

Examination of Yukon River Chinook Salmon
Commercial Catch Size Trends:
Is there evidence for decline?

Toshihide “Hamachan” Hamazaki
Alaska Department of Fish & Game
Division of Commercial Fisheries
Anchorage, Alaska, 99518



Challenges in Size Trend Analyses

- Incomplete & short-term data
- Non-linear trend
- Leads to inconsistent & misleading trend assessment

Needs long-term complete data
&
Non-linear trend analyses



Y-1 Commercial Catch Data



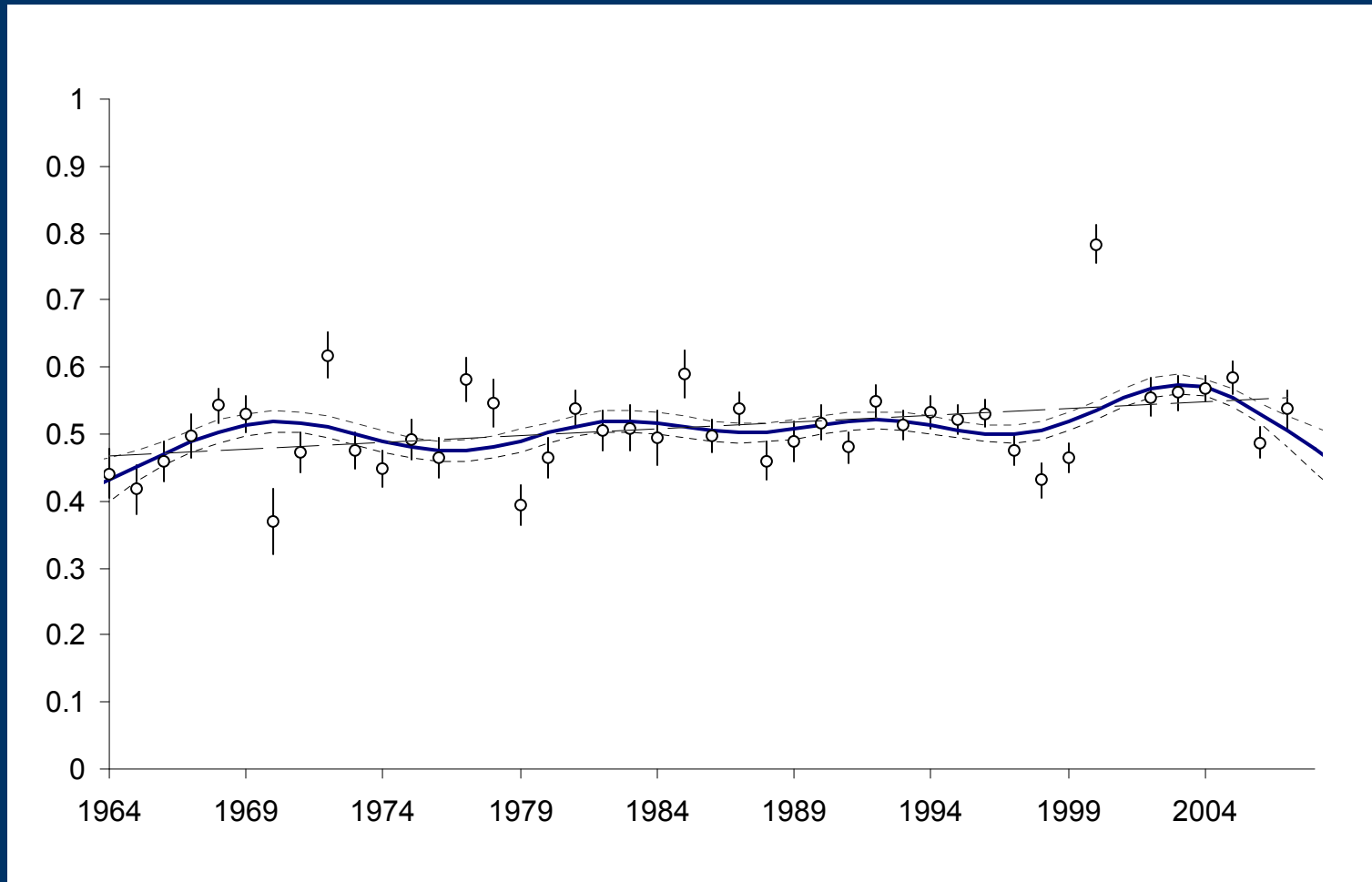
- The longest and the most complete ASL data available (1964 – 2007)
- The data has not been previously available for ASL trends analyses.
 - No separation of samples during **Restricted** (Maximum mesh size ≤ 6 inch: **Chum directed**) periods and **Unrestricted** (No maximum mesh size: **Chinook directed**) periods.
- DuBois (ADF&G) recovered mesh size & fishing periods data.
- Remove effects of mesh size on ASL trends.
- Examined data from **Unrestricted periods** only.



