

Recent Developments in Pop-up Tag Technology in Support of Fisheries Research

Presented by
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Mitigating impacts of fishing on pelagic ecosystems:
towards ecosystem-based management of tuna fisheries
Montpellier, France
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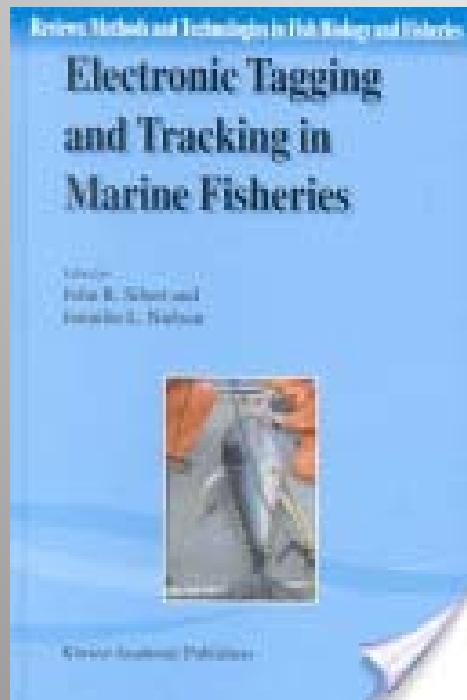
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A Little History



- The concept of a “pop-up” tag began in 1970s to study grey whales
- It was again discussed in 1994 at 45th Tuna Conference- with the goal to provide fisheries-independent data
- In 1996 it was recognized that pop-up tags were technically feasible at the TAB (Tagging of Atlantic Bluefin) workshop in Miami (Restrepo, 1996)

Electronic Tagging and Tracking in Marine Fisheries (Reviews: Methods and Technologies in Fish Biology and Fisheries) by John R. Sibert and Jennifer L. Nielsen
(Dec 1, 2001)



Pop-up tags for fish

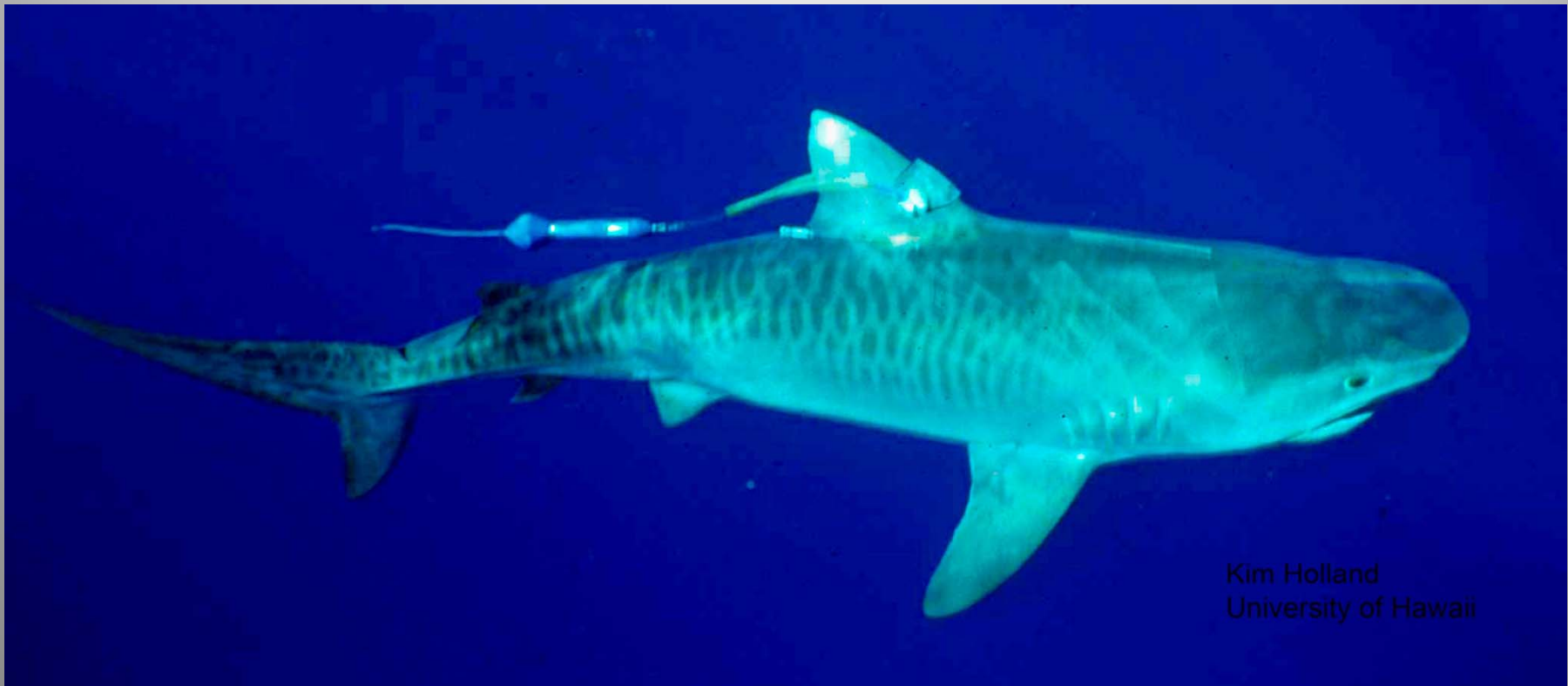
- Microwave Telemetry produced the first pop-up tags in 1997.
- These were “single-point” tags that simply gave you an Argos pop-up location.
- The first deployments were on giant bluefin tuna in the Atlantic.

