

Background
information

Data

Statistical
analysis

Conclusions

Oceanographic influence on albacore catch from the Am. Samoa longline fleet

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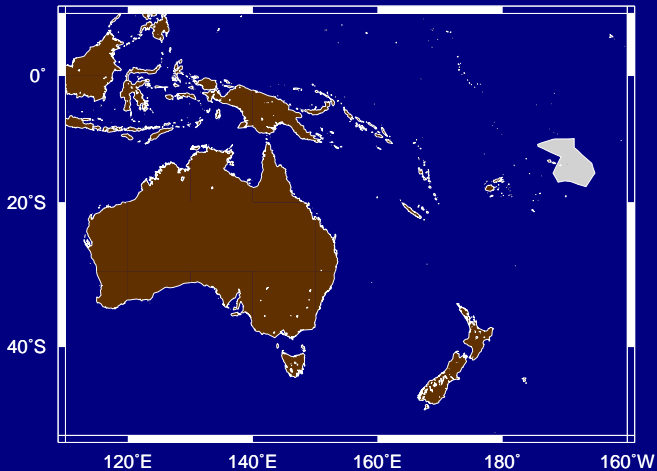
American Samoa

Background information

Data

Statistical analysis

Conclusions



Longline fishing fleet composition

1996

ALIAS

1997

ALIAS
MONO51

1998

ALIAS
MONO51

1999

ALIAS
MONO51

2000

ALIAS
MONO51
MONO50

2001

ALIAS
MONO51
MONO50

2002

ALIAS
MONO51
MONO50

2003

MONO50
ALIAS
MONO51

2004

MONO50
ALIAS
MONO51

2005

MONO50
ALIAS
MONO51

Background information

Data

Statistical analysis

Conclusions

Some fleet characteristics

Background
information

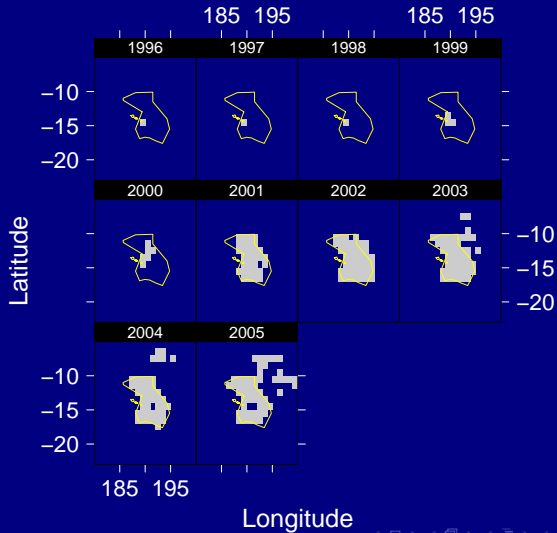
Data

Statistical
analysis

Conclusions

| | ALIAS | MONO50 | MONO51 |
|-----------------|---------------|-----------------|-----------------|
| Vessel length | 30 ± 3 | 46 ± 2 | 77 ± 13 |
| Number caught | 6.3 ± 6.3 | 30.7 ± 24.4 | 49.2 ± 39.1 |
| Hooks per set | 278 ± 87 | 1531 ± 403 | 2529 ± 557 |
| Hooks per float | 24 ± 10 | 38 ± 5 | 33 ± 4 |

