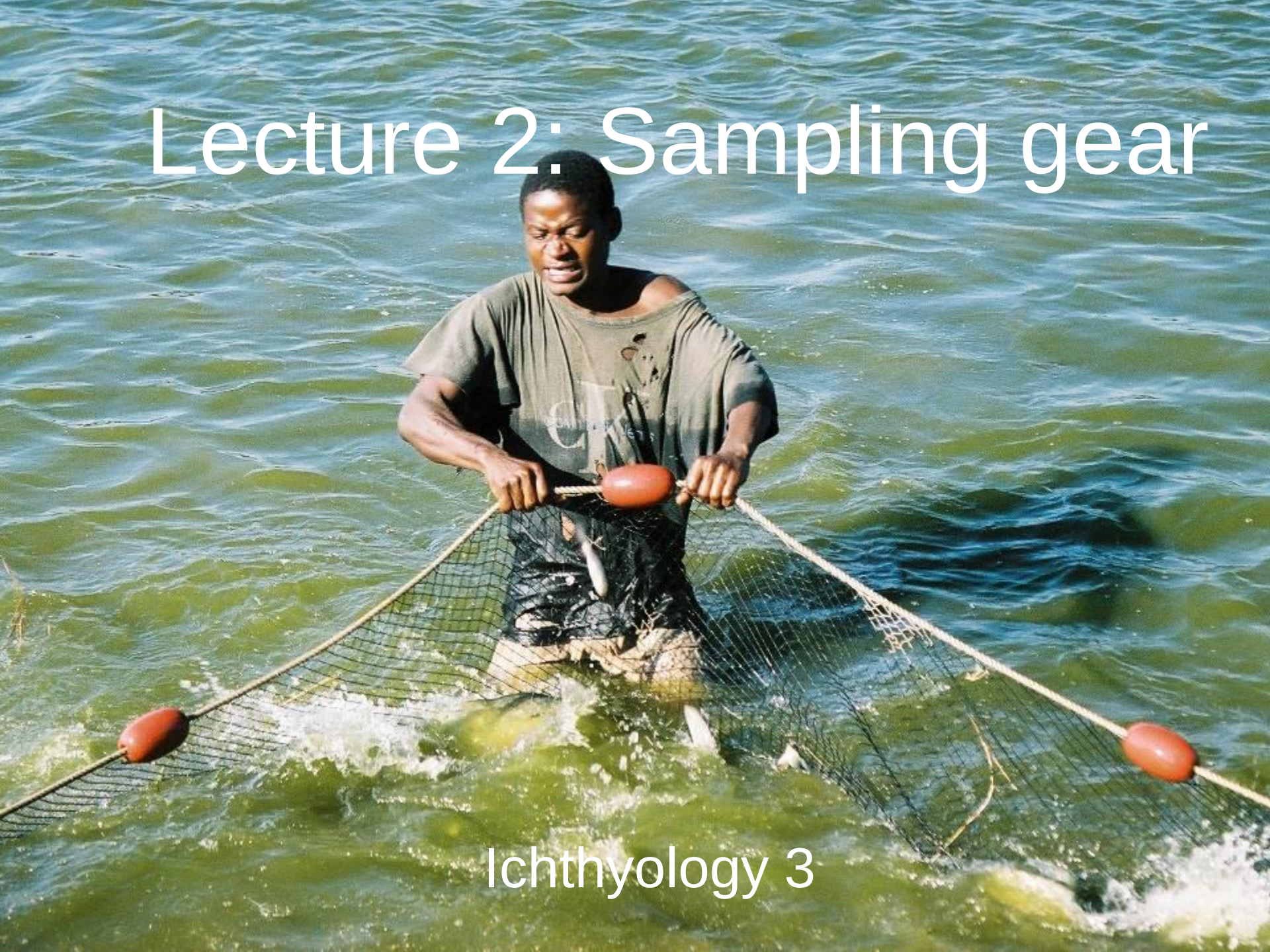
Lecture 2: Sampling gear



Ichthyology 3

Total samples

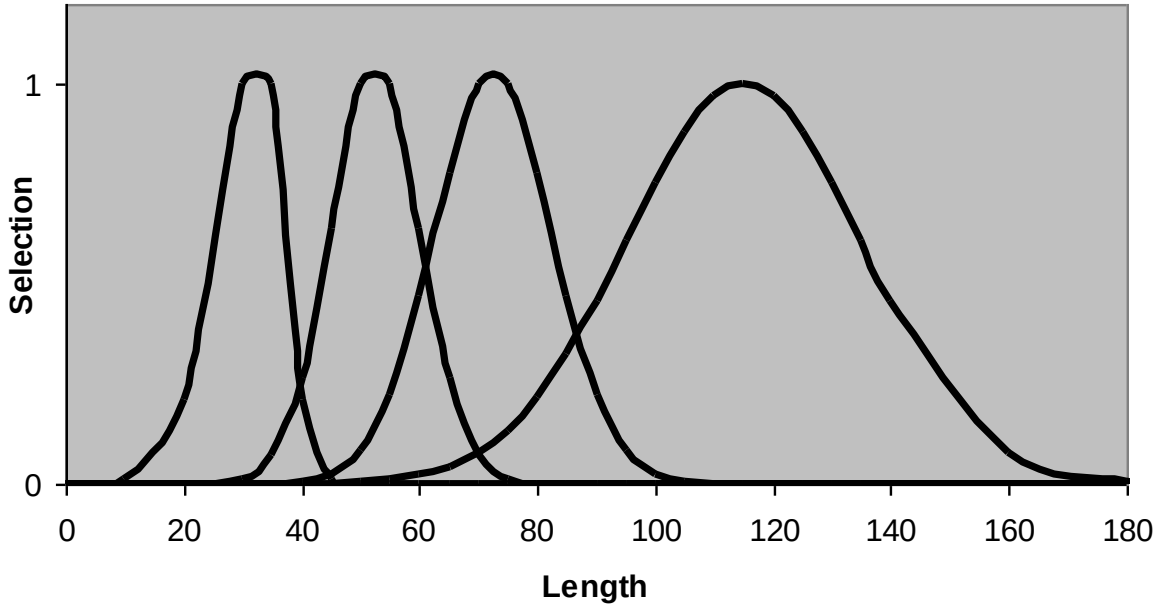
- **Total samples**
- *Draining*
  - Gives a total sample but this is often not practical.
  - Kariega estuary study on salt marshes.
- *Explosives*
  - Extremely effective sampling tools there is inherent danger.
  - Legal issues their use is discouraged.

Partial samples

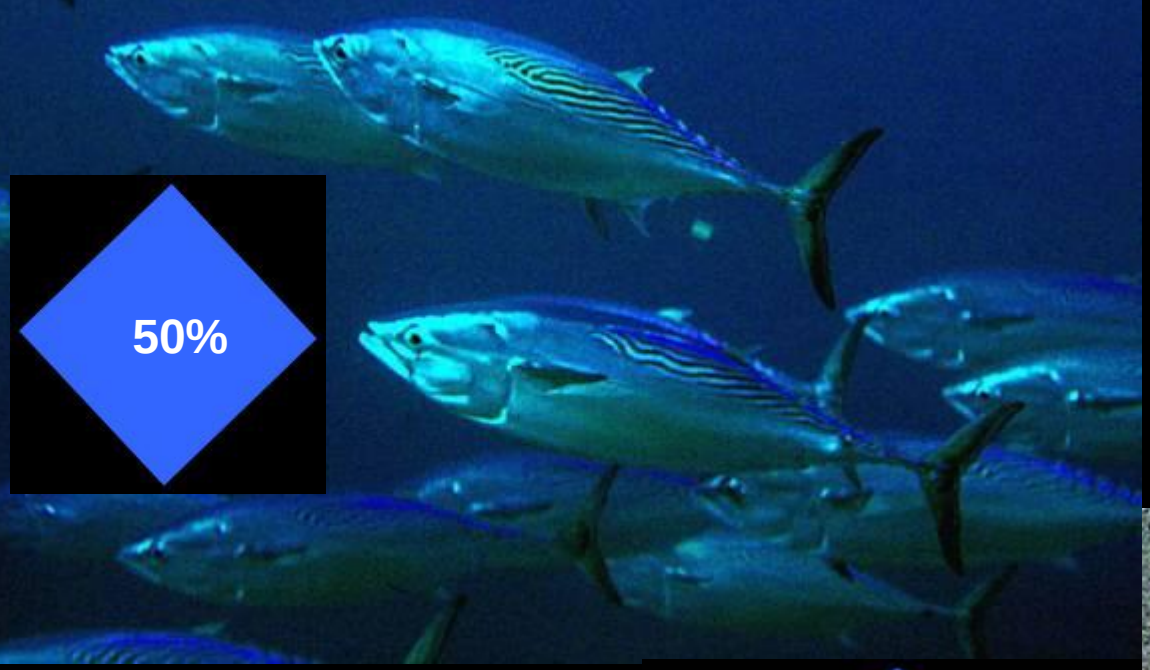
- **Passive sampling gear**
- Gill nets, traps, fyke nets and longlines.
- Advantage of passive fishing gear is that it is not time consuming and after it is set other activities can be carried out by the researcher.
- Good gear for monitoring fish stocks
- Catch-per-unit effort of a passive gear must always be standardized to a measurement of the gear and a to a unit time. eg kg per 100m net per hour.
- Overestimates the number of fish that move

