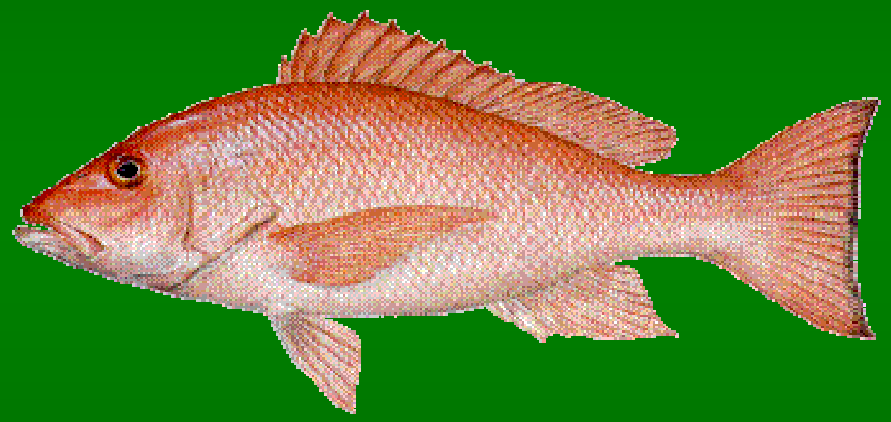
Tracking Red Snapper with an Acoustic Telemetry System



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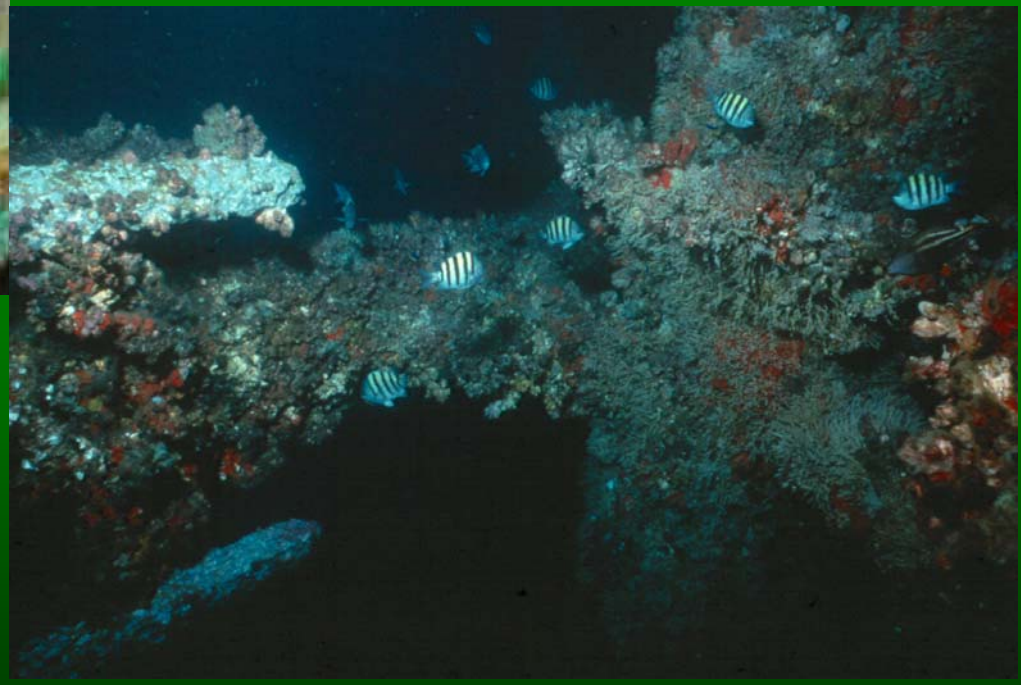
Introduction

- Oil platforms/artificial reefs = excellent fishing
- Studies: fish aggregate around platforms in large numbers
  - Red snapper big component of these communities

Oil Platforms

- Do oil platforms provide exceptionally high quality habitats?
  - *In situ* food production
  - Predator refugia
  - Increased physical habitat

