

Fishing gears and techniques (Chap. 5)

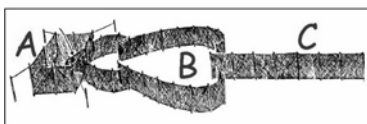
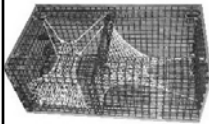
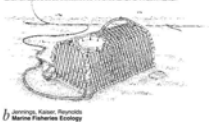
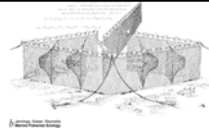
Types of gear and methods used:

- Dependent on species targeted
- Active and passive gears
- Must account for fish behavior
- Choice of gear depends on intended market

Traps

Encourage entry and prevent escape

- baited or unbaited
- barrier or fence traps (pound nets)
- eels, menhaden, crabs, structure-oriented fish (sea bass)



Hook and line

Hand-held

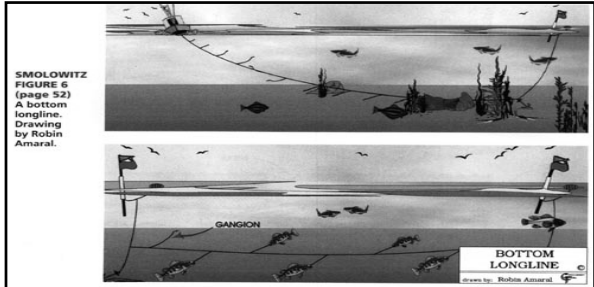
- J-hook vs. Circle hook
- commercial and recreational
- shark, halibut, deep water reef fishes



Trolling

- towed behind boats to catch PELAGIC species
- simulating school of bait fish
- tuna, mackerel, dolphinfish





SMOLOWITZ FIGURE 6 (page 52) A bottom longline. Drawing by Robin Amaral.

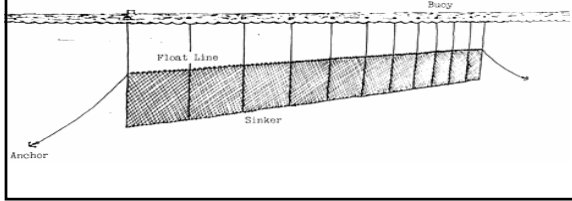
Longlines

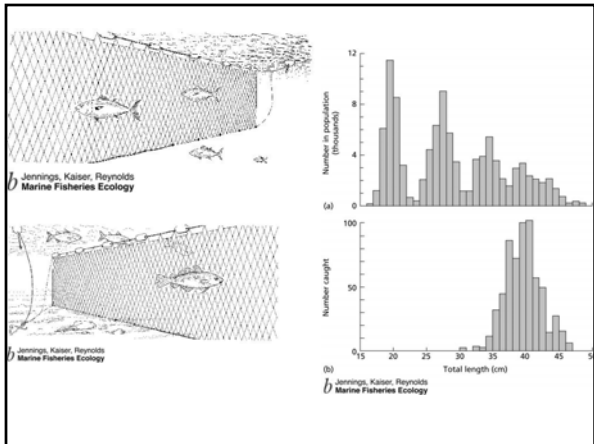
- set near surface for pelagic fish (e.g. tuna, sharks)
- set near seafloor for demersal fish (e.g. halibut)
- typically in open ocean up to 100km long, fishing to 400m depth

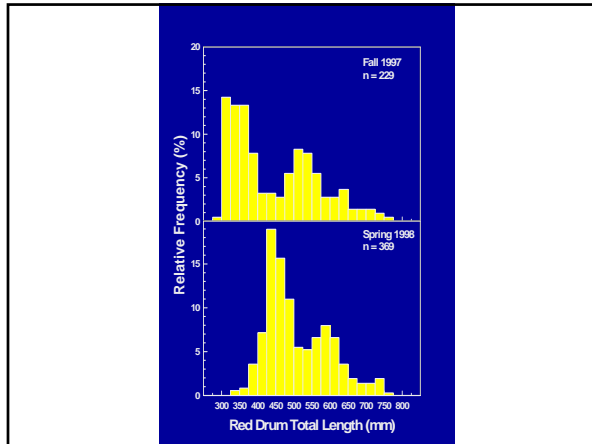
Stationary Nets

Gill nets

- used in shallow water for mackerel, mullet, shad, flounder, spot
- used in deeper water for demersal fish such as sharks
- very selective fishing gear (see Box 5.4)







Stationary Nets

Trammel nets

- small mesh panel between 2 panels of larger mesh
- very effective for benthic species