Gill nets

- Rectangular wall of netting.
- Very size selective.
- Always use a gill net fleet.
- Number of panels and mesh size - determined by the target species.
- The placement of the individual panels within the fleet must be randomised.



Hanging ratio



50%

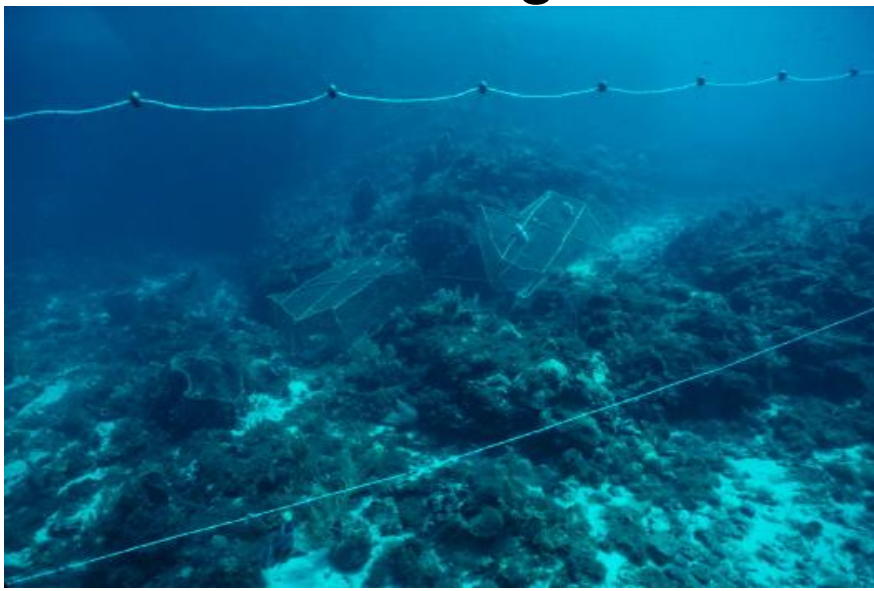
40%

60%

- Monofilament is more efficient than multifilament nets, but are much harder to repair.
- Important that the net is set along a depth contour.
- Also floating or bottom set gill nets.
- CPUE always has a net length and time component: x kg/100-m net/hr-1.

Disadvantages

Ghost gears



Selective

Bycatch

Traps

- Baited valve traps
- Habitat traps (octopus longlines)
- Fyke nets
- It does not really matter how these gears are set (along or across contours) as long as it is consistent.
- CPUE?
- Fish not killed in gear