Data Analyses

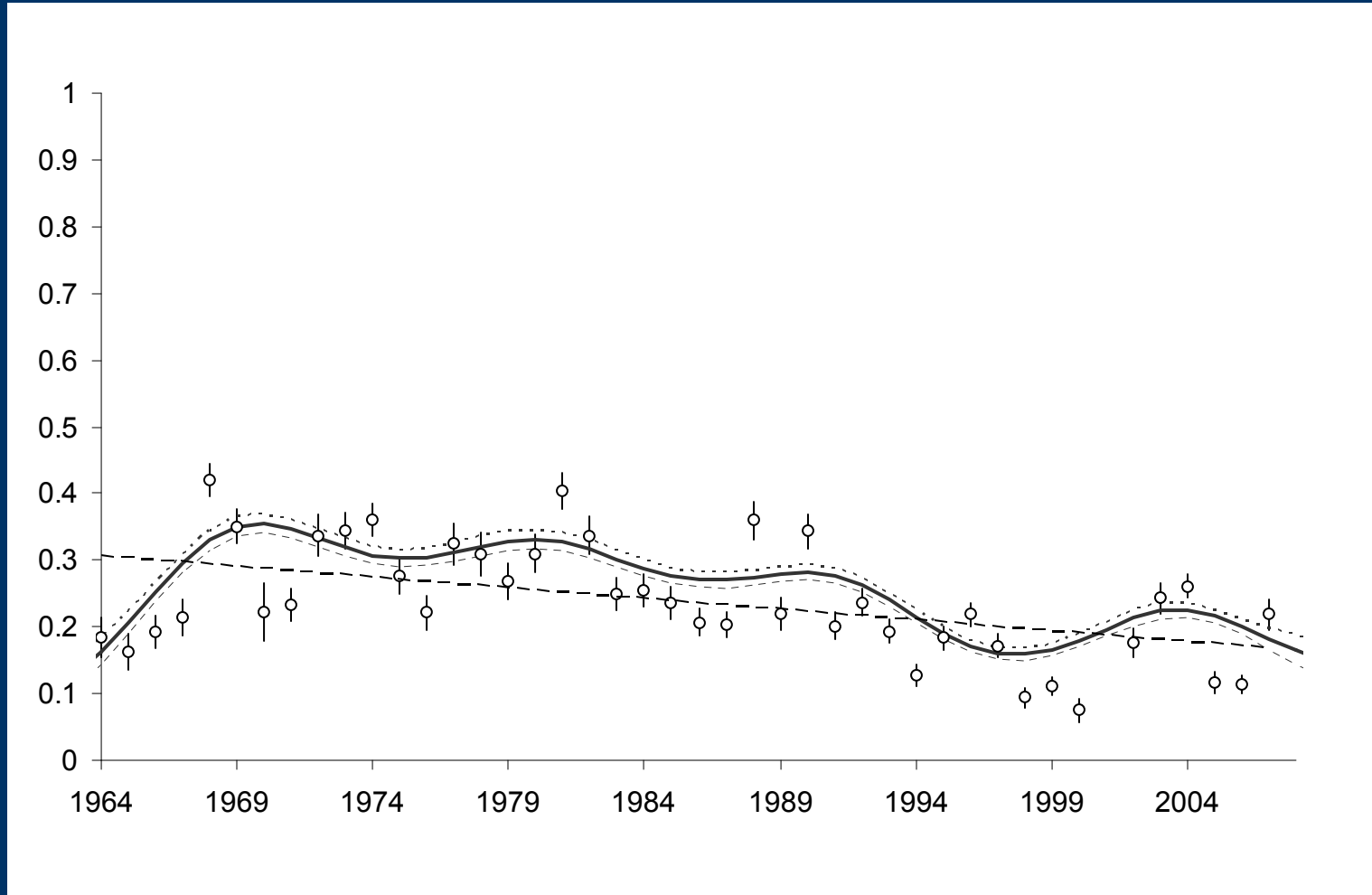
- **ASL trends Examined:**
 1. Proportion of female Chinook.
 2. Proportion of large (≥ 900 mm) Chinook
 3. Proportion of age-1.4 (6-year-old) and -1.5 (7-year-old) Chinook
 4. Average length of age-1.4 and -1.5 Chinook
- **Statistical Analyses**
 - Linear Logistic Regression: 1, 2, 3
 - General Linear Model: 4
 - Generalized Additive Model (GAM): 1, 2, 3, 4
 - Non-linear, non-parametric regression model