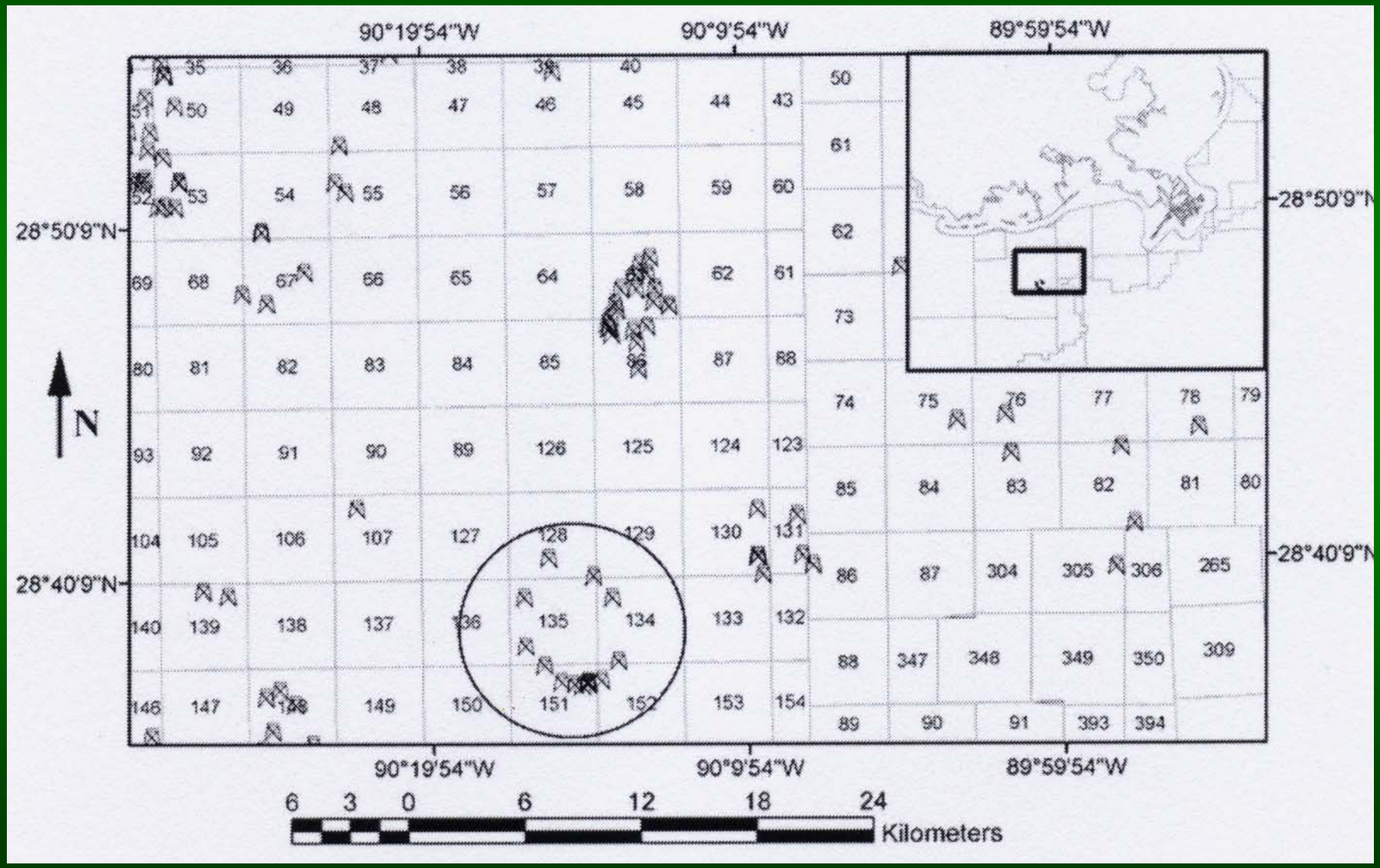
Oil Platforms



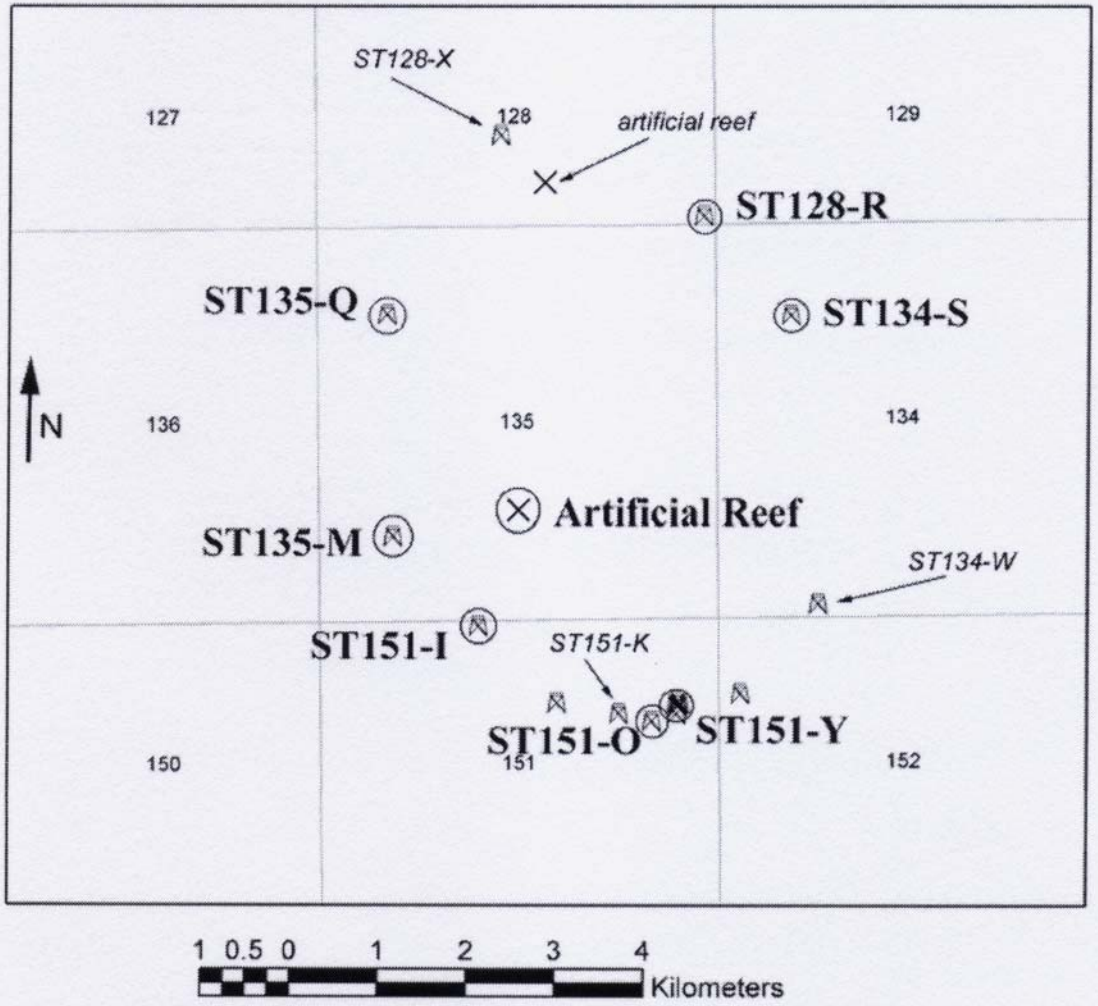
The Science

- Telemetry
  - Site fidelity: suitability of habitat
  - Temporal and spatial patterns
    - Temporal: foraging habits

