First Use of Mobile Peer-to-Peer Network Technology on a Marine Animal

-The "Business Card" Tag-

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Possible Applications

• School Fidelity, School Longevity

• Intra-specific Interactions
  - Mating interactions (e.g., in sex segregated species)
  - Identify reproductive timing and duration (spawning aggregations)

• Predator/Prey Interactions
  – Marlin and tuna
  – Sharks and turtles

• Identification of Hot Spots ("essential habitat")
  - Sharks and turtles
  - Swordfish and turtles
  - Dolphin and tuna
The “Business Card” Tag (BCT)

Combines receiver and transmitter in a single device
Cycles between listening and transmitting unique ID code
Compatible with the Vemco passive monitoring system
- Can detect other Vemco coded transmitters
- Detectable by Vemco receivers
Datalogging tag - Must be recovered to retrieve data
Proof-of-concept Questions

Will it work in the real world?!

- How does transceiver duty cycle influence detection efficiency?
- How frequently do BCT-equipped animals detect one another?
- Can we figure out where encounters occur?
Public Safety Implications of Shark Ecotourism
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Questions:
(1) Do sharks follow boats back to shore?
(2) Do sharks come into areas used for recreation?

Methods: Acoustic Monitoring
(1) Sharks implanted with transmitters
(2) Movements tracked with remote receivers
Experimental Design Schematic

- BCT Shark
- V16 Shark
- Moored Receivers
Summary Of Results

4 Galapagos sharks equipped with BCTs in May 2008
2 BCTs recovered after 20 and 132 days at liberty

- BCT #1 = 4,506 detections of 28 sharks
- BCT #4 = 4,875 detections of 30 sharks

Each recovered BCT had detected all 3 other BCTs on multiple occasions
BCT4 Known Movements

OAHU
Stationary receivers detecting BCTs

BCT#4 detecting other BCTs

BCT#4 detecting V16 coded transmitters
Stationary receivers detecting BCTs

BCT#4 detecting other BCTs
Stationary receivers detecting BCTs

BCT#4 detecting other BCTs
Estimated Location of BCT4-BCT1 Encounters
BCTs deployed on sharks successfully detected one another, plus other conventional transmitters.

Initial results indicate the potential of BC tags to document the frequency of inter-individual interactions beyond the range of fixed receivers, and for carrying receivers to locations important to the animals.

Even without on-board geolocation capability, inferences can be made about the site of inter-individual interactions.
Next Steps - Beacon Grid
Predator-Prey Interactions

Tiger shark and Green Sea Turtle
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