



IOTC WPNT Mahe 7-11th July 2025

Methods for stock structure,
connectivity assessment

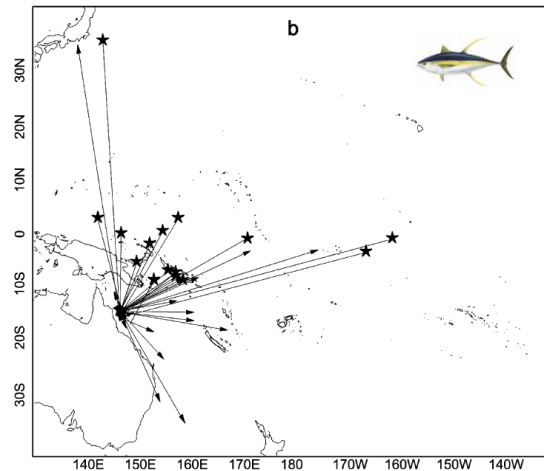


How to assess stock structure / connectivity

- Genetic / Genomic approaches
 - mtDNA
 - Microsatellites
 - NGS approaches
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- Non genetic approaches
 - Meristics
 - Morphometrics
 - Tagging (conventional tags, electronic tags)
 - Chemistry (e.g. otoliths, muscle)
 - Parasites
 -

Conventional tags

- Principle
 - Information on where tagged fish were released and recaptured provides insight into movement and dispersion



Hampton & Gunn 1998

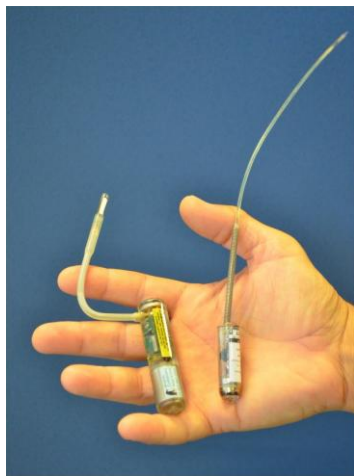


Conventional tags

- Principle:
 - Information on where tagged fish were released and recaptured provides insight into movement and dispersion
- Advantages:
 - Can provide information on more than just movement/mixing (e.g. growth, natural mortality, fishing mortality, abundance)
- Limitations:
 - Provide point-to-point movement; high costs and effort limitations
 - Limited by: the proportion of the population tagged individuals represent, time at liberty of tagged individuals, the distribution of tagging and recapture effort, tag reporting rates, **single generation span**

Electronic tags

- Principle
 - Provides (likely) movement path from which can infer connectivity/stock structure



Images from B. Leroy

Electronic tags

- Principle

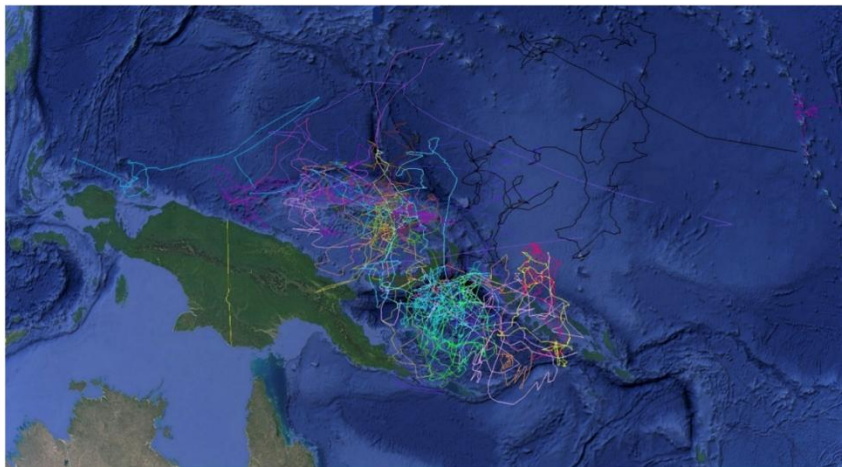
- Provides (likely) movement path from which can infer connectivity/stock structure

- Advantages

- Can provide information on fine scale spatial and temporal movements (including vertical movements), ideal for testing specific movement hypotheses

- Limitations

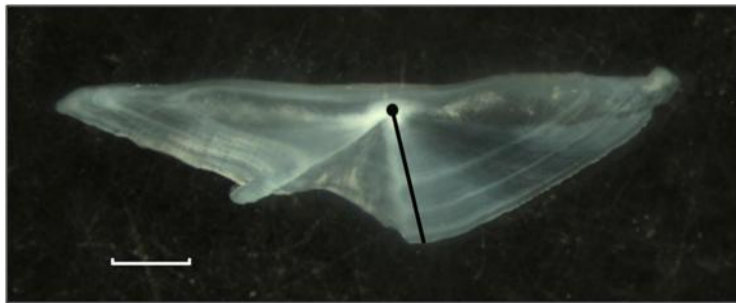
- High cost, effort limitations (particularly for release)
- Limited by: the proportion of the population tagged individuals represent, the time at liberty/time of tag adherence, the distribution of tagging and recapture effort (for archival tags), tag reporting rates (archival tags), impractical for use on early life history stages such as larvae or small juveniles, **single generation span**



Tracks of electronically tagged YFT in the western Pacific. Data are from the Pacific Tuna Tagging Portal managed by SPC.

Otolith chemistry

- Principle
 - Elemental concentrations within otoliths determined by physical and chemical characteristics of environment (as well as diet, metabolism etc)
 - When assessed in conjunction with temporal references in otoliths (e.g. core or edge material, annual or daily growth rings) can provide information on ontogenetic movements, including natal origins
 - If these characteristics are known, can trace fish movement
 - If not known, can at least indicate if fish have lived in different environments



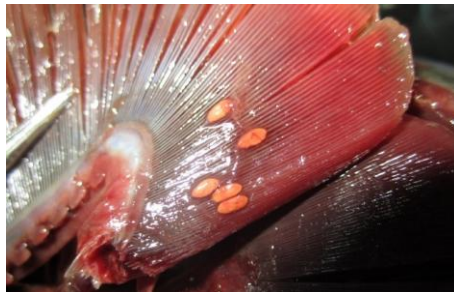


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 - If these characteristics are known, can trace fish movement
 - If not known, can at least indicate if fish have lived in different environments
- Advantages
 - Fish only have to be caught once, all fish carry a signal
- Limitations
 - Destructive sampling required, can be expensive, may be unable to discriminate between discrete stocks living in a similar environment, **single generation span**

Parasites

- Principle
 - Parasites act as 'biological tags', and have different distributions to that of the host species
 - If it is known where a fish picks up a particular parasite, its subsequent movements can be deduced (e.g. didymozoids in New Zealand skipjack tuna)
 - If source of infection unknown:
 - Where parasites similar, fish either have common history or live in a similar environment
 - Where different, location history of fish different by residence time of parasite examined





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 - Where parasites similar, fish either have common history or live in a similar environment
 - Where different, location history of fish different by residence time of parasite examined

- Advantages

- Fish only have to be caught once, little specialist equipment required, relatively low cost

- Limitations

- Destructive sampling often required, often young fish have few parasites (=limited to no signal), may be unable to discriminate between discrete stocks living in a similar environment, time consuming, **single generation span**



Genetic approaches... see next presentation