Methods – Site



Methods – Site

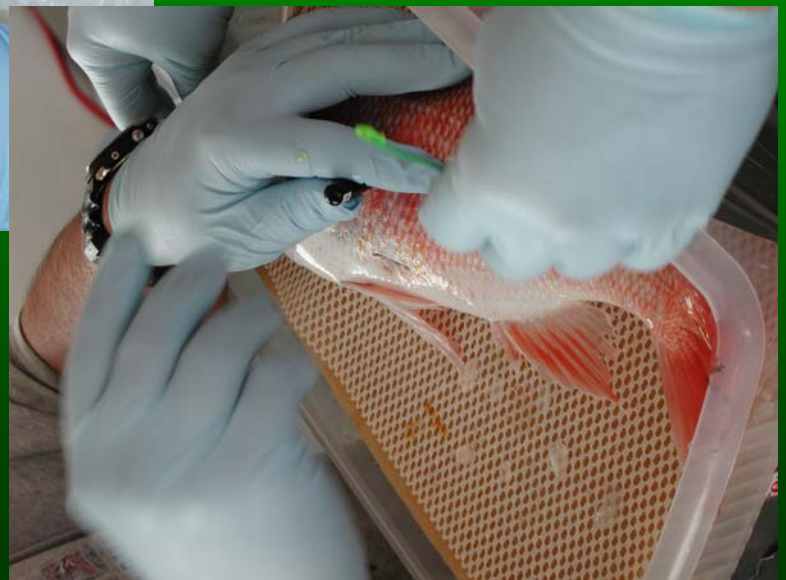


Methods

Methods – Implantation

- MS-222, incision, sutures, recovery tank
- Orient to bottom and swim down (Patterson et al. 2001)