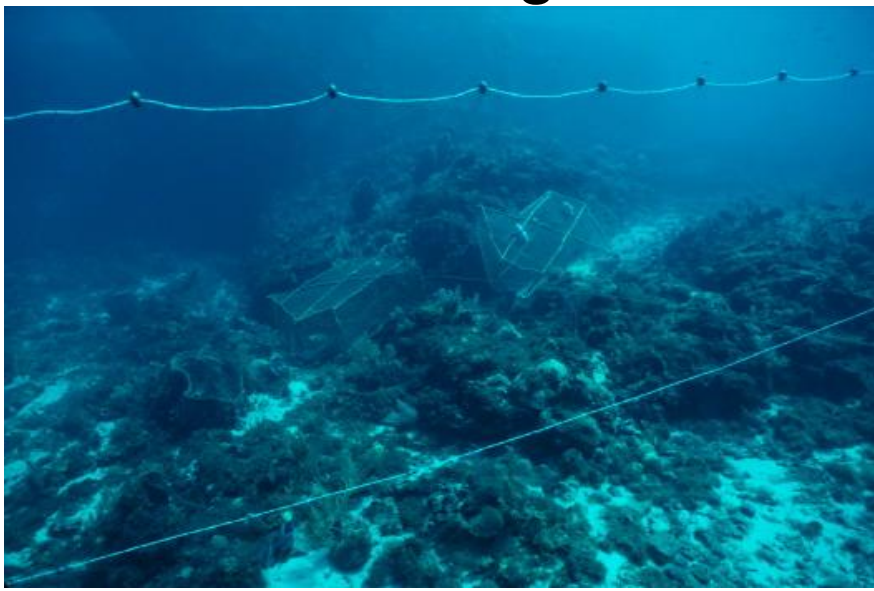
Advantages

Fish can be released after capture

Less size and species selective

Disadvantages

Ghost gears



Bycatch

Longlines

- Hook sizes depend on the species and size of fish that are to be targeted.
- Hooks are size selective.
- Longline CPUE:
  - x kg/100-hook/hr-1.

Advantages of passive gear

- Labour of operation is economical.
- With appropriate precautions, fish can be caught unharmed (not gill nets).
- Information concerning density (both spatial and temporal) and migrations can be collected as the fishing effort remains constant from day to day.
- Can be used to measure relative abundance.

Bias with passive gear

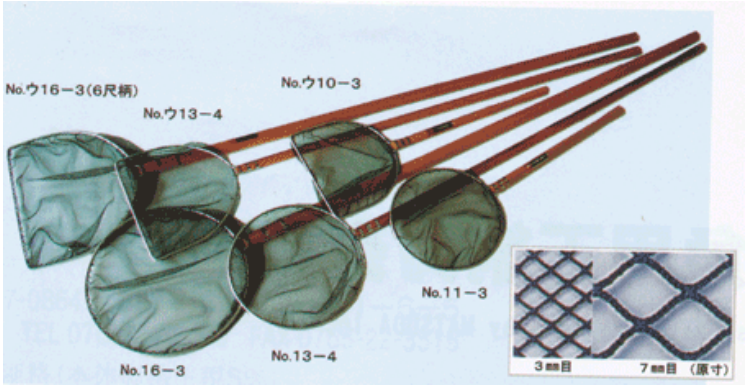
- Relies on the fish to encounter the gear and select for:
  - More active species.
  - More active individuals within a population (spawning migration/nest, feeding etc).
  - Longlines and baited traps will obviously target foraging fish.

- Gears may saturate.
- All are size selective depending on the dimensions of the gear.
- They are not suitable for all habitat types.
- They lack a spatial dimension and are therefore not useful for estimating total abundance.

How will this affect results???? And how can this be remedied?

