Adult bonefish movement corridors & spawning locations around Grand Bahama

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Bonefish

- Prized sportfish –141 million+ $/yr in The Bahamas



- Typically inhabit nearshore coastal areas – most popular for development



History of Grand Bahama

- Grand Bahama – 2nd most developed island
- Major changes between the late 1950's to late 1970's

History of Grand Bahama

- 1st major change - closing off of Hawksbill Creek in 1956/57 with road & development of ship harbour

History of Grand Bahama

•Bonefish historically used Hawksbill Creek as a migration route before it was effectively severed

History of Grand Bahama

- 2nd major change - construction of Grand Lucayan Waterway (GLW) – late 60's-70's

Year 1 study – Oct’13 to Jun’14

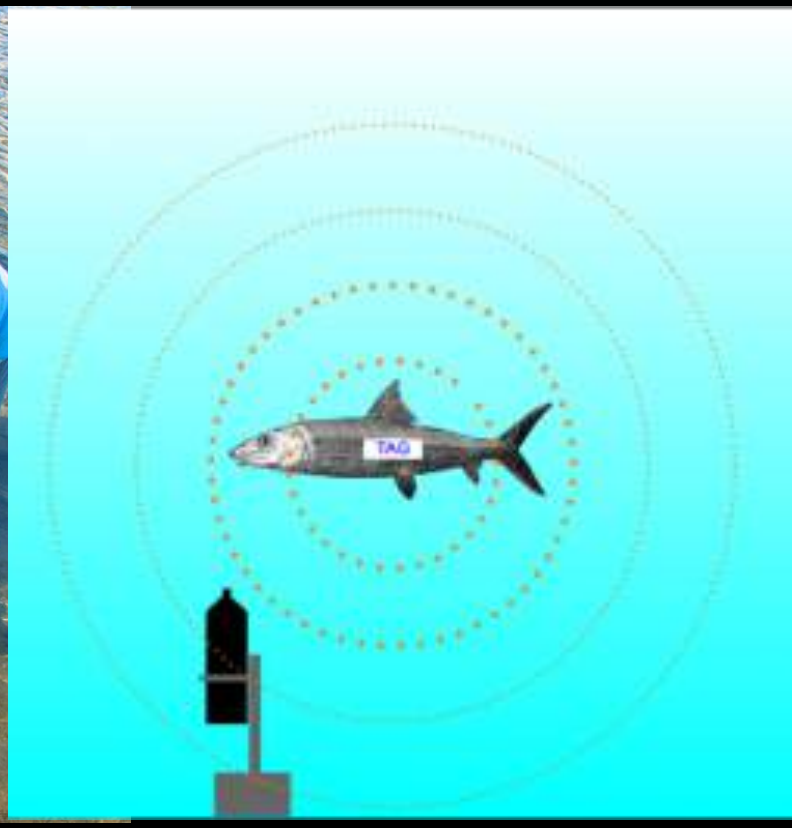
- Determine contemporary movement corridors of adult bonefish during spawning season around Grand Bahama
- Focus on movements during spawning season remains a pressing area of research

Study area

- Note shallow flats on north, deep water on south
- GLW approx. 17 km (11 miles) from Hawksbill Creek

Methods

- 17 VR2W receivers
- 30 V13 coded tags (513 d life)