Towed nets and dredges

Otter trawls

- otter boards (trawl doors), floats
- demersal or pelagic species
- fishing speed, gear weight, scope

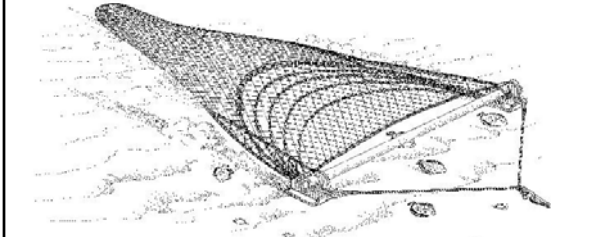
SMOLOWITZ
FIGURE 3
(page 49)
A bottom
trawl,
Drawing
by Robin
Amaral.

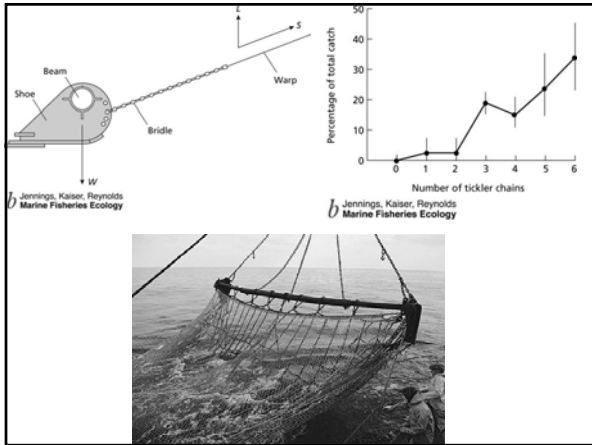
OTTER TRAWL

Towed nets and dredges

Beam trawl

- Horizontal beam with shoes, heavy
- Tow speed vs. gear weight
- Shrimp, flatfish

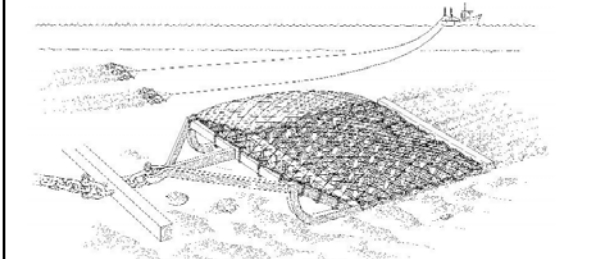




Towed nets and dredges

Dredges

- Similar to beam trawls
- Chain bag and tooth plates
- Scallops, clams, gastropods



Towed nets and dredges

Dredges

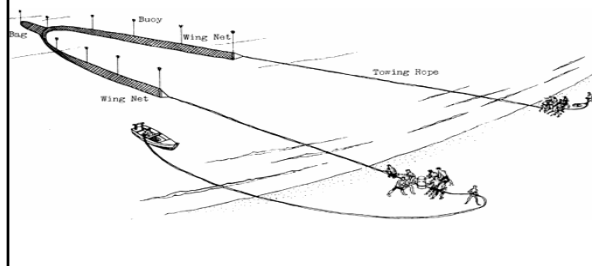
- Most destructive to benthic habitat, but
- Bycatch of non-target species is low



Surrounding nets

Beach seine

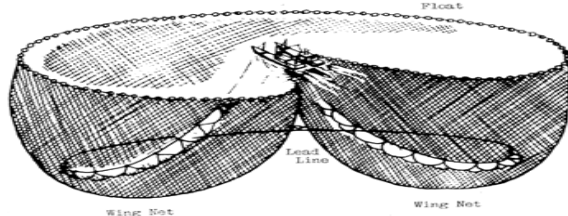
- efficient for juvenile fishes inshore
- small predators, bait fishes



Surrounding nets

Purse seine

- efficient gear for pelagics
- Large catches (>20 tons)
- 1 or 2 boats to set net
- Fish located with sonar or helicopter then...



Aggregation devices

- Take advantage of fish aggregation behavior
- Floating rafts anchored offshore (\$\$)
- Sargassum mats, oil rigs (free to fishers)
- Advantages: reduce search time
- Disadvantages: high costs and short lifespan



Other techniques

- spears
- diving (can be very efficient)
- poisons
- explosives



Effects of fishing

1) Non-target bycatch (unwanted spp. & sizes)

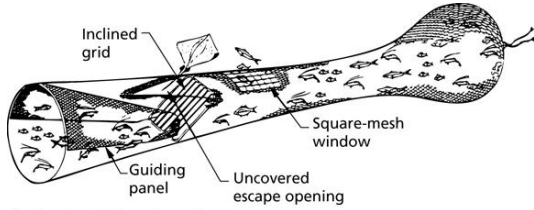
What happens to escaped/returned individuals?