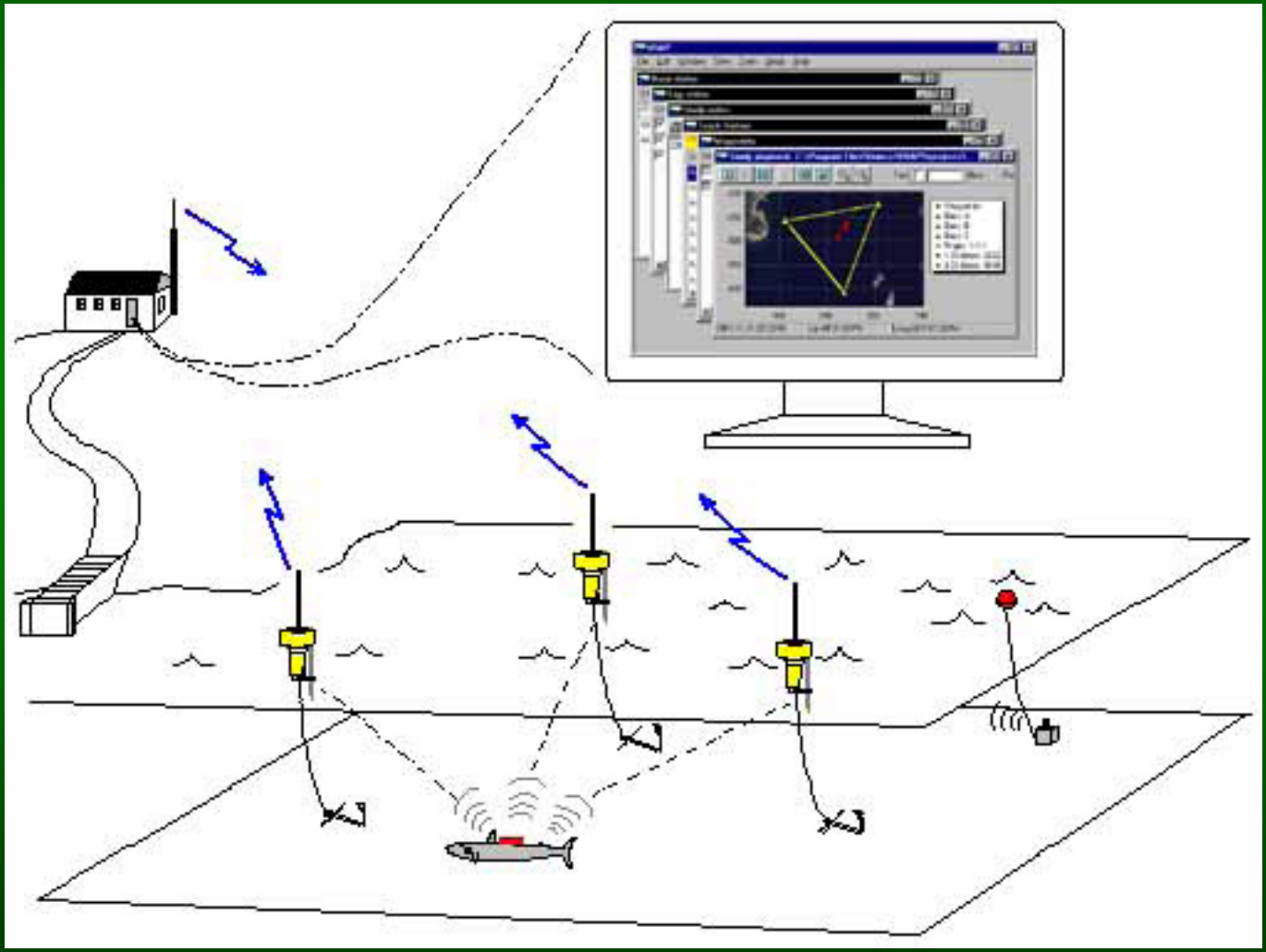
Transmitters



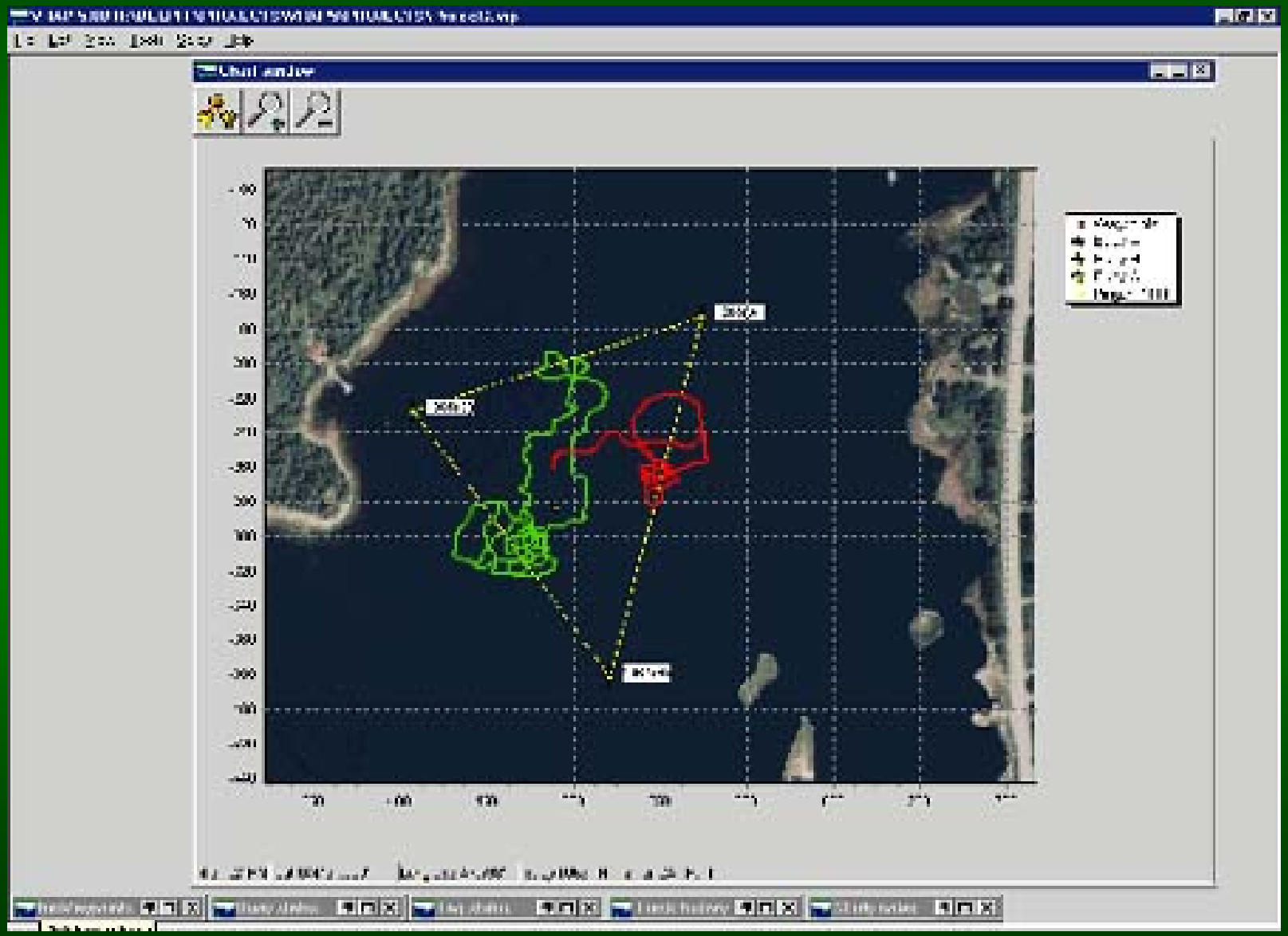
Methods

- VEMCO Radio-acoustic positioning and telemetry system (VRAP)
  - Real time tracking
    - Hydroacoustic transmitters
    - Independent receivers
    - Base station