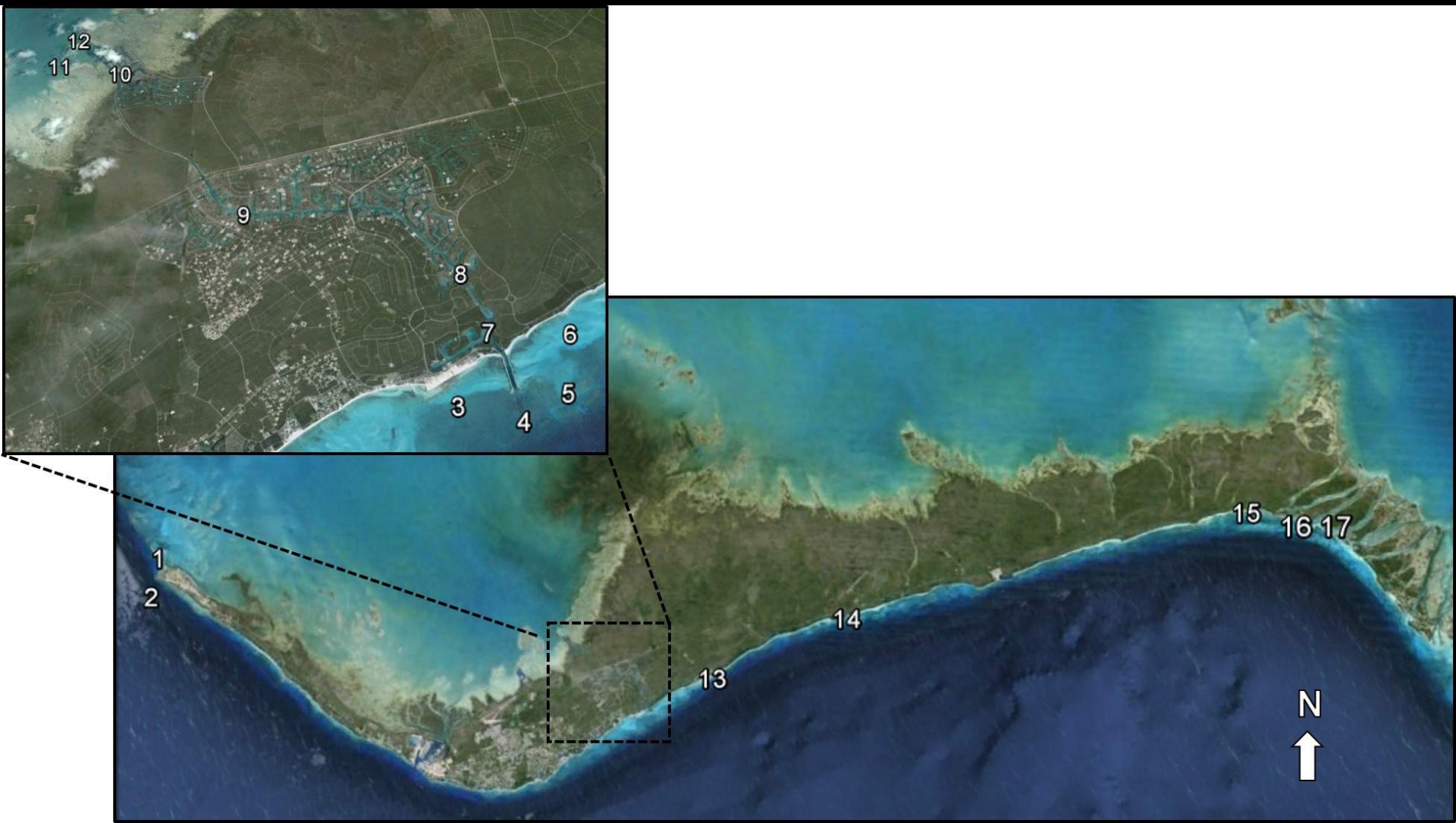


Methods

•Tagging locations (zones) → 24 fish tagged on north side; 6 fish tagged on south side

Methods

- Receiver locations



Methods

- Data collected October 25, 2013 to June 21, 2014
- Supplemented passive array with manual tracking

Results

- 20/30 bonefish detected post-release
- 26,108 detections logged
- 0 bonefish tagged on S-side fully traversed GLW
- 8 bonefish tagged on N-side fully traversed GLW
  - Timing corresponded to 1-4 d before or after new or full moon
  - Multiple tagged fish using canal on same date (e.g., March 18, 2014 to go south then multiple fish returning north on March 21, 2014)

