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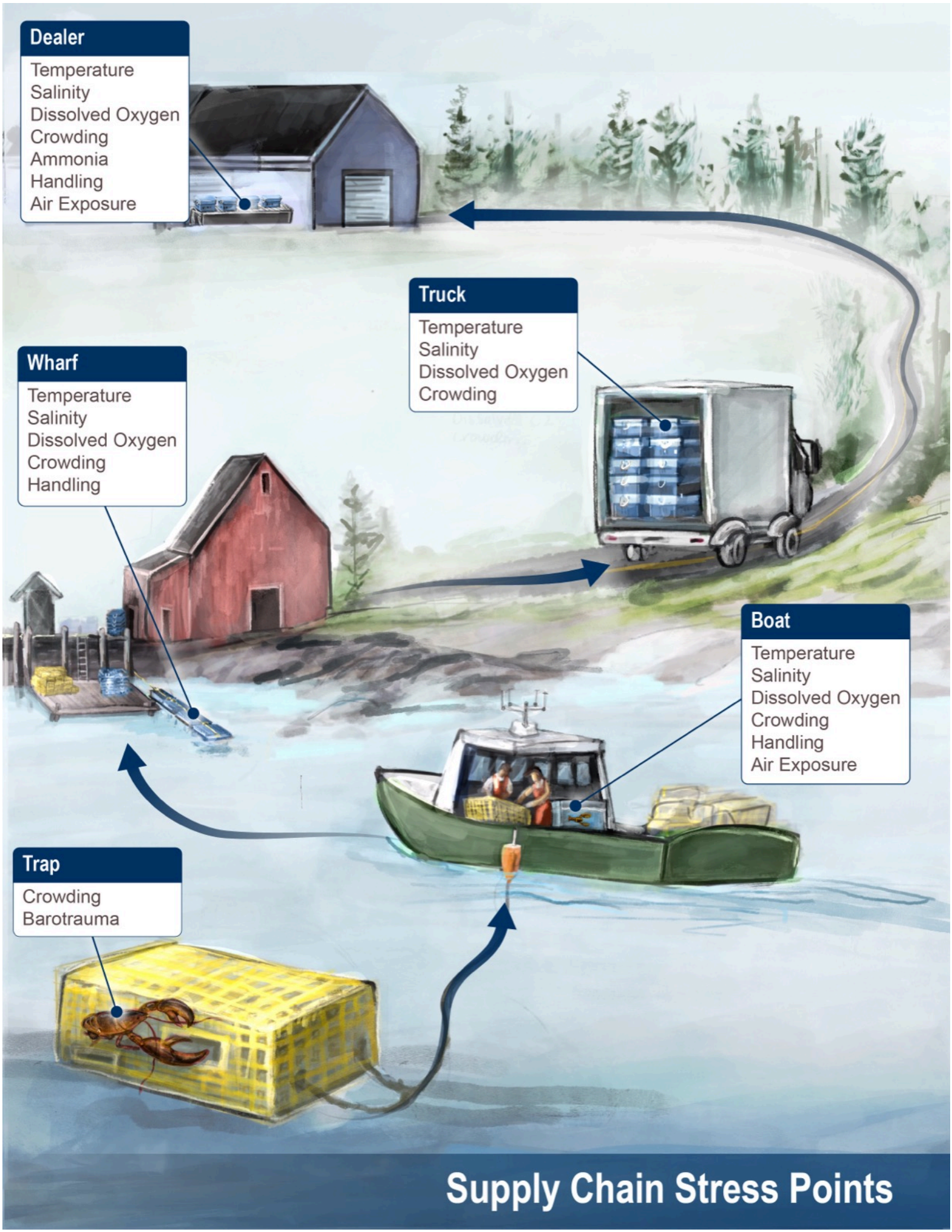
Best Practices in Handling of the American Lobster


Dealer
Temperature
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Barotrauma
Supply Chain Stress Points

Trap to Dealer: Likely Sources of Stress

The American lobster fishery consists of a supply chain, from harvesters to buyers, that exposes lobsters to different types of stress. The industry strives to sell healthy, vigorous, live lobsters to the next link in the supply chain because live lobsters command the highest price.

