HAWAII TUNA TAGGING PROJECT 2
With Updates on Related Tagging Projects

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Hawaii Tuna Tagging Project (1995-2001)

(archipelagic scale, conventional dart tags for bigeye and yellowfin tuna)

- **Movement** of bigeye and yellowfin within the Hawaii EEZ and between major fishing grounds. (*exchange rates*)

- **Interaction**
  - direct gear interaction / concurrent interaction
  - sequential or growth interactions
  - spatially segregated interaction

- **Exploitation rates** and differential vulnerability (*local fishing mortality*) of tuna around seamounts and FADs

- **Aggregation effects** - retention rates of bigeye and yellowfin tuna around seamounts, FADs and local...
HTTP: objectives and outcomes

- **17,986** bigeye and yellowfin tagged @ 53:47 ratio
  - 12.6% overall recapture rate

- Bulk transfer model developed to describe tag loss by all means
  - ... between offshore FADs/seamount, inshore areas and offshore LL fishery
    - Estimated transfer (*movement*) rates
    - Estimated size and species-specific M and F rates

- Calculated residence times and exploitation rates

- Provided a closer definition of fisheries and exploitation patterns
Yellowfin in red
Bigeye in blue
Meanwhile, changes in Hawaii-based tuna fisheries:

- A decline in effort in the surface fisheries for juvenile bigeye and yellowfin on the Cross Seamount and offshore weather buoys;

- The development and expansion of a deep-set short longline fishery on the Cross Seamount to target larger bigeye tuna and seamount associated pomphrets;

- An increase in the setting and exploitation of privately set FADs close to the main Hawaiian islands, primarily aggregating and harvesting sub-adult bigeye tuna;

- Increased harvesting of very small yellowfin tuna from the inshore Hawaii State FADs;

- A steady increase in tuna longline effort by the domestic fishery due to conversion of swordfish effort and a steadily increasing number of hooks per tuna directed set.

- Increasing fuel costs
The HTTP 2: Justification

- HTTP concentrated on interaction issues relevant to the Cross Seamount and offshore weather buoy fishery (YF and BE)

- The Cross seamount handline fishery has evolved, shifting to short longline gear and multi-species targeting

- Nearshore issues relevant to Hawaii domestic fisheries remain unresolved

- Need to update movement parameters, M and F estimates and examine AREAS and SPECIES under-represented during the HTTP

- Lack of knowledge of skipjack resources when they may become increasingly important to local fisheries

- Continued uncertainty as to the ‘connectivity’ of tropical tuna between Hawaii and the broader WCPO biomass
HTTP2: objectives

1) update estimates of fishing mortality ($F$), ‘natural’ mortality ($M$) and movement parameters for yellowfin and bigeye tuna in Hawaiian waters while deriving initial estimates of $M$ and $F$ and movement parameters for *skipjack*.

- To include a continuation of existing PFRP tagging projects to define the typical home range for “Hawaiian” tuna using *sonic*, *archival* and *PAT* tags,
- … with a greater emphasis on areas and species under-represented during HTTP, i.e.
  - bigeye tuna found around the main Hawaiian Islands and targeted by the *private FAD* fishery, and
  - yellowfin and skipjack tuna on FADs and near shore aggregation sites,
- … with increased emphasis on tagging *unassociated* or near shore bank associated tuna schools with both conventional dart and acoustic tags.
HTTP2: objectives

2) Document the FAD-associated temporal and vertical behavior of skipjack tuna.
   - Using acoustic pinger and depth reporting tags on receiver equipped FADs with
   - … simultaneous releases with yellowfin and bigeye tuna to provide species-specific comparisons in mixed aggregations.

3) Determine the diurnal vertical behavior of bigeye tuna and *lustrous pomphret* (*Eumegistis illustris*) associated with the Cross Seamount.
   - Using acoustic depth reporting tags on all three species in simultaneous seamount residence,
   - … which will require deployment of acoustic receivers on bottom-mounted acoustic release systems.
a comparison between HTTP and HTTP2
Project outline

- **Species**
  - Skipjack, yellowfin, bigeye, lustrous pomphret (*Eumegistis illustris*)

- **Tag types** (conventional, acoustic, archival, PAT)

- **Release sites**
  - State anchored FAD system
  - Private bigeye FADs
  - Banks (*koas*)
  - Open water areas
  - Cross Seamount

- **Release timetable**
  - 2 years, start late 2008
Project outline

- Tagging platforms
- Fishing gears and methods
- Key personnel
  - Holland, Itano, Weng
- Data processing and analysis
  - Integrated with PTTP
SCALING UP: Sonic and Archival Tags
Cross Seamount Pomphret funding from NMFS
Cross Seamount acoustic images (R. Domokos, NMFS)
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Cross Seamount acoustic tagging and imaging

Cross Seamount acoustic images (R. Domokos, NMFS)
Nearshore FAD Issues

- Interrupt normal movement routes?
- Decrease catches in traditional koas and fishing grounds?
- Increases vulnerability of very small tuna
- “Burn out” an area, reduce productivity?

Private FADs

- Selectivity
- Seasonality
- Bigeye behavior
SPC - PACIFIC TUNA TAGGING PROJECT

Cruise 1 and Papua New Guinea Tuna Tagging Project
Cruise 1

Cruise 2: Micronesia, Marshall Islands to Wallis and Futuna

HTTP 2
Mahalo