Distribution of fishing locations



Background information

Data

Statistical analysis

Conclusions

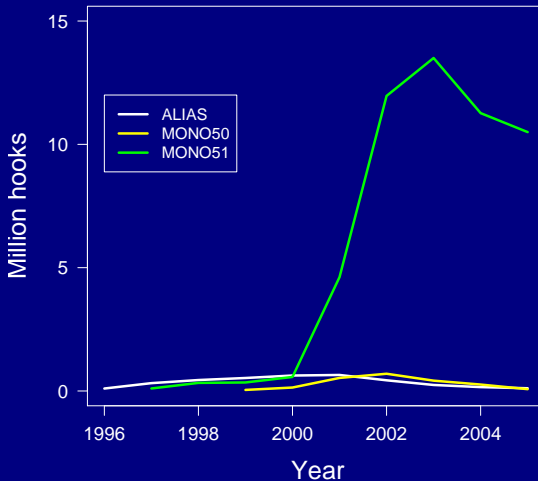
Total number of hooks trend

Background information

Data

Statistical analysis

Conclusions



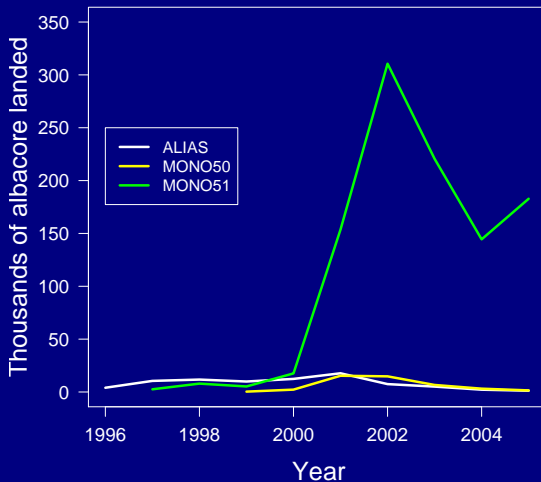
Catch trend

Background information

Data

Statistical analysis

Conclusions



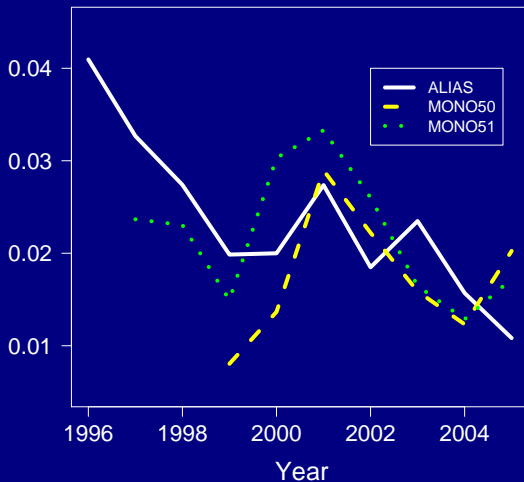
Trends in catch per unit of hooks

Background information

Data

Statistical analysis

Conclusions



Fishery dynamics in the Samoan Archipelago PFRP project

K. Bigelow, A. Langlely and J. Hampton proposed to

Background
information

Data

Statistical
analysis

Conclusions

Fishery dynamics in the Samoan Archipelago PFRP project

K. Bigelow, A. Langley and J. Hampton proposed to

- 1 Analyze the spatial and temporal dynamics and fishery interaction of longline fisheries

Background
information

Data

Statistical
analysis

Conclusions

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K. Bigelow, A. Langley and J. Hampton proposed to

- 1 Analyze the spatial and temporal dynamics and fishery interaction of longline fisheries
- 2 Comparison of albacore fishery dynamics in other Pacific Island countries longline fisheries

Background
information

Data

Statistical
analysis

Conclusions

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Background
information

Data

Statistical
analysis

Conclusions

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- 2 Comparison of albacore fishery dynamics in other Pacific Island countries longline fisheries

A. Langley (2006) concluded that

- 30% decline of albacore biomass available to PICT
- low catch rates since 2002 are attributed to change in oceanographic conditions

Fishery dynamics in the Samoan Archipelago PFRP project

K. Bigelow, A. Langley and J. Hampton proposed to

- 1 Analyze the spatial and temporal dynamics and fishery interaction of longline fisheries
- 2 Comparison of albacore fishery dynamics in other Pacific Island countries longline fisheries
- 3 Improvements to the regional albacore stock assessment

Background
information

Data

Statistical
analysis

Conclusions

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- 2 Comparison of albacore fishery dynamics in other Pacific Island countries longline fisheries
- 3 Improvements to the regional albacore stock assessment

A. Langley and J. Hampton (2006) concluded that the biomass has declined in the last decade without affecting the sustainability of the exploitation

Background
information

Data

Statistical
analysis

Conclusions

Fishery dynamics in the Samoan Archipelago PFRP project

K. Bigelow, A. Langley and J. Hampton proposed to

- 1 Analyze the spatial and temporal variation of catch

Background
information

Data

Statistical
analysis

Conclusions

Fishery dynamics in the Samoan Archipelago PFRP project

K. Bigelow, A. Langley and J. Hampton proposed to

- 1 Analyze the spatial and temporal variation of catch using statistical methods to characterize patterns in the data and model them with GLM using catch as the dependent variable

Background
information

Data

Statistical
analysis

Conclusions

Fishery dynamics in the Samoan Archipelago PFRP project

K. Bigelow, A. Langley and J. Hampton proposed to

1 Analyze the spatial and temporal variation of catch

can any oceanographic variable explain the recent decrease
in catch rates ?