Proportion of Females



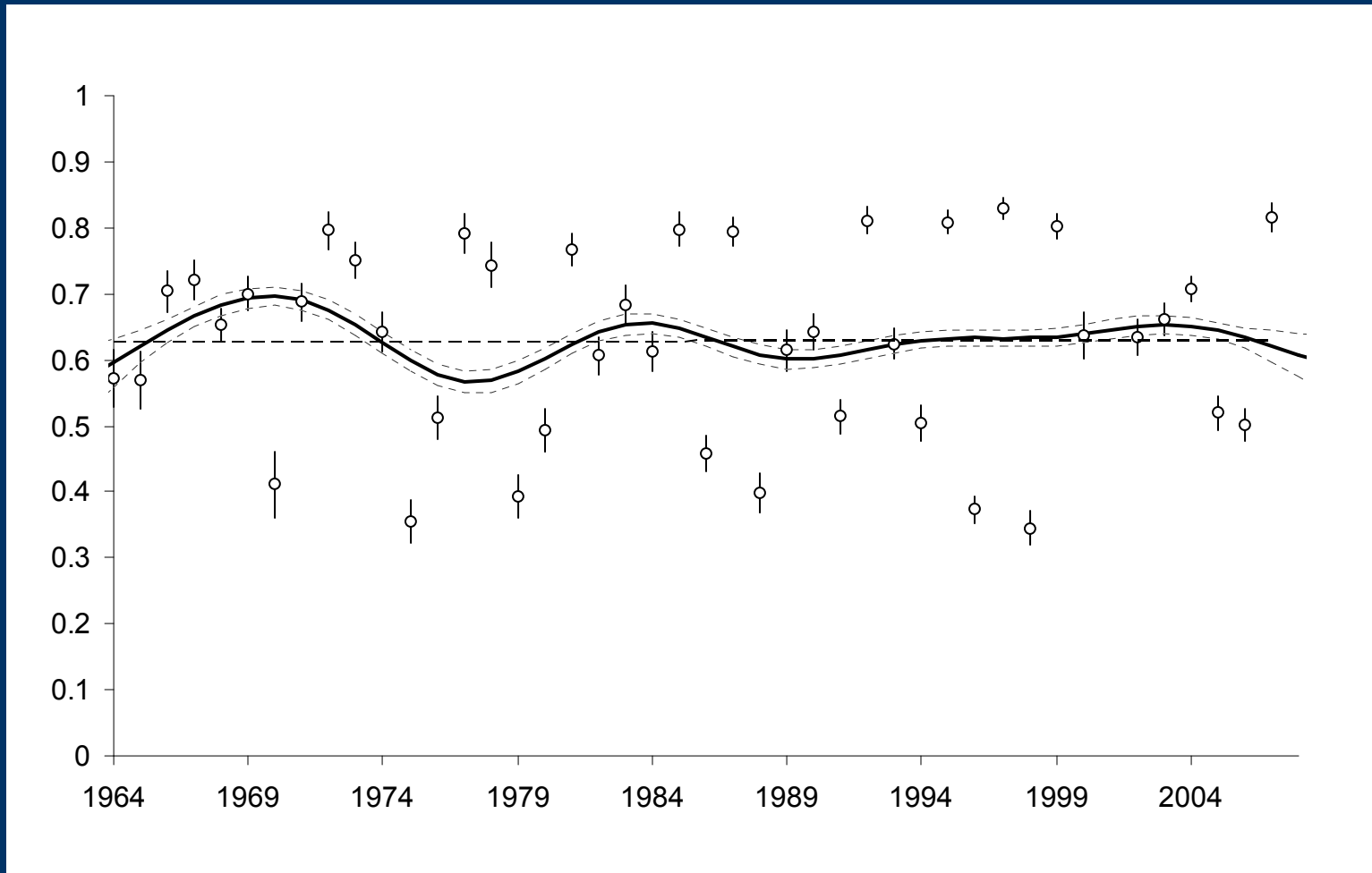
Increase (0.2% per year, $P < 0.0001$) GAM, $P < 0.0001$