VRAP



VRAP

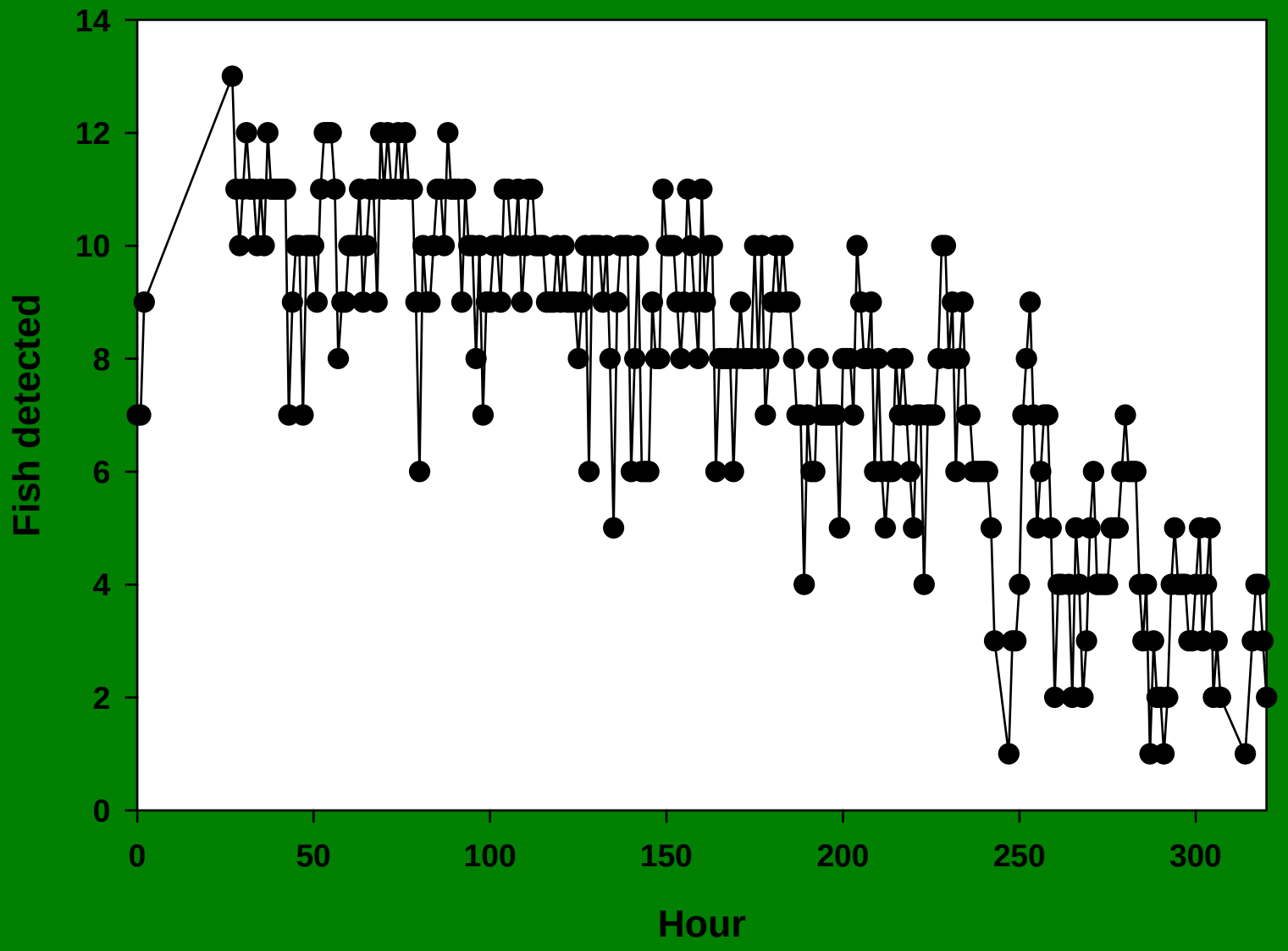


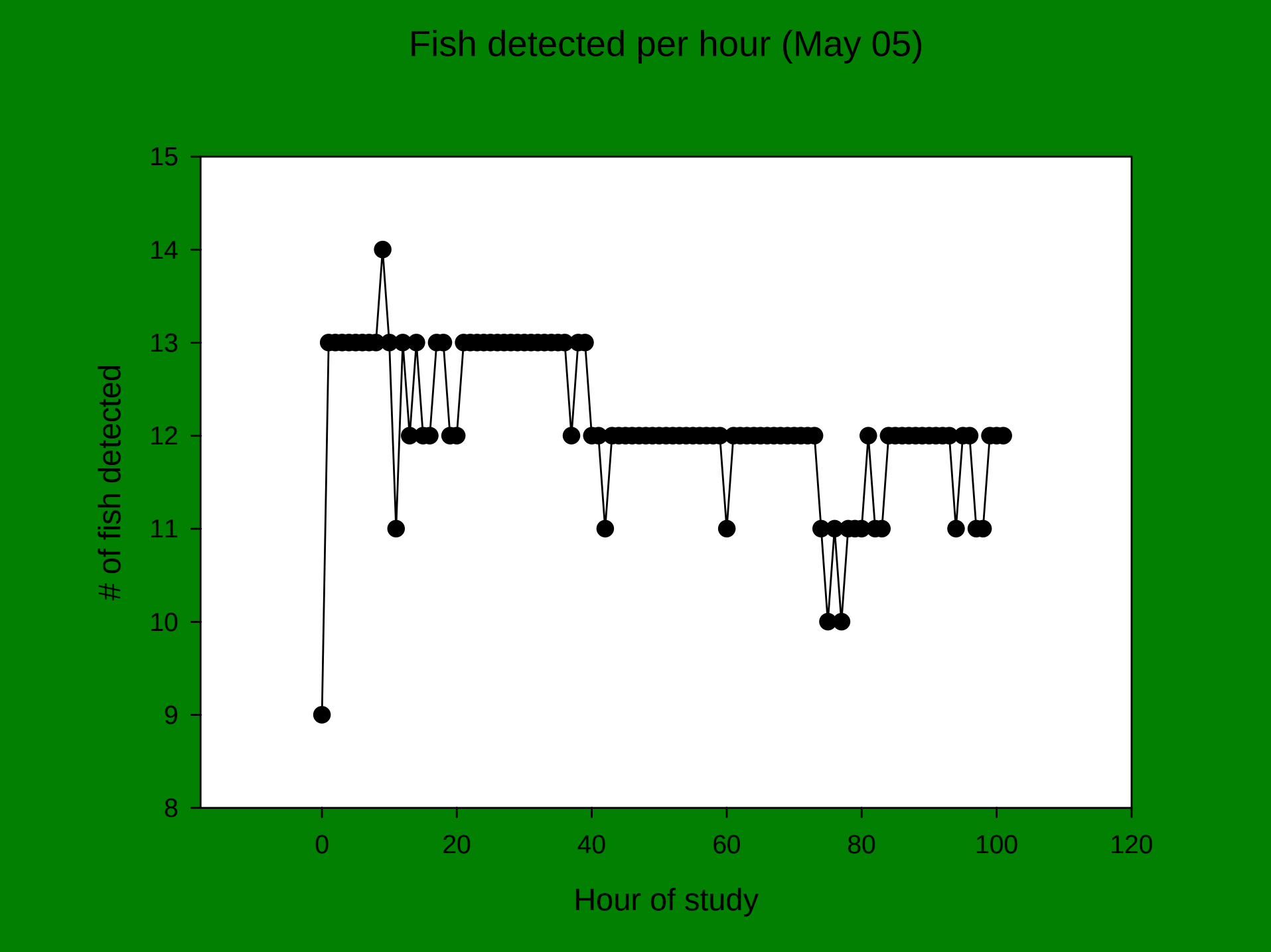
Methods