Stress along the way can compromise lobster health, and reduce its value. Losses of lobsters along the supply chain is known in the trade as “shrinkage,” and it costs the industry millions in lost profits each year. Improvements in handling and storing lobster can make this process more efficient.

The purpose of this guide is to help industry members limit the risk of shrinkage. It gives a brief overview of where lobsters may experience different types of stress as they pass through the supply chain, and how to mitigate it.

Temperature (safe range 40°-66° F , optimal 54°-64°)

Lobsters may experience stressful temperatures at any point along the supply chain.

Keeping lobsters within their temperature limits is important along the entire supply chain. Even within the safe temperature range, drastic changes in temperature may stress them. Lobsters are especially vulnerable in live tanks and floating crates when summer water temperatures exceed the safe limit.

Maintaining high flow rates of water between 40 and 66° F can promote survival, as long as tank water is well-mixed. Be sure fresh water mixes all the way to the bottom of holding tanks.

For long-term holding, temperatures as low as 40-45° F can safely slow lobster metabolic rates. However, care must be taken to gradually acclimate lobsters when moving between tanks with different temperatures.

Salinity (optimal 25-35 ppt, lethal below 15 ppt)

Salinity stress is typically less common. Lobsters are most likely to experience stressful salinities when floating at the dock.

Heavy rain dilutes sea water, especially at the surface. If lobsters are kept in floating crates for extended periods under these conditions they may die. Shelter lobsters from rain as much as possible on the boat and at the dock.

Upper salinity limits are unlikely to be exceeded, especially if tanks are supplied a constant flow of seawater. If lobsters are stored in tanks with recirculating water, however, evaporation may cause salinity to steadily increase over time.

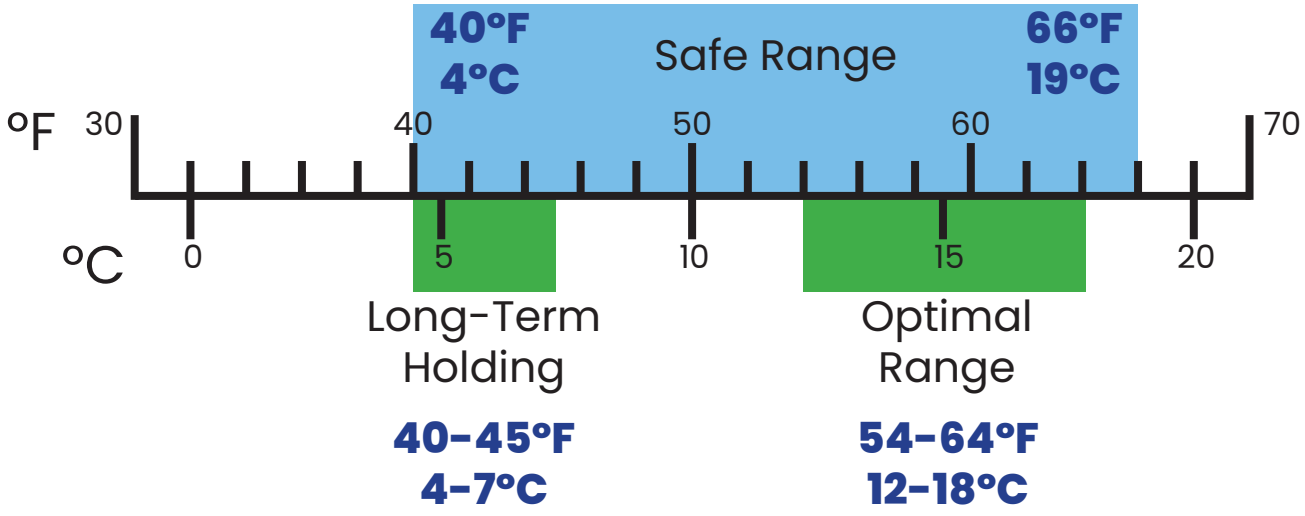
Dissolved Oxygen (highly temperature dependent)

An important rule of thumb is that as temperatures warm the supply of oxygen in water declines, but a lobster's need for oxygen increases. Aeration and circulation therefore become increasingly important to lobster survival the warmer it is. Increasing water flow and adding bubblers to holding tanks can help.