Proportion of Large (≥ 900 mm)



Decrease (0.3% per year $P < 0.0001$) GAM, $P < 0.0001$

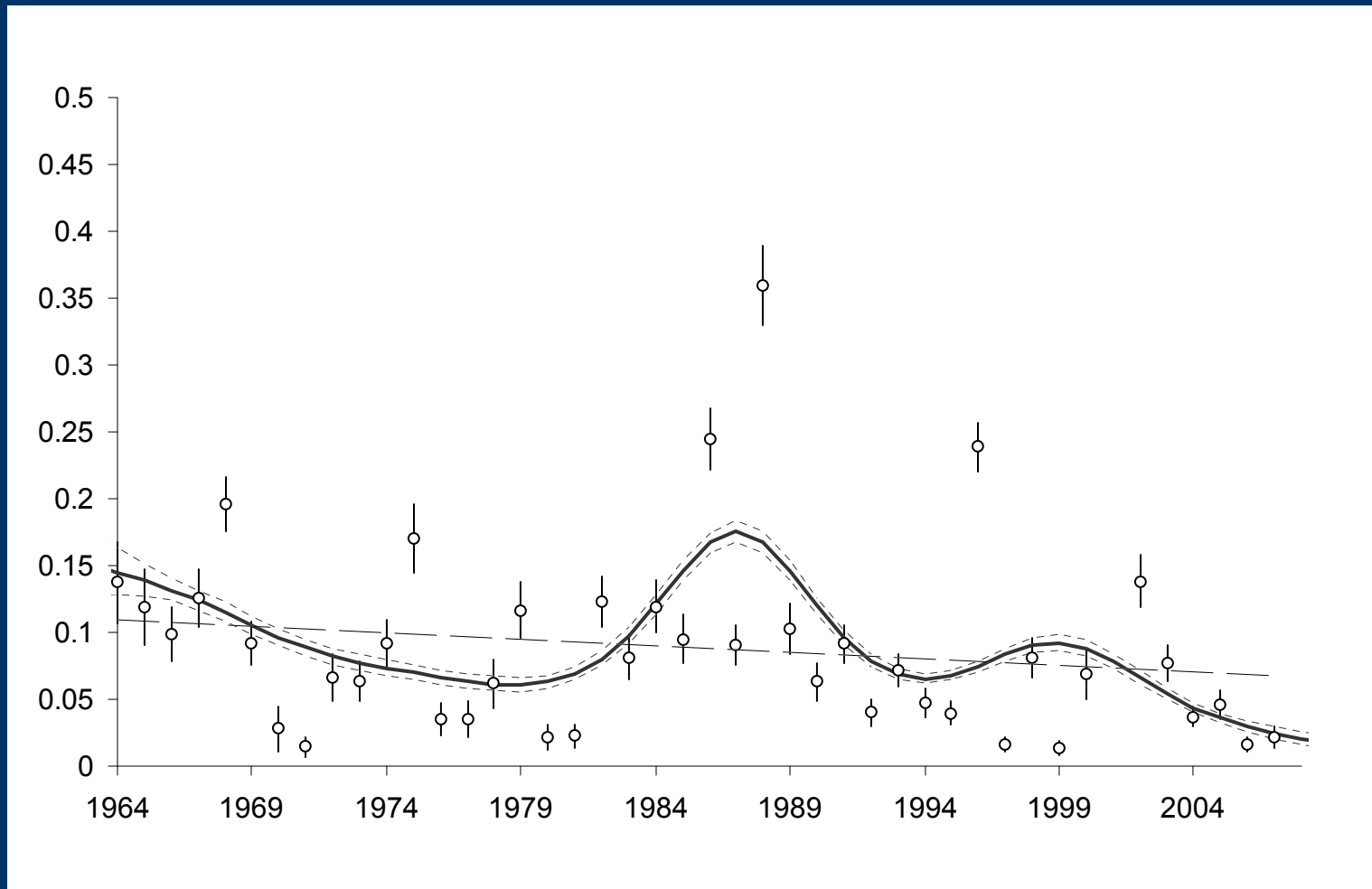
Proportion of age-1.4 (6-year-old)