Active gear

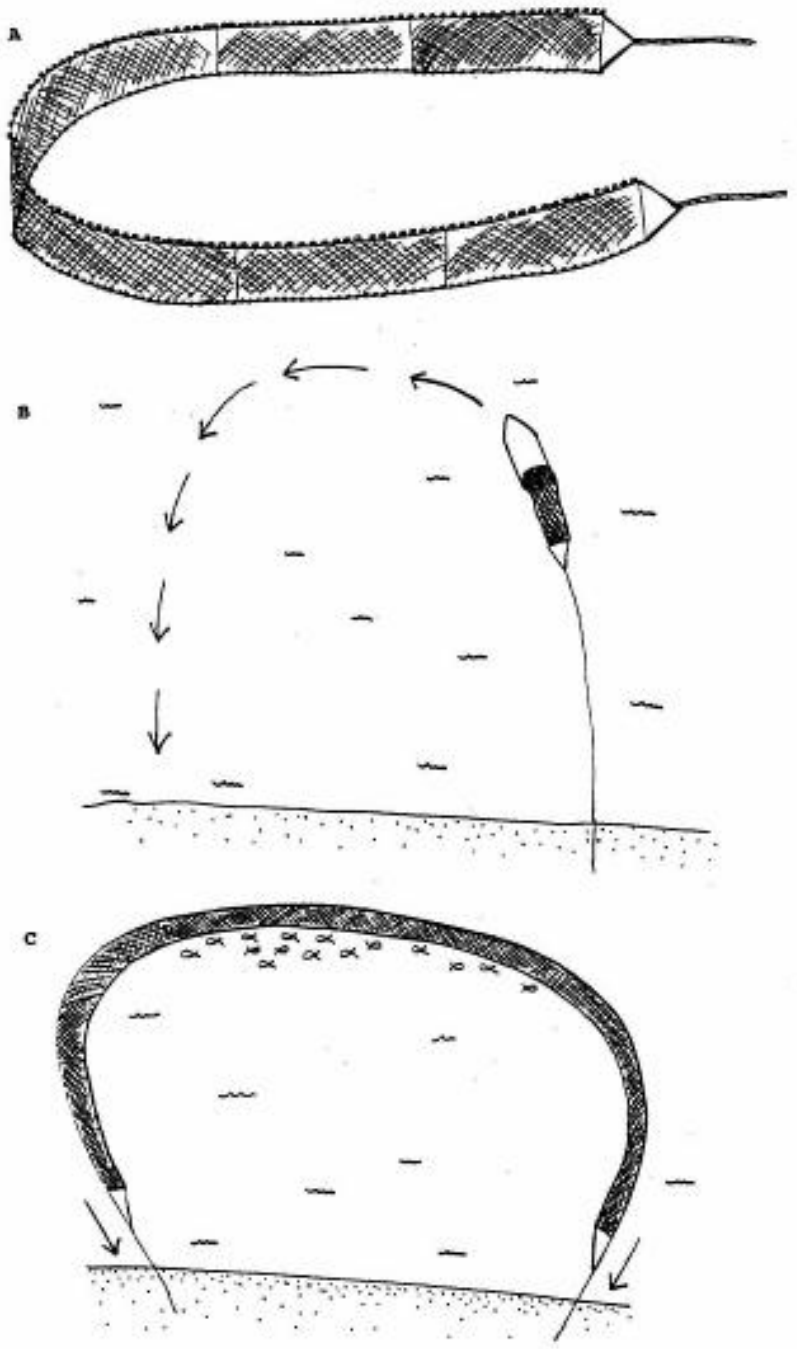
- *Major advantage is that they do not rely on active fish and sample over a known area.*
- *Most have spatial dimension.*
- *Hook and line*
  - operator bias and selects for actively feeding fish. Also hook size is selective.
- *Scoop Nets*
  - Can be useful for sampling among vegetation and in small streams.
  - Biased against large fish



- *Cast Net*
- Operator bias

Seine nets

- Seines are the biggest, most expensive and labour-consuming fishing gears.



- *Advantage of seines*
  - Large sample can be obtained in a relatively short time if the fishing conditions are favourable.
  - Seine nets are relatively non-selective for certain sizes of fish.

- *Disadvantages*
  - High cost and the number of personnel needed for its use.
  - Not all areas of the water body are accessible.
  - The morphology of the bottom is one of the most important of these conditions.
  - Seining beaches should have hard, clear, gently sloping bottoms.
  - Efficiency reduced if it is hauled into a boat (Danish seine better).
  - If snags etc. have to be removed the preparation of special sampling beaches may well influence the fish behaviour.
  - Avoidance reactions select against larger and more active fish.
  - Difficult in running waters.
  - Depth limited.

Electro-fishing

- Use of an electric current flowing through the water.