Results

- Some N-side bonefish chose different routes to access the S-side

Results

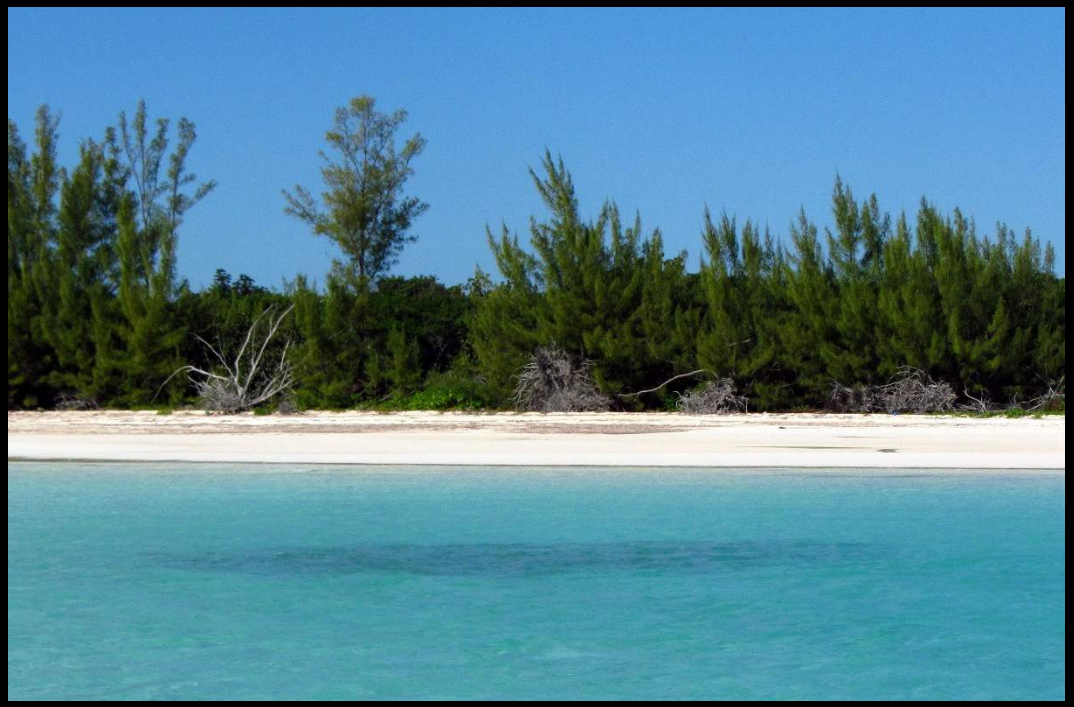
- Bonefish #33 (80 km from tagging location); 4 d to go from receiver 2 to receiver 6

Results

- Bonefish #08 & #09 [88 km from original tagging location] to receiver 15 at east end

Results

•Manual tracking → potential pre-spawning aggregation site? (500+ fish, 1 d before full moon, 1 running male angled from school)



Discussion

- Movements through GLW appear to have connection to moon phases → consistent with Danylchuk et al. (2011) → strong tides disperse pelagic larvae
- Loss of Hawksbill Creek somewhat mitigated by GLW
- Need to manage GLW as fish habitat

Discussion

•Need to further investigate one potential pre-spawning aggregation site and determine if there are others