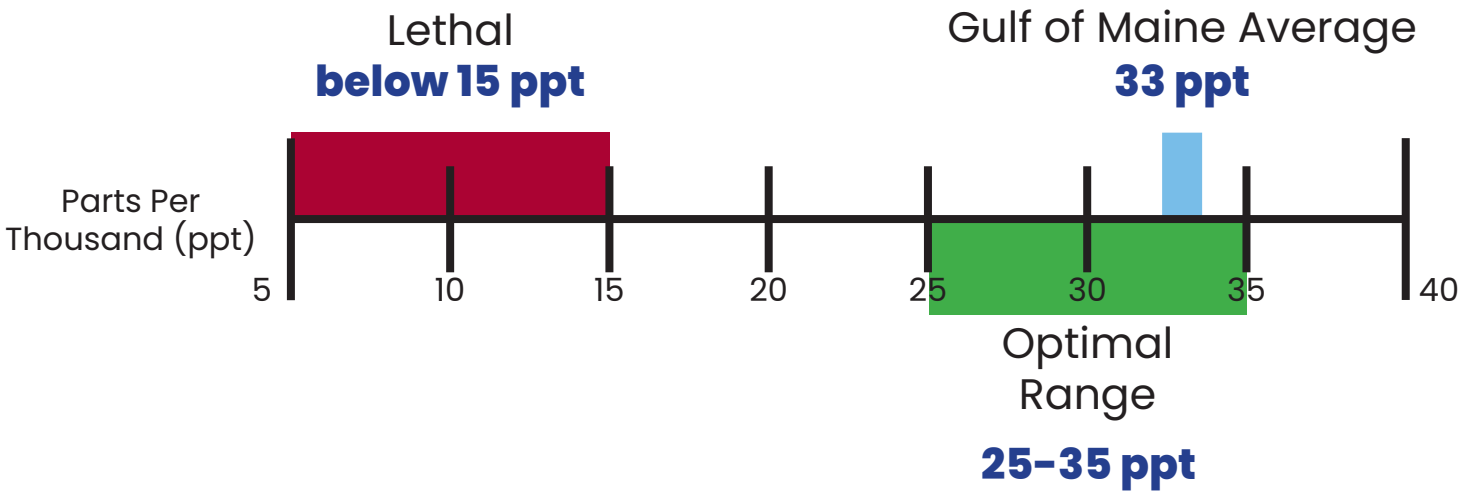
Low oxygen is most likely to affect lobsters floating at the dock, or being held at a wholesaler's facility. Dissolved oxygen can be difficult to measure, but is not necessary to measure if precautions are taken to prevent suffocation. As long as high flow rates and safe temperatures of seawater are maintained, lobster are unlikely to experience stressfully low oxygen.

Overcrowded tanks are also much more likely to have issues with dissolved oxygen.