Advantages

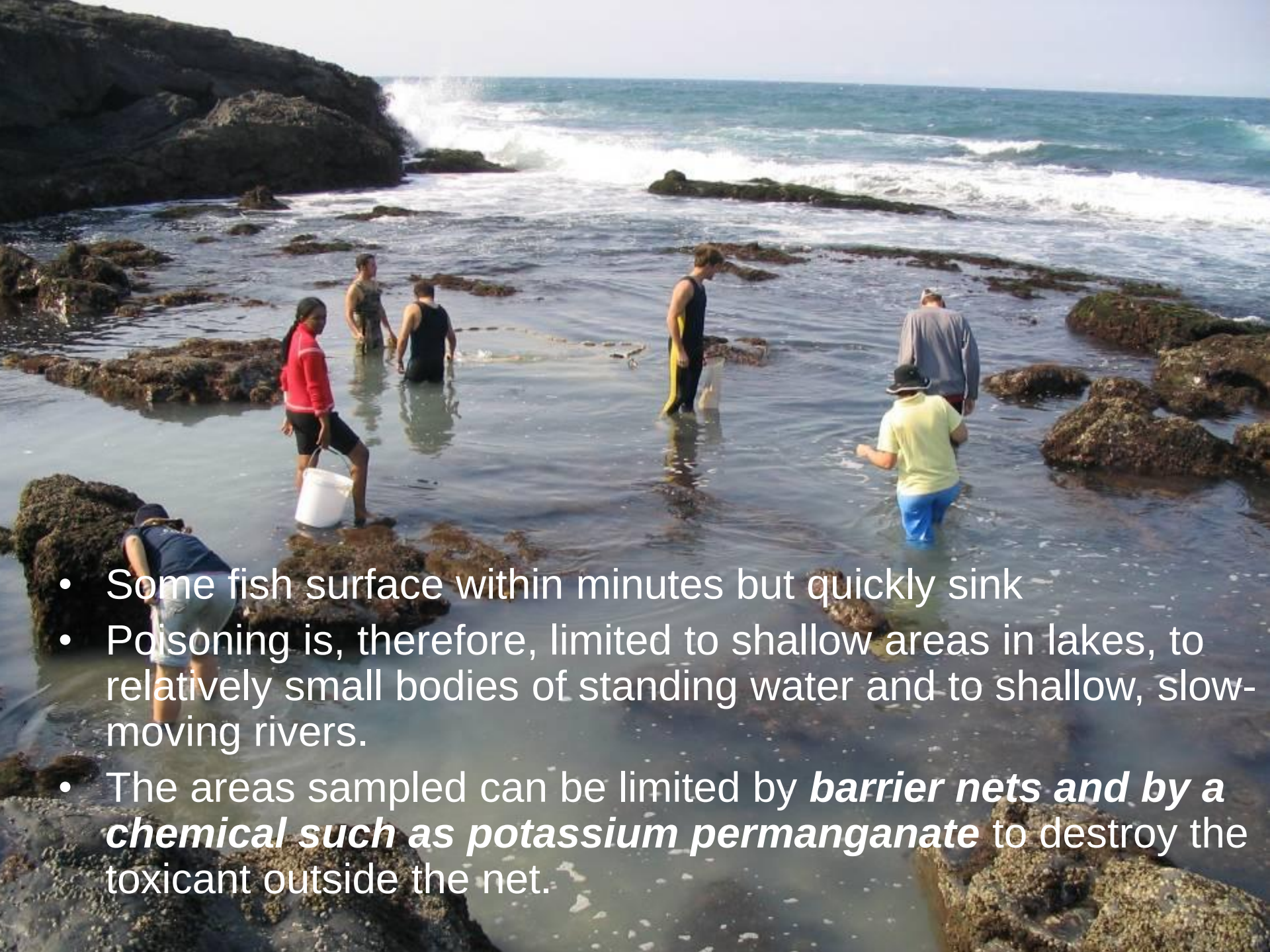
- Do not require preliminary preparation of the site
- Requirements in terms of manpower and physical exertion are small.
- Immediate collection of fish.
- Competently carried out, the method does not result in mortality or damage to the fish to any greater extent than does netting.

Disadvantages

- Variability of effect when compared with the use of nets or traps.
- Risk of physical danger to both fish and operators.
- The sampling error arises mainly from the fugitive fish.
- A batch of fish caught electrically, marked and subsequently fished over, will include some which will subsequently avoid an electric field at the first sensation.
- This sensitivity may decrease with time, but in the case of salmonids it persists for more than a day.
- Effect of this shyness - increase the numbers of unmarked fish associated with the marked ones re-caught, and so to inflate the estimate of population.

Chemicals

- Two toxicants, rotenone and antimycin
- Rotenone, the active constituent of derris root,
- Inhibits electron transport over the gill membrane.
- Also lethal to many other species.
- Stability or persistence of rotenone is dependent
  - pH, temperature, oxygen and suspended matter.
- Varies appreciably between species, and between fry, juveniles and adults of one species.
- Predators may gorge themselves on smaller fish.



- Some fish surface within minutes but quickly sink
- Poisoning is, therefore, limited to shallow areas in lakes, to relatively small bodies of standing water and to shallow, slow-moving rivers.
- The areas sampled can be limited by ***barrier nets and by a chemical such as potassium permanganate*** to destroy the toxicant outside the net.

Advantages

- Fairly non-selective in terms of size.

- If the sampled areas are representative of the entire water body or of a series of water bodies then information on species composition, size distribution and on standing stock, in terms of numbers and weight per unit area can be obtained.

- Accuracy of estimations depends on:
  - sufficient concentration of toxicant
  - the ability to collect all fish.

- The cost of the technique can be relatively low.

Disadvantages

- Destructive on target species.
- Cannot be applied to waters destined for human consumption.

Best gears and practices?