Year 2 study – Oct’14 to Jun’15

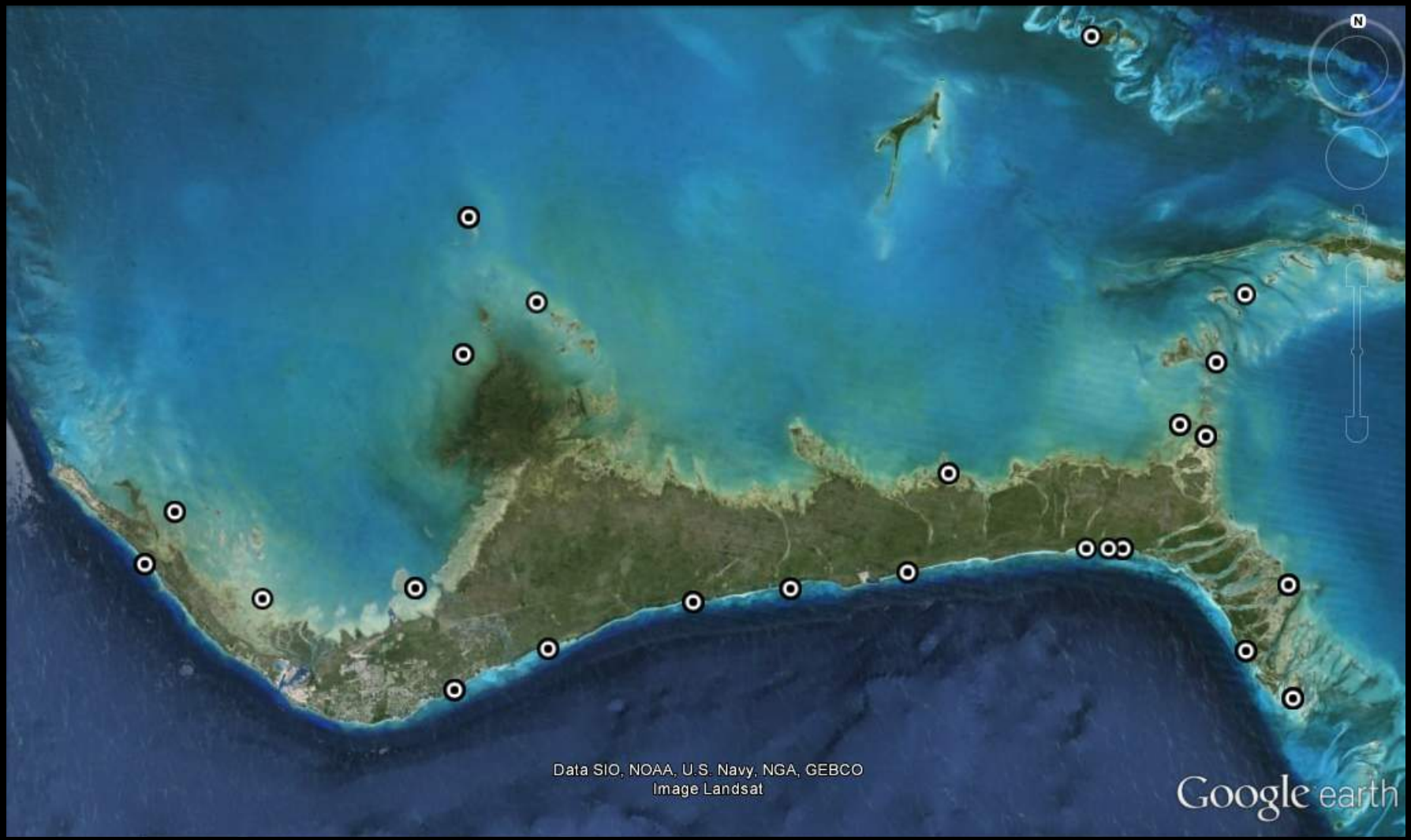
- Determine pre-spawning/spawning aggregation sites & investigate the frequency of movements to these locations
- Determine additional environmental factors associated with spawning events

Methods

- 67 VR2W receivers (32 from OTN)
- 56 V13 coded tags (513 d life)