Temperature

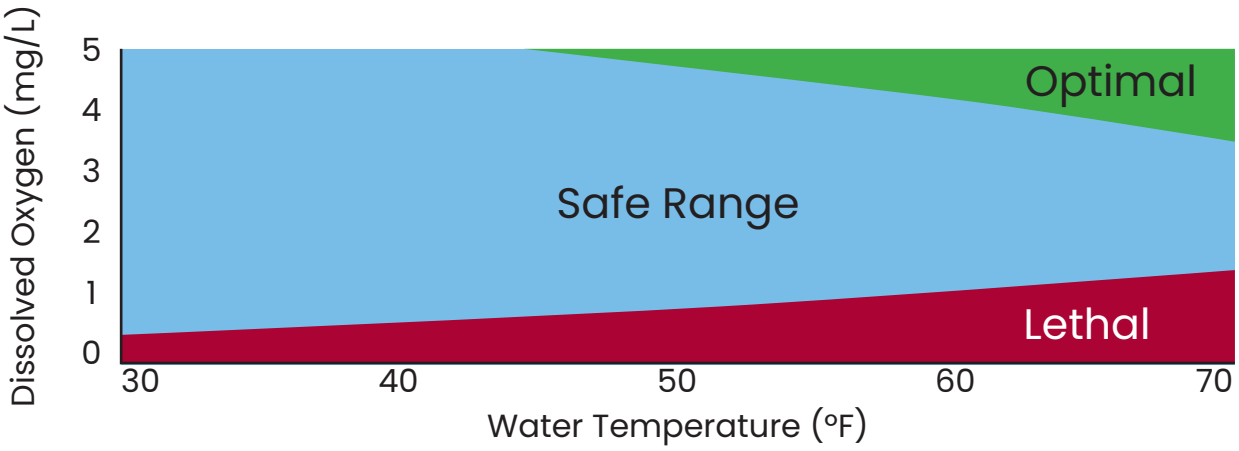


Salinity



Dissolved Oxygen

Minimum Safe Value **1.2 mg/L** or **20% saturation**

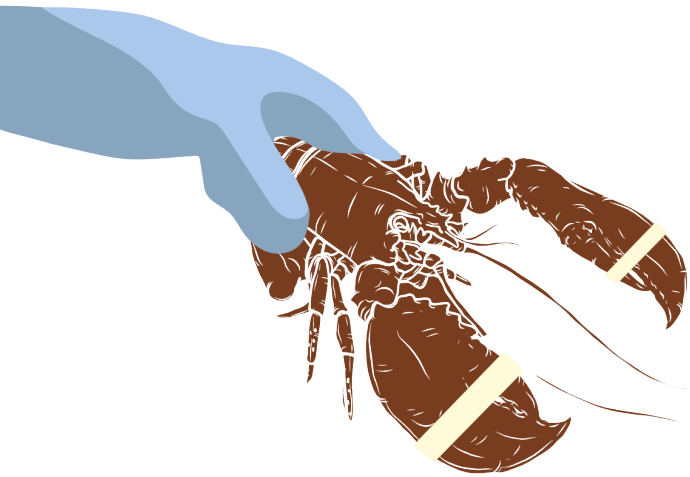


Air Exposure

Any time spent out of water can be stressful for lobsters. Lobsters may not exhibit clear signs of stress, but sustained periods out of water can still impact health. After exposure to air, allowing lobsters to rest for a period in a tank with cool well-circulated water can mitigate impacts of air exposure. Warm weather will decrease the length of time lobsters can safely stay out of water. If lobsters must be out of water, take steps to ensure they remain cool and damp.

Handling

Any amount of handling, even by experienced individuals, can result in stress for lobsters. Limit handling time as much as possible. Treat each individual lobster like an egg. Cushion any surfaces lobsters may come in contact with to avoid shell damage. Damage to the shell could lead to greater risk of disease or death, and impacts the overall quality of the lobster. When moving lobsters into holding tanks, place rather than throw lobsters, as throwing has been linked to increased risk of injury and mortality.



Crowding

Lobsters in crowded holding tanks or crates are more likely to injure themselves or others. If lobsters cannot be moved to other tanks/crates, lowering the temperature and limiting light can help maintain lower levels of activity, leading to a lower likelihood of injury.

Ammonia

Ammonia is a natural waste product of lobsters and other organisms, but becomes toxic at high concentrations. Ammonia buildup is extremely unlikely to occur if there is good water flow and holding tanks are well mixed. Ammonia will buildup in stagnant water, or recirculating tanks, in such cases be sure to schedule regular water changes. Crowded tanks are more at risk for high ammonia levels. Ammonia test strips are available at most pet/aquarium stores.

Barotrauma

Barotrauma is stress that results from a rapid change in pressure. This will only occur during trap hauling, and is most likely to occur when hauling traps set in deeper water. It is unclear exactly how barotrauma affects lobsters, but when retrieving deep set traps, extra care in handling can limit the risk of impacting lobster health.

Interactive effects

Multiple stressors may occur simultaneously, and when combined, are often more severe than each stressor would be on its own. Swift resolution of each stressful condition is key to limiting the harm from interactive stressors on the lobsters.

Assessing lobster vitality with the RAMP (Reflex Action Mortality Predictor) tool

RAMP is a method to identify the lobsters at most risk of dying. It first involves a quick check of four reflexes. The more reflexes that are unresponsive, the greater the risk of death. Injuries, such as cracked shells or missing claws, further increase the chance of death. Finally, the bigger the lobster, the more vulnerable it is to any injury or loss of reflexes.