Background
information

Data

Statistical
analysis

Conclusions

Data

Background
information

Data

Statistical
analysis

Conclusions

Time period 1996–2005

16 variables

- longline logbook: date, position (lat, lon), vessel type and identification, hooks # per set, hooks number per float, timing of longline set and albacore catch
- oceanography: SST (Reynolds), SSH (AVISO), isotherm depth (GODAS 15°C and 27°C)

matched on spatio-temporal basis

35,000+ longline sets analysed

Which variables are important to explain catch variability ?

Background information

Data

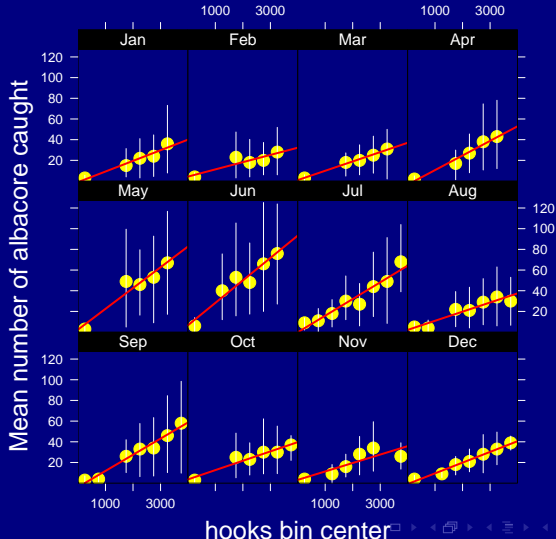
Statistical analysis

Conclusions

| | Df | AIC | Pr(F) |
|-------------------------|-----|---------|-----------|
| PERMIT.NUMBER | 104 | 695852 | 1.95e-20 |
| BOAT.CATEGORY | 2 | 757011 | 0.00e+00 |
| NUMBER.OF.HOOKS.SET | 1 | 834158 | 0.00e+00 |
| SET.YEAR | 9 | 996116 | 3.60e-208 |
| END.SET.TIME | 1 | 1008314 | 0.00e+00 |
| GODAS15 | 1 | 1135721 | 0.00e+00 |
| MINIMUM.HOOKS.PER.FLOAT | 1 | 1136330 | 0.00e+00 |
| BEGIN.SET.LATITUDE | 1 | 1142339 | 0.00e+00 |
| SET.MONTH | 11 | 1163335 | 9.86e-42 |
| GODAS27 | 1 | 1187152 | 0.00e+00 |
| REYNOLDS | 1 | 1220015 | 3.94e-150 |
| BEGIN.SET.LONGITUDE | 1 | 1238450 | 2.23e-34 |
| BEGIN.SET.TIME | 1 | 1240461 | 8.29e-22 |
| SET.DAY | 30 | 1242047 | 1.00e-00 |
| AVISO.WEEK | 1 | 1242380 | 9.81e-10 |
| <none> | | 1243690 | |

Relationship between number of albacore caught and hooks number set

2004



Background information

Data

Statistical analysis

Conclusions

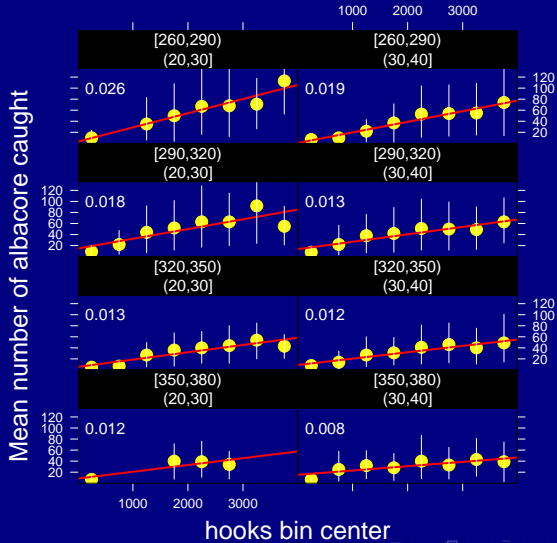
catch/hooks relationship within gear/15°C isotherm depth bins