- In 1998 Wildlife Computers introduced our “PAT” line of pop-up tags.
- The initial “PAT1” tags also included the archiving and transmission of depth and temperature data.
- The first deployment of PAT1 tags were on whale sharks off Gladden Spit in Belize in April 1998





PAT1 on a Tiger shark



Kim Holland
University of Hawaii



Pop-up tags today

- Wildlife Computers and Microwave Telemetry remain the primary manufacturers of pop-up tags
 - Tags have become smaller
 - Wildlife Computers MiniPAT
 - Microwave Telemetry X-tag
 - Transmitted data are information rich
 - The MiniPAT can produce 12 data message types
 - Detailed status messages send information about the state of the tag
- Other vendors are experimenting with producing their own versions of pop-up tags

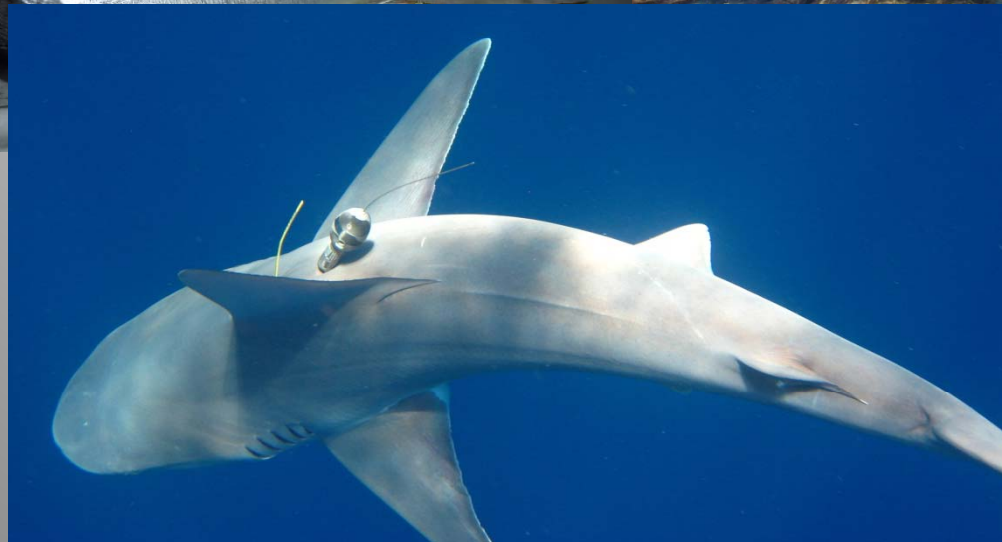


Today's MiniPAT

- Attaches to the study animal via a tether
- Collects and archives depth, temperature and light intensity measurements
- Releases from the study animal via an active corrosion of the tether pin on a user-defined date, or if the tag determines it is no longer on a diving animal. Tag floats to the surface of the water
- Depth and temperature readings are processed into various message types to describe the animal's behavior and environmental parameters recorded during the deployment
- Dawn and dusk light curves are extracted from the light-intensity readings and formatted into geolocation messages which allow a coarse track during the deployment to be determined
- Messages are transmitted to the Argos system, which processes and forwards the data to the user.
- Pop-up location and post-release track is provided by Argos



MiniPATs





New Survivorship PAT (sPAT)