- Assume that fish escaping gear are:
 - not damaged
 - minimally stressed
 - make a complete recovery
- However, many potential negative effects:
 - Injury and stress
 - Increased vulnerability to predators and disease
 - Growth & reproductive capacity impaired
 - Depend on gear (trawl, gillnet, hook and line)

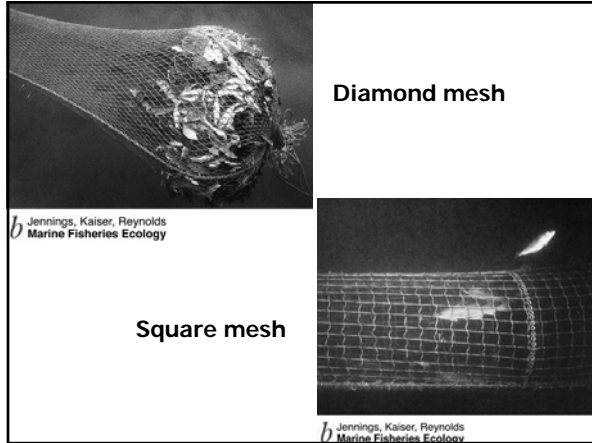
Effects of fishing

Gear modifications (TED's) to reduce bycatch

- Trawl Efficiency Devices
- Trash Eradication Devices
- Turtle Excluder Devices

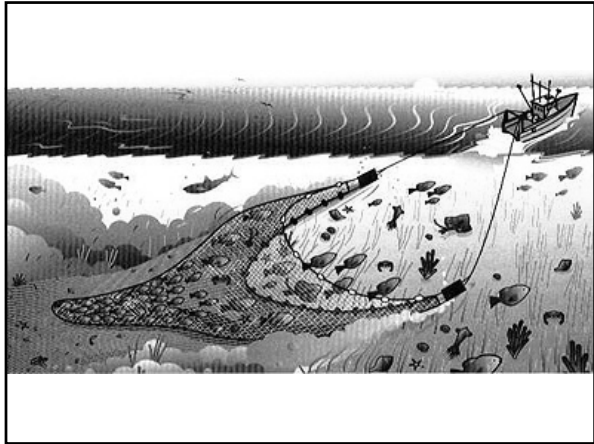


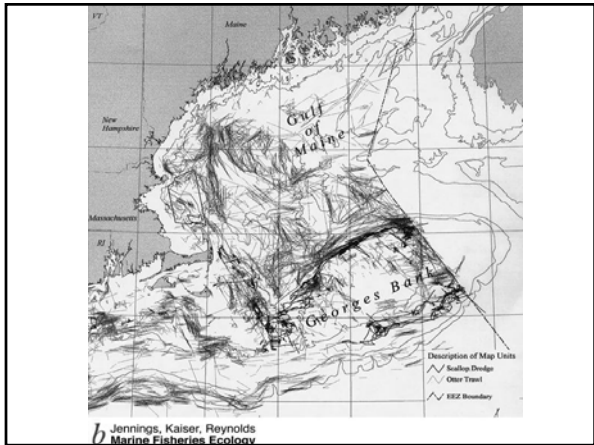
b Jennings, Kaiser, Reynolds
Marine Fisheries Ecology




More Effects of fishing



- 2) Ecological impacts on marine communities
 - Trophic dynamics and competition (e.g., effects of krill fishery on whale populations)
- 3) Damage to benthic habitats
 - demersal trawls and dredges
 - can assess physical damage, but hard to determine long term impacts on communities
 - may prevent settlement of benthic animals
 - may reduce structural complexity for small fish