No Change ($P = 0.23$)

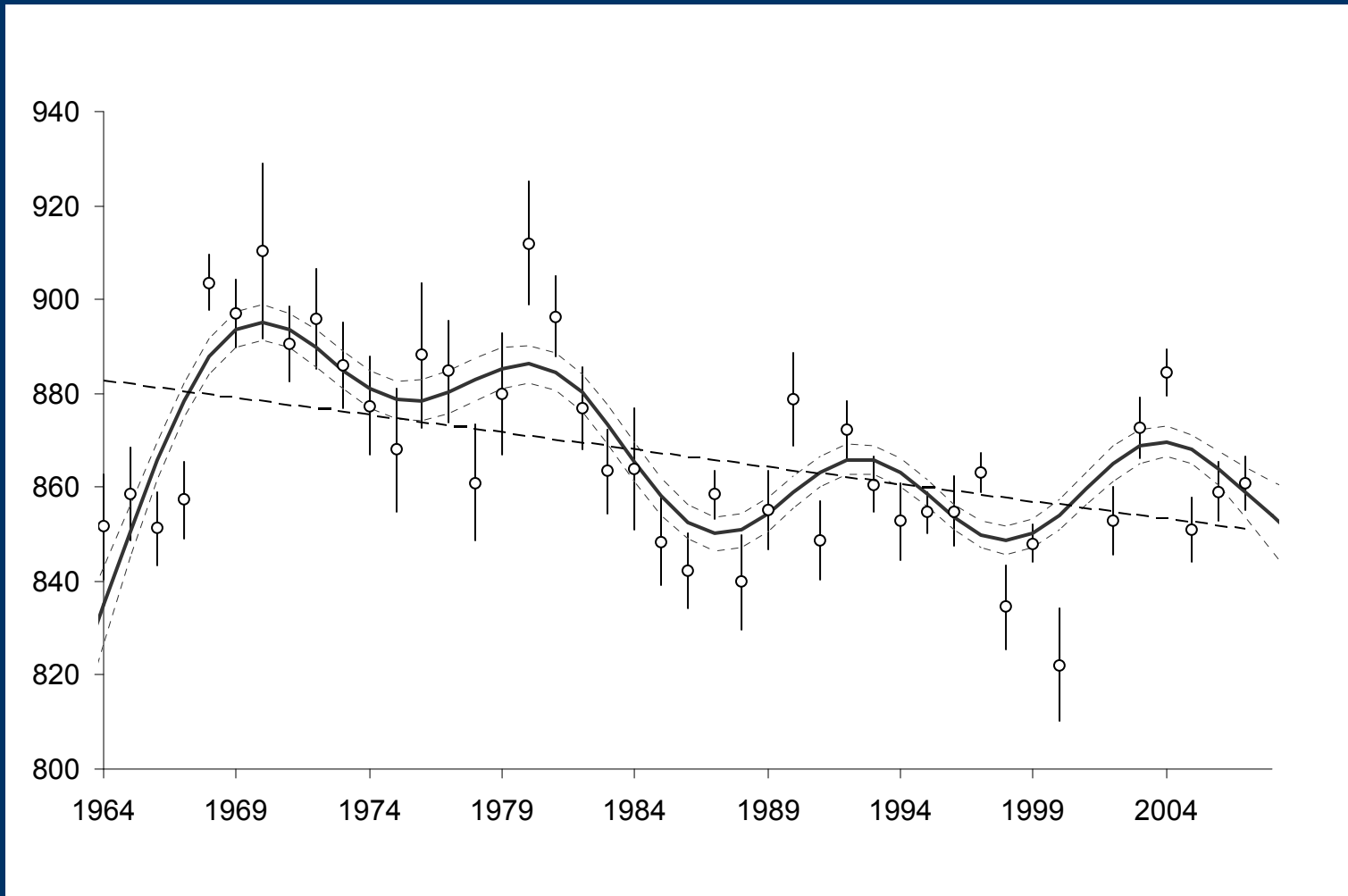
GAM, $P < 0.0001$

Proportion of age-1.5 (7-year-old)



