the bottom

Trap runners – These are two rectangular shaped devices attached to opposite sides of the bottom length of a lobster trap, used to prevent damage to the lobster's claws. Runners are typically as least 1/4-inch thick and made of wood, cement or plastic composite material.

Trawls – A string of multiple traps, ranging from four to 40 or more, strung together by groundline, with a single or double buoy line attached

Triple – Three traps tied together with groundline, attached to a single or double buoy line

Wash buoy – (See Marker Buoy)

Weak link – (See Breakaway)

Notes

The Consortium for Wildlife Bycatch Reduction consists of Blue Water Fishermen's Association, Duke University, Maine Lobstermen's Association, New England Aquarium, and University of New Hampshire. Administered out of the New England Aquarium, the Consortium supports collaborative research between science and the fishing industry to identify practical bycatch reduction solutions for endangered species.

The Maine Lobstermen's Association (MLA) is the largest commercial fishing industry group on the east coast, representing the interests of 1200 lobstermen from Eastport to Kittery. The MLA advocates for a sustainable lobster resource and the fishermen and communities that depend on it.

Protecting the blue planet

Founded in 1969, the New England Aquarium is a global leader in ocean exploration and marine conservation. Through its conservation and research programs, the Aquarium develops and implements new solutions to protect the oceans and balance the human impacts on them.