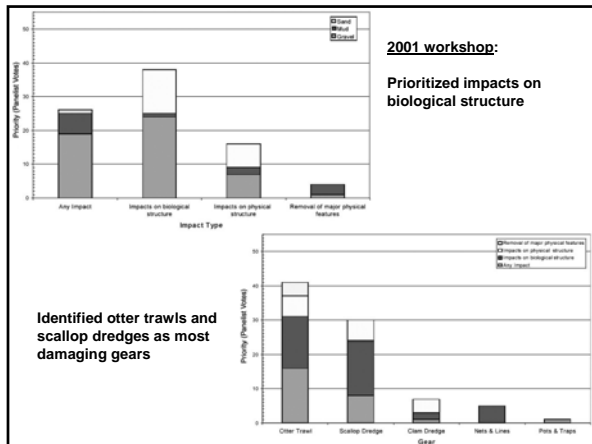


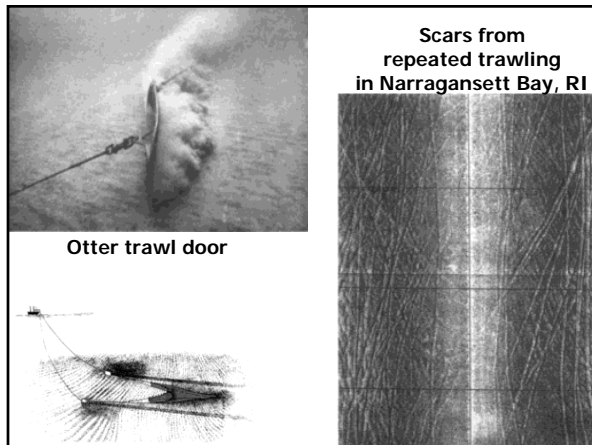


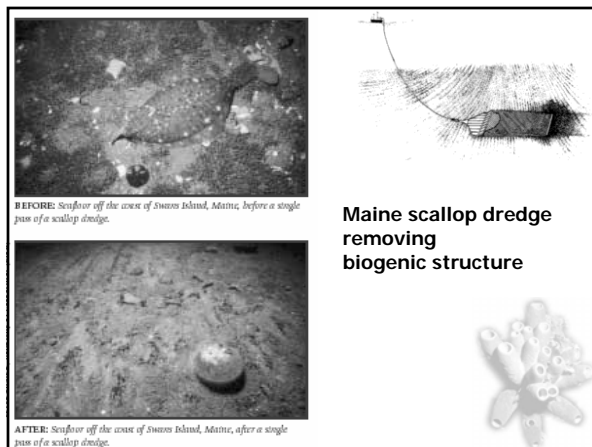


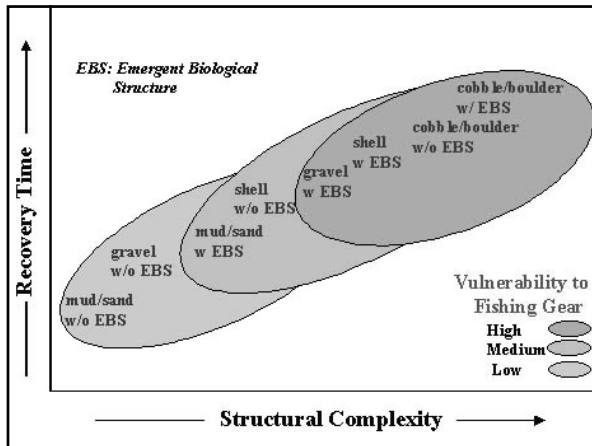
Industrialization of fishing has led to larger, heavier gear that is more damaging to the substrate

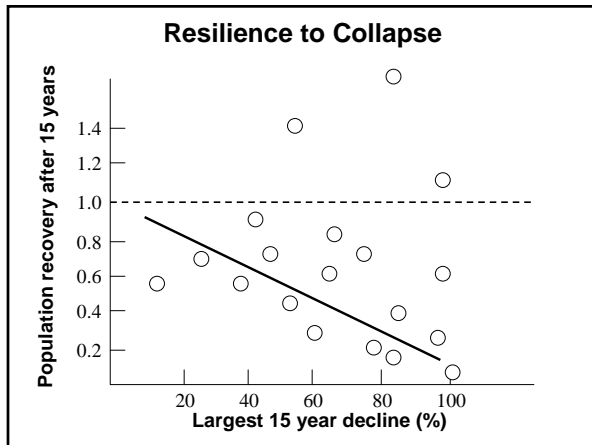












Gear selectivity

A good catch index depends on:

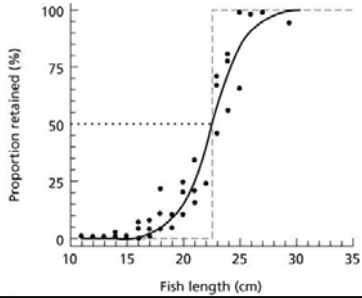
- consistent (precise) and accurate catch estimates
- catch rates depend on sampling gear used

Factors to consider when choosing a gear:

- fish girth vs. mesh size
- gear avoidance capabilities
- fish behavior (schooling, habitat use, activity rhythms)
- day vs. night gear deployment
- random sample?

Gear selectivity

Example of a selectivity ogive:



Gear selectivity