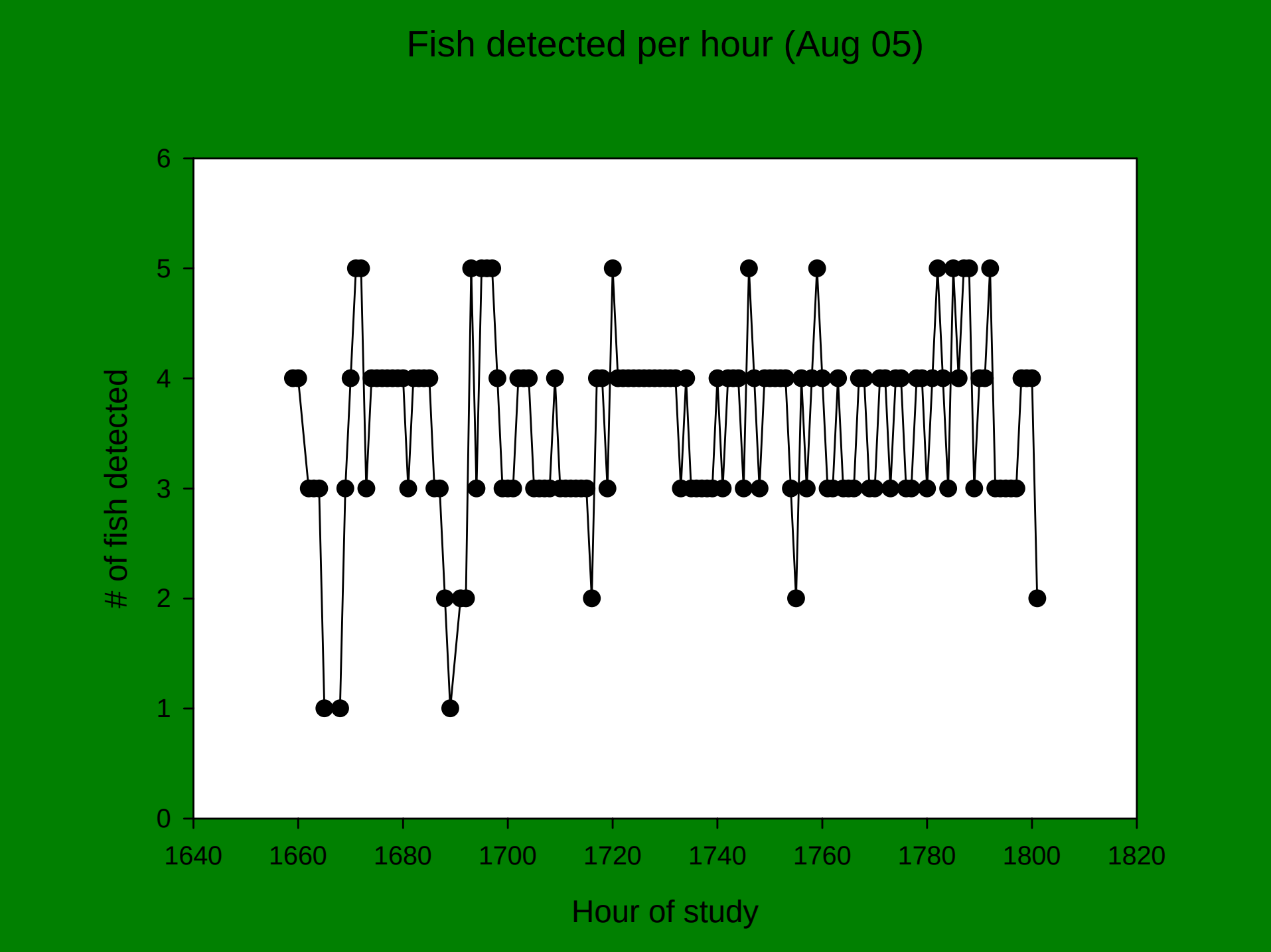
- Fish detections = positions + unresolved tags
  - Fish detected per hour
  - Fourier analysis