- Now available for survivorship studies in both recreational and commercial fisheries
- Monitors the status of the tagged animal for 30 days
- Immediately after a mortality or tag detachment is detected, the sPAT releases from the tether and transmits through the Argos satellite system
- If after 30 days the sPAT is still associated with a diving animal, it will release from the tether and transmit its status
- Wildlife Computers monitors the transmissions. A detailed report is sent to the researcher.
- Tag price includes pre-assembled tether/anchor and Argos charges
- Significantly less expensive than the MiniPAT so sample size can be increased







New Mark-Report PAT (mrPAT)

- Smallest pop-up tag available, 30g in air, 110mm long x 22.4mm in diameter
- mrPAT simply releases on the date as programmed by the user and transmits to the Argos satellites- you get a single-point Argos pop off location
- Can be used as an electronic 'spaghetti tag' to provide fisheries-independent measures of dispersal patterns and migration.
- Beta version mrPATs are currently being tested on captive salmon
- Scheduled to be fully field-tested and available for sale late 2013

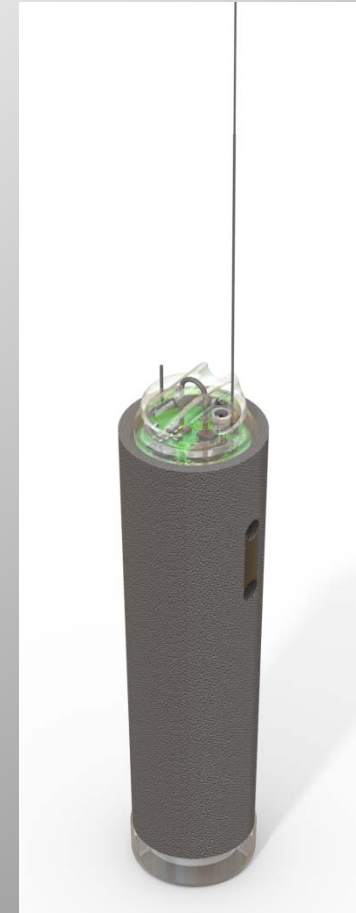




No bulbous float, hidden antenna



Antenna is coiled in the tether during deployment – springs upright when tether is jettisoned





More environmental data



The Mk10-PAT, while still being used for tagging studies, is also the platform we use for new experimental designs

Currently testing an integration of the Loligo dissolved oxygen sensor- if data prove useful, we will focus on a more efficient hydrodynamic shape



Beyond the tag- handling the fish



Fish handling techniques and aids such as cradles are important to tagging success, minimizing the handling time and potential injury to the fish.



More than “Tying One On”

- Keeping a pop-up tag on fish for a full deployment remains a challenge
- Various tag anchors have been designed and tested, but no design has proved significantly superior across species
- We continue to active working with the user community to help with the design, manufacture and testing of different anchors



Wildlife Computers Wilton Dart



Other commonly used darts



Wildlife Computers
Titanium Dart

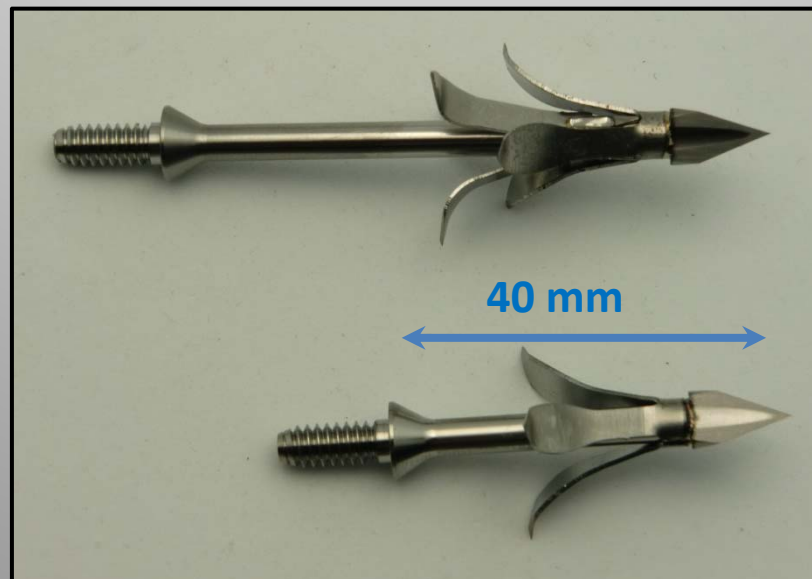


Domeier Dart



Advanced technology for dart designs

- Our engineers have been working with a company that makes miniature medical devices for implants in humans
- The titanium darts below are the result of collaboration between a cetacean researcher, our engineers and the medical device manufacturer. They are used for externally attaching a satellite tag to cetaceans. I





Thank you!



The Wildlife Computers Team