Oceanographic Influences on Albacore Catch Rates in the American Samoa Longline Fishery

Réka Domokos, Jeffrey J. Polovina, and Michael P. Seki
Background

American Samoa longline fishery

• Longline fishing starts in 1995; NMFS collects ship log data from 1996
• Sudden expansion of the American Samoa fishery during 1999 – 2001
• American Samoa longline fisheries supply canned tuna for US consumers that equal in landing to Hawaii longline fisheries
• Target species is albacore (*Thunnus alalunga*) which dominates the catch
• Negative trends in longline catch rates since 2002 compel investigation of oceanography and pelagic habitat of fishing grounds, focusing on EEZ
The American Samoa Fishing Grounds and Exclusive Economic Zone
Longline Hooks within the American Samoa EEZ

Jan 1996 – Feb 2005
Longline Albacore Catch and CPUE within the American Samoa EEZ
2002 – 2004

[Graph showing monthly catch and CPUE from January 2002 to January 2004, with peaks in June and July and lower values in other months.]
CPUE of Albacore with SSH and Geostrophic Currents for May 29 – June 05, 2003

Tuna: from Am. Samoa longline fisheries; Altimetry: from weekly Jason Satellite data
CPUE of Albacore with SSH and Geostrophic Currents for Aug 14 – 21, 2003

Tuna: from Am. Samoa longline fisheries; Altimetry: from weekly Jason Satellite data
Standard Deviation of SSH within the American Samoa EEZ in 2003
Surface Current System of the South Pacific Ocean

(from Tomczak and Godfrey, 1994, after Qiu and Chen, 2004)
Seasurface Elevations over the American Samoa Fishing Grounds for March, 2003
Seasurface Elevations over the American Samoa Fishing Grounds for September, 2003
Mean March Seasurface Elevations Geostrophic Currents from 2001 through 2004

From weekly Jason Satellite with .25° x .25° resolution for ssh and .5° x .5° resolution for currents
Mean September Seasurface Elevations Geostrophic Currents from 2001 through 2004

From weekly Jason Satellite with .25° x .25° resolution for ssh and .5° x .5° resolution for currents
Mean July Albacore CPUE from 2001 through 2004

Summed over 25° x 25°
Mean January Albacore CPUE from 2001 through 2004

Summed over .25° x .25°

Latitude

Longitude

Number of Catch per 1000 Hooks

0 10 20 30 40 50 60
Standard Deviation of SSH and Albacore CPUE within the American Samoa EEZ in 2003
Longline CPUE within the American Samoa EEZ for June, 2003
Longline CPUE within the American Samoa EEZ for June, 2004
Seasurface Elevations over the American Samoa Fishing Grounds for April, 2003
Seasurface Elevations over the American Samoa Fishing Grounds for April, 2004
Standard Deviations of SSH within the American Samoa EEZ

Months

Jan  Feb  Mar  Apr  May  Jun  Jul  Aug  Sep  Oct  Nov  Dec  Jan

2004
2003

SSH standard deviation (cm)

Jan  Feb  Mar  Apr  May  Jun  Jul  Aug  Sep  Oct  Nov  Dec  Jan
Summary

• Locations of longline albacore catch and high CPUE seem to
  – show intra-annual variability that lags SECC by a couple of months
  – correspond with locations of eddy boundaries

• Significant drop in albacore catch and CPUE from 2003 to 2004 corresponds with
  – decrease in strength (and eastward extension) of SECC
  – significant drop in STD of seasurface height within the EEZ
Conclusions

• Possible influence of SECC on longline performance
• Further research needed focusing on
  – characteristics of SECC
  – Investigation of connections between SECC and albacore catch
• 2006 Feb cruise to American Samoa EEZ
Seasurface Elevations over the American Samoa Fishing Grounds for March, 2004
Seasurface Elevations over the American Samoa Fishing Grounds for December, 2003
Longline CPUE within the American Samoa EEZ for May, 2003
Longline CPUE within the American Samoa EEZ for May, 2004
Longline Hooks and Albacore Catch within the American Samoa EEZ
Jan 2002 – Feb 2005