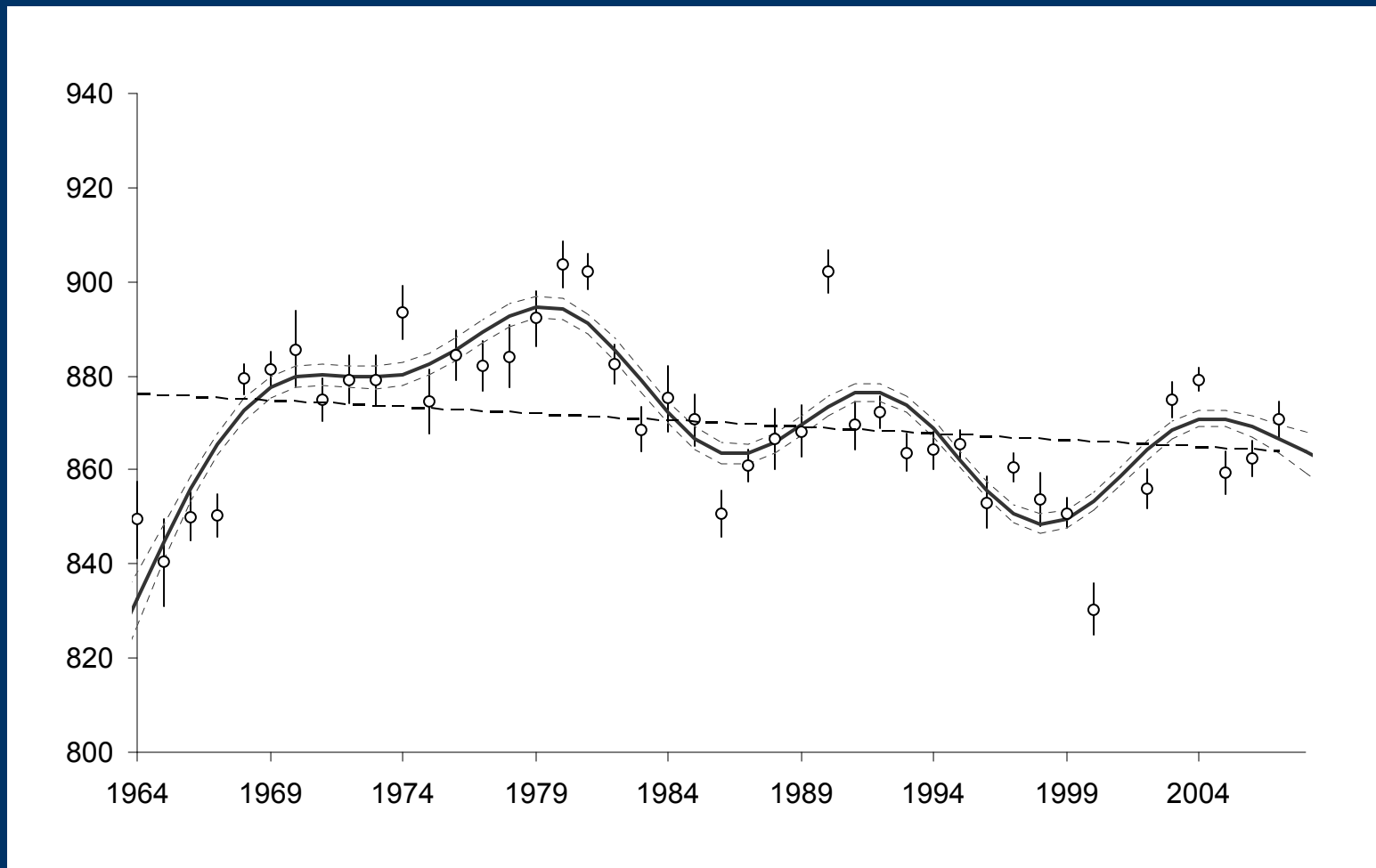
Decrease (0.1% per year $P < 0.0001$) GAM, $P < 0.0001$