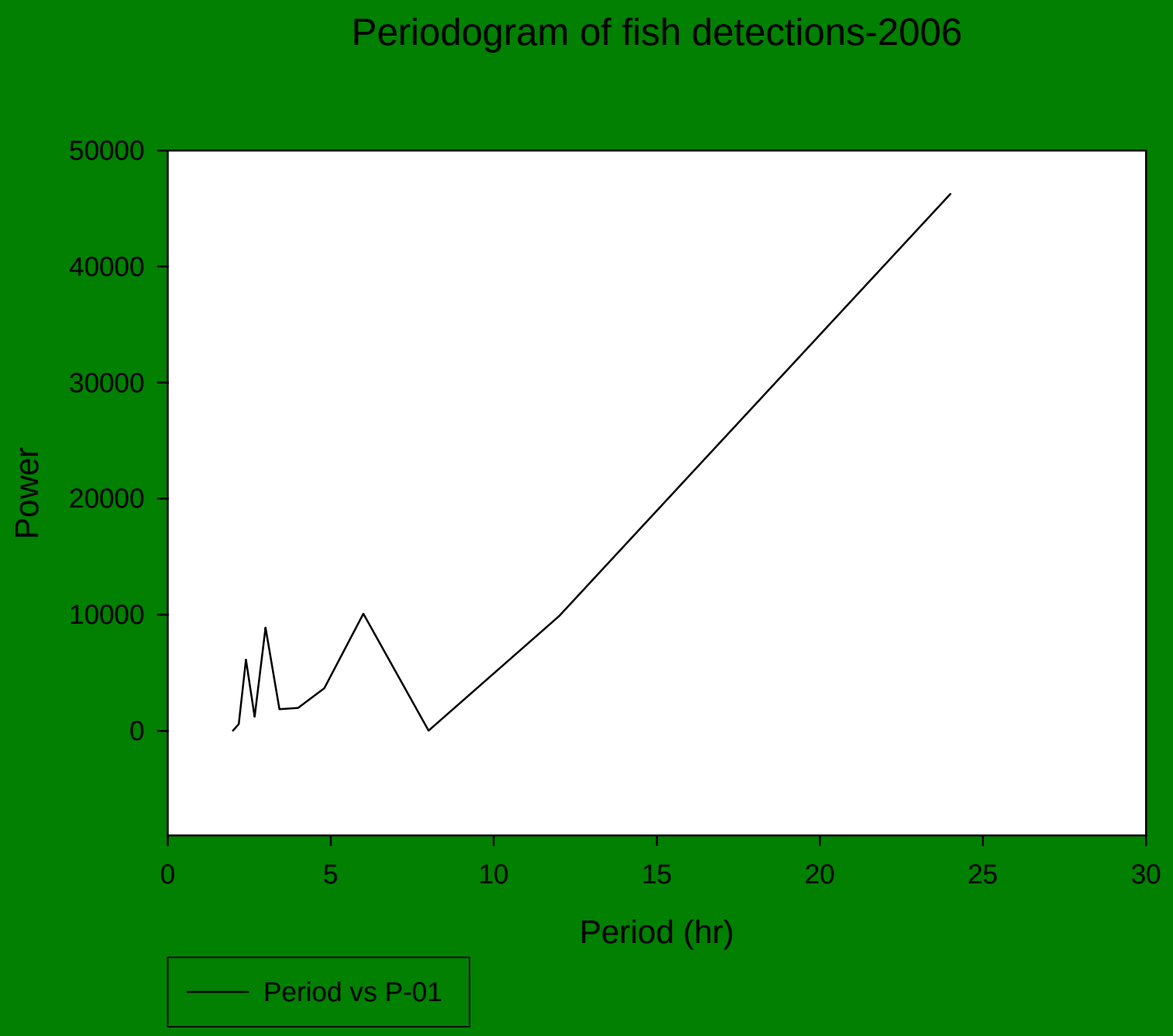
Results

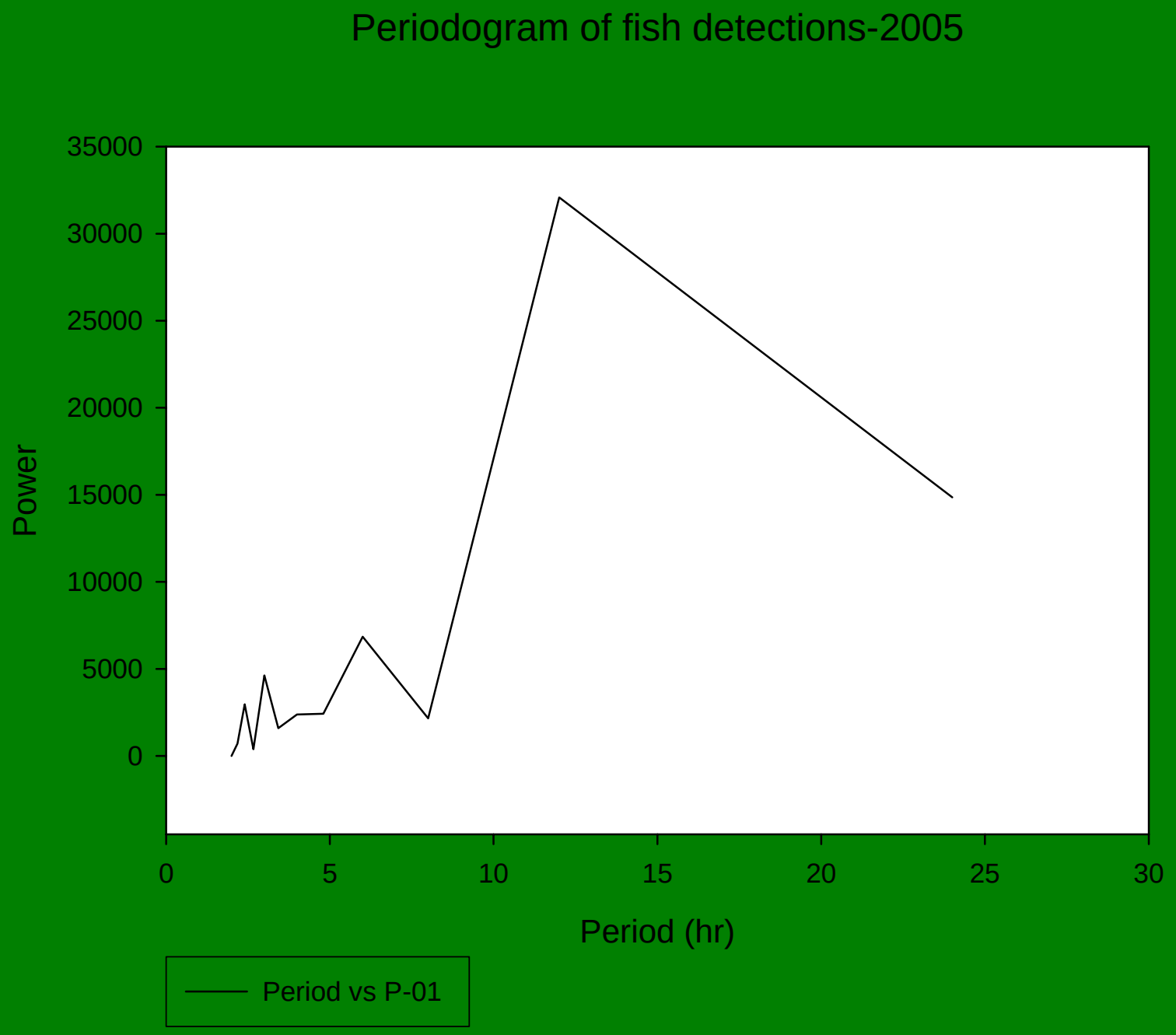
Fish detections vs. time (Total)