Background information

Data

Statistical analysis

Conclusions



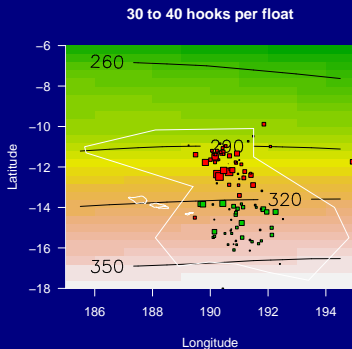
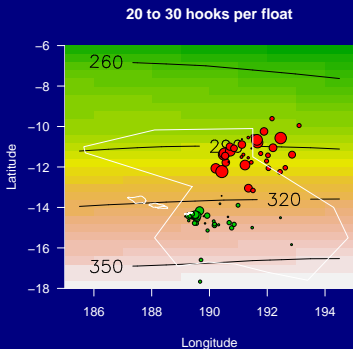
Spatial distribution of CPUH and 15°C isotherm depth

Background information

Data

Statistical analysis

Conclusions



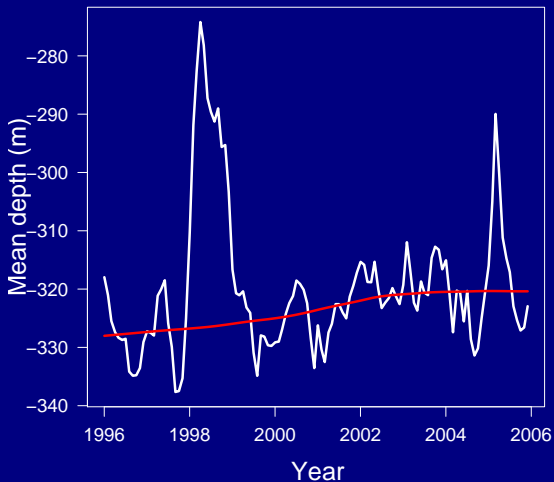
Trend in mean depth of 15°C isotherm over the entire EEZ

Background information

Data

Statistical analysis

Conclusions



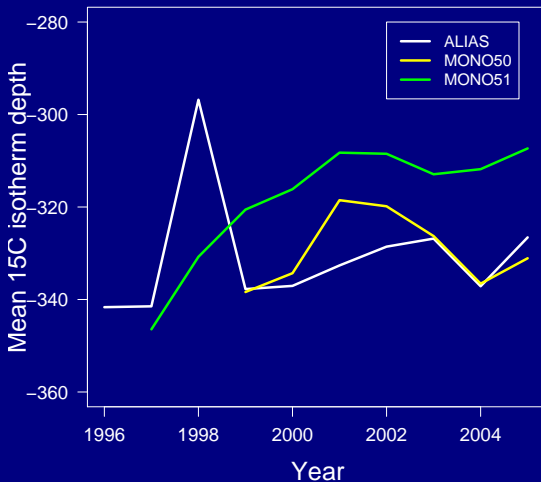
Trend of fishery targeted 15°C isotherm depth

Background information

Data

Statistical analysis

Conclusions



Conclusions

- CPUH are altered by 15°C isotherm depth: the shallower the isotherm the larger the CPUH

Background
information

Data

Statistical
analysis

Conclusions

Conclusions

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- Natural condition around Am. Samoa have changed during last decade towards shallower 15°C isotherm providing better conditions to catch albacore

Background
information

Data

Statistical
analysis

Conclusions

Conclusions

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- The fleet composition shifted toward larger, more mobile, vessels allowing fishermen to target fishing location that maximize CPUH

Background
information

Data

Statistical
analysis

Conclusions

Conclusions

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- As a result of these fishery/oceanographic changes, increasing trends in CPUH should have been observed.

Background
information

Data

Statistical
analysis

Conclusions

Conclusions

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- Natural condition around Am. Samoa have changed during last decade towards shallower 15°C isotherm providing better conditions to catch albacore
- The fleet composition shifted toward larger, more mobile, vessels allowing fishermen to target fishing location that maximize CPUH
- As a result of these fishery/oceanographic changes, increasing trends in CPUH should have been observed.
- The declining trend in CPUH is therefore due to other causes such as declining abundance or other oceanographic features

Background information

Data

Statistical analysis

Conclusions