Reflex loss, injuries, and lobster size sum together to predict the likelihood that a lobster survives. A small uninjured lobster may be able to recover from even a loss of all reflexes, if you act fast to remove it from stress and get it into cool, oxygen-rich water. However, as injuries add up, each lost reflex greatly increases the chance of death, especially for bigger lobsters.

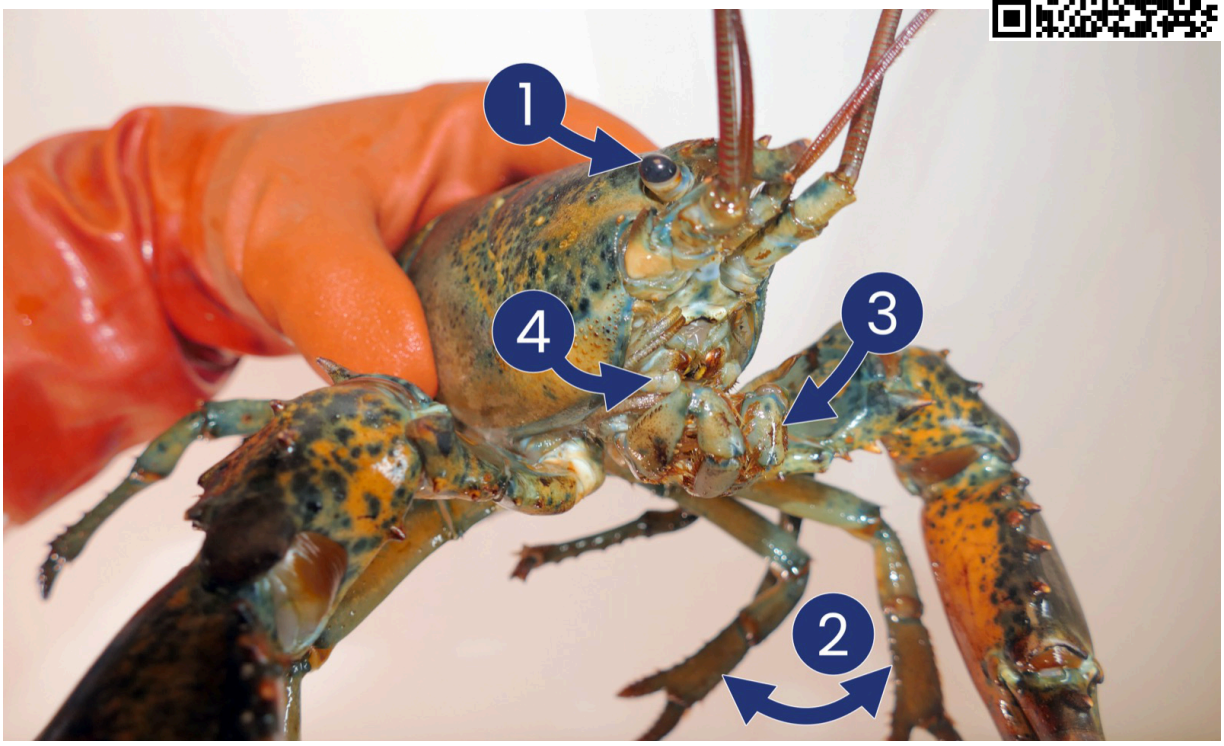
Four reflexes to test:

1. Eye retraction – gently touch the lobster's eye to see if it moves in response
2. Leg movement – pick up the lobster and see if its legs move in response
3. Mouthpart #1 – gently pull down the outermost "mouth leg" (3rd maxilliped) and see if it comes back up
4. Mouthpart #2 – nudge the mouthpart behind the one from the previous step (2nd maxilliped) to the side and see if it returns toward the middle

Five Injuries to check for (any damage counts!):

1. Missing claw(s)
2. Damage to claw(s)
3. Cracks or holes in carapace
4. Damaged antenna
5. Damaged tail fan

To learn more about RAMP and to see a video demonstration:



The average mortality of lobsters along the supply chain is 2%, which represents millions of dollars lost. Cutting mortality even slightly could increase efficiency and profits by millions.

Project partners

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