Methods

- Tagging locations

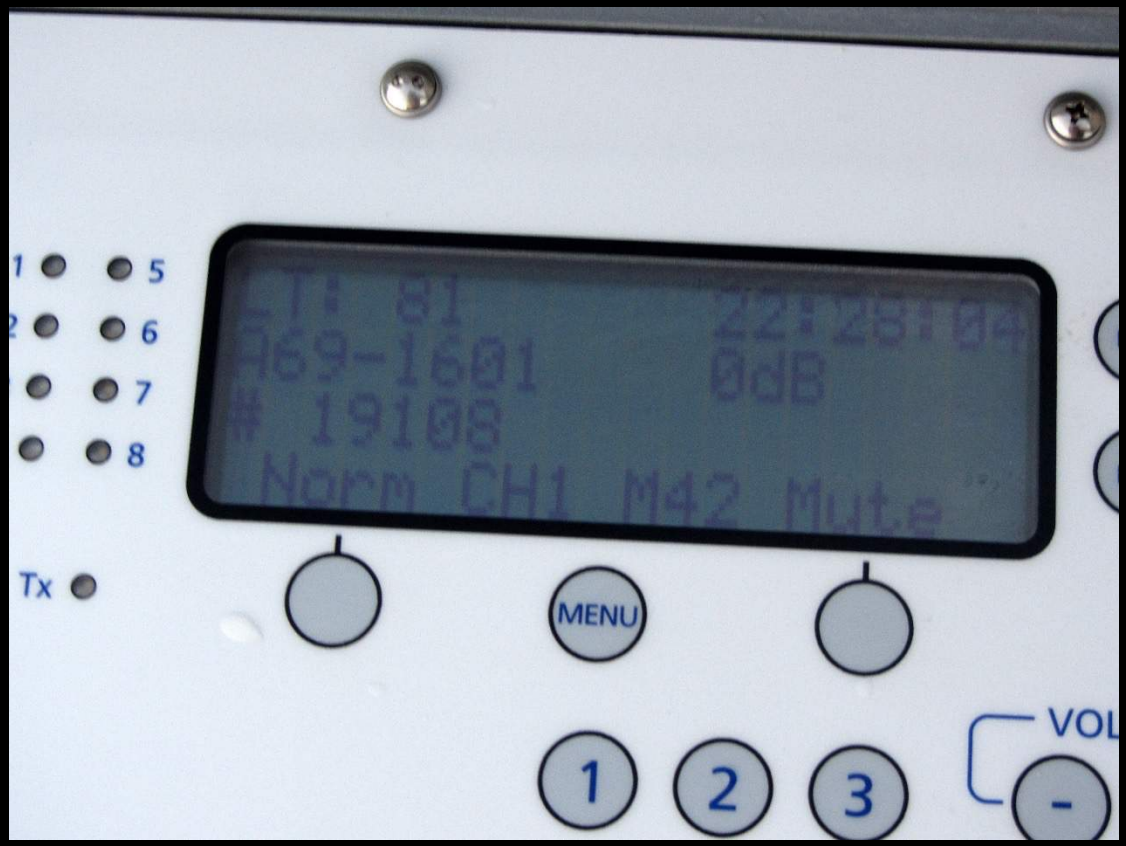


Methods

- Receiver locations

Methods

- Data collected October 18, 2014 to June 2, 2015
- Supplemented passive array with manual tracking



Preliminary results

- 30/56 bonefish detected post-release
- 55, 524 detections logged
- 3 clear pre-spawning aggregation sites, with multiple fish going to these locations on multiple days during the study
- 2 bonefish used multiple pre-spawning aggregation sites
- Several tagged male fish likely spawned multiple (≈5) times
- Longest migration to spawning site → 143 km

Preliminary results

- Pre-spawning aggregation sites with >5000 bonefish observed with predators
- Anglers fish pre-spawning aggregations
- Tide phase may influence offshore movements related to spawning

Preliminary discussion

- Loss or degradation of habitat related to pre-spawning/spawning a real conservation & management issue if there are indeed only 3 sites
- Any habitat alterations in main movement corridor regions could have negative affects on bonefish populations
- Need to actually document spawning event

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