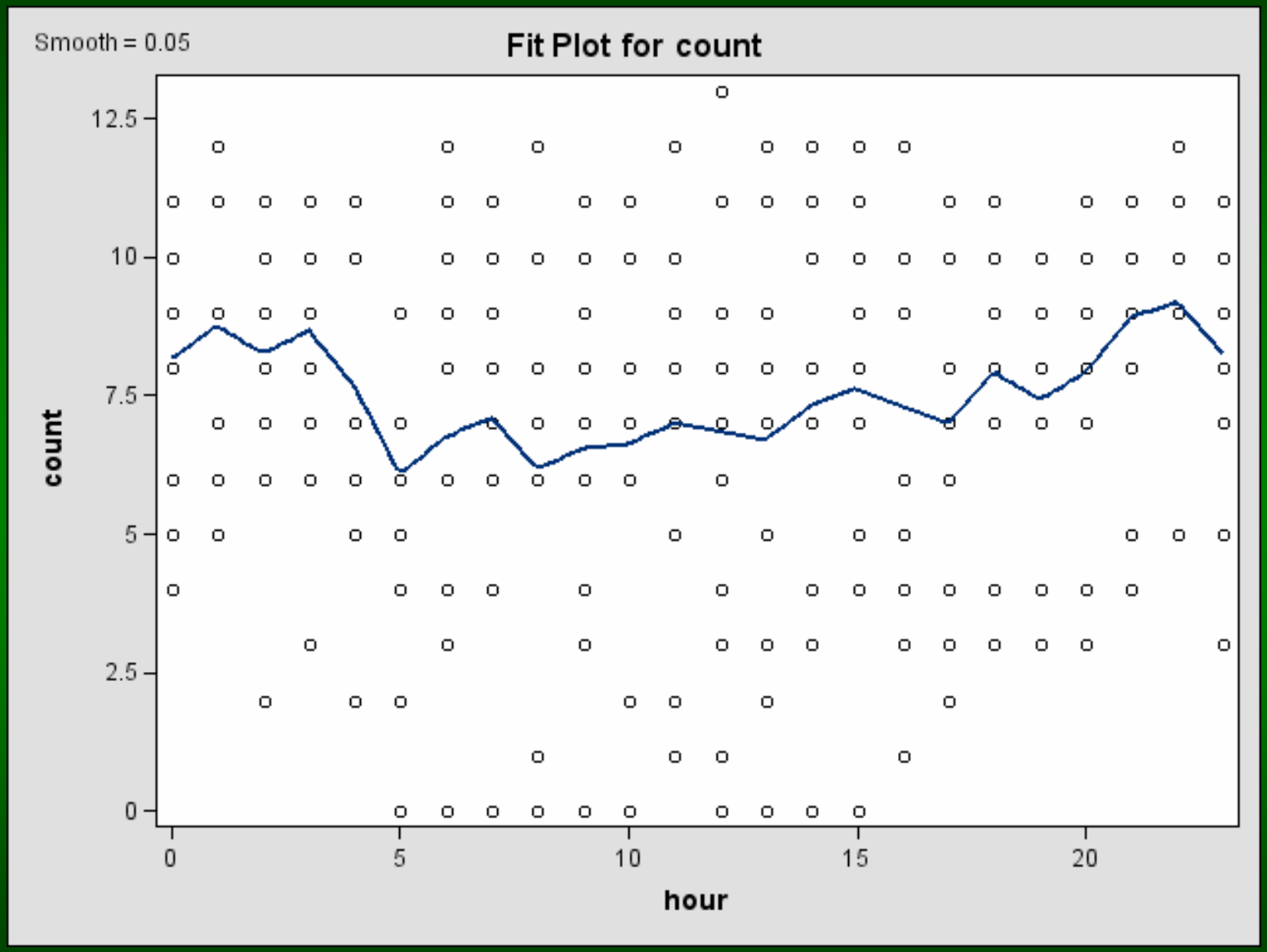



Fish detected per hour (May 05)
# of fish detected
Hour of study
15
14
13
12
11
10
9
8
0
20
40
60
80
100
120


Fish detected per hour (Aug 05)
# of fish detected
Hour of study
0
1
2
3
4
5
6
1640
1660
1680
1700
1720
1740
1760
1780
1800
1820


Periodogram of fish detections-2006
50000
40000
30000
20000
10000
0
Power
0
5
10
15
20
25
30
Period (hr)
Period vs P-01


Periodogram of fish detections-2005
35000
30000
25000
20000
15000
10000
5000
0
Power
0
5
10
15
20
25
30
Period (hr)
Period vs P-01


Smooth = 0.05
Fit Plot for count
count
12.5
10
7.5
5
2.5
0
0
5
10
15
20
hour

Discussion

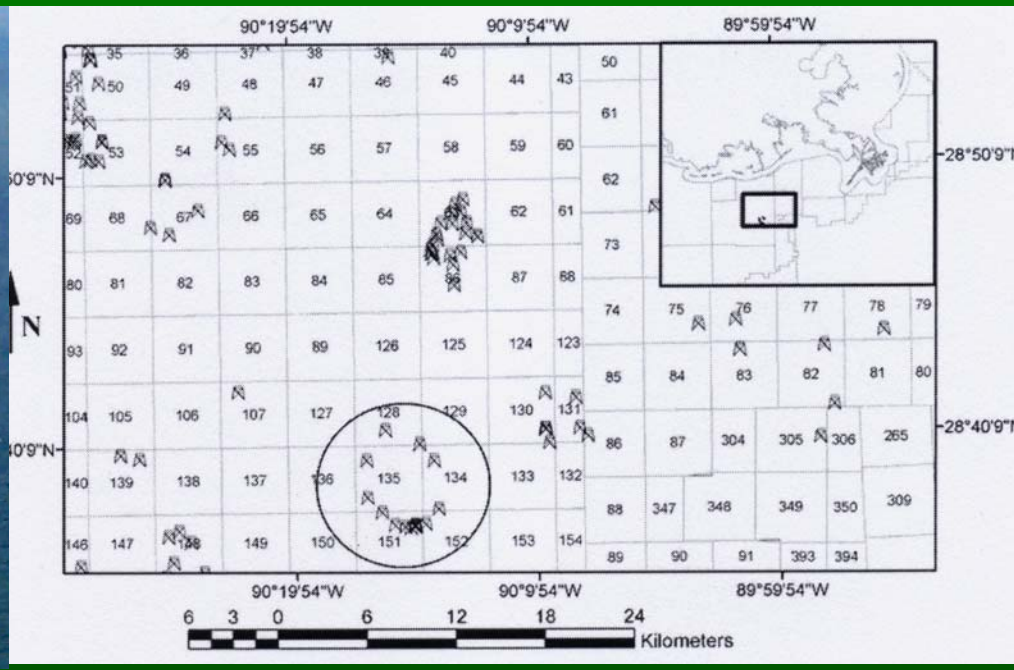
Site Fidelity

- Proxy for suitability of new artificial reefs
  - Important to attraction-production
- Widely varying numbers off Alabama (25–60%)
- Oil platform: <1% (Peabody and Wilson, in review)

Periodicity

- Number of fish decreases and increases regularly
- Fourier→ 24-hour periodicity
- Feeding behavior
  - Schooling, dispersal to feed
  - Diet studies: non-reef-associated prey

Feeding Haloes



Discussion

- Ability to detect
  - Diel/tidal patterns
  - Detection radius

Acknowledgments

- Committee members: Jim Cowan, Mark Benfield, and Barry Moser
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- Dave Nieland, Aaron Podey, Mike McDonough (the elder), and all the people who helped me catch red snapper
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Louisiana State University
Coastal Fisheries Institute

References

Patterson, W. F. III, J.H. Cowan Jr., C.A. Wilson, and R.L. Shipp. 2001. Age and growth of red snapper, Lutjanus campechanus, from an artificial reef area off Alabama in the northern Gulf of Mexico. Fish. Bull. 99:617–627.

Peabody, M.B. and C.A. Wilson. 2006. Fidelity of red snapper (Lutjanus campechanus) to petroleum platforms and artificial reefs in the northern Gulf of Mexico. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2006-005. 64 pp.