Mean length of age-1.4 (6-year-old) Male



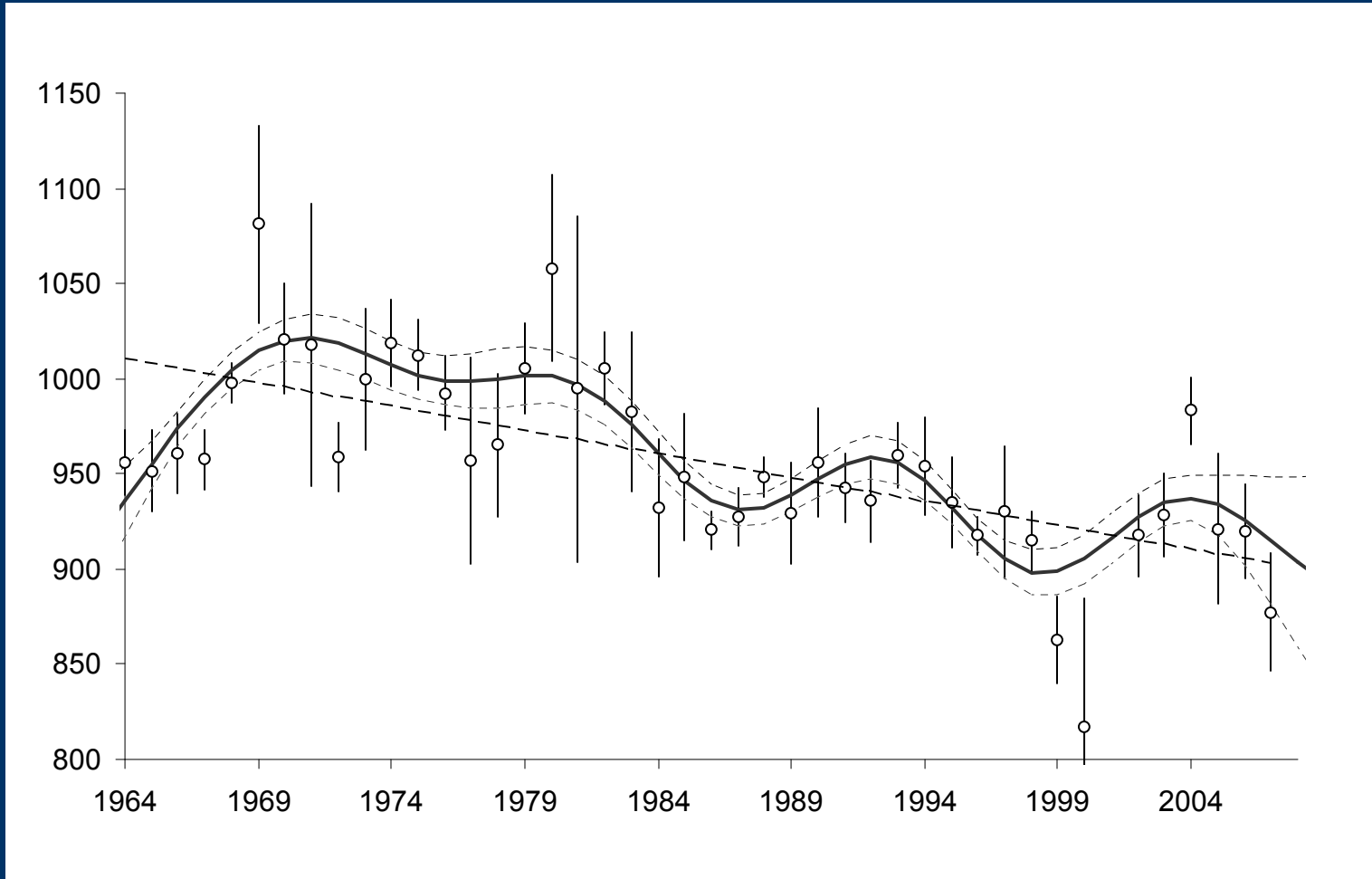
Decrease (0.7 mm per year $P < 0.0001$) GAM, $P < 0.0001$

Mean length of age-1.4 (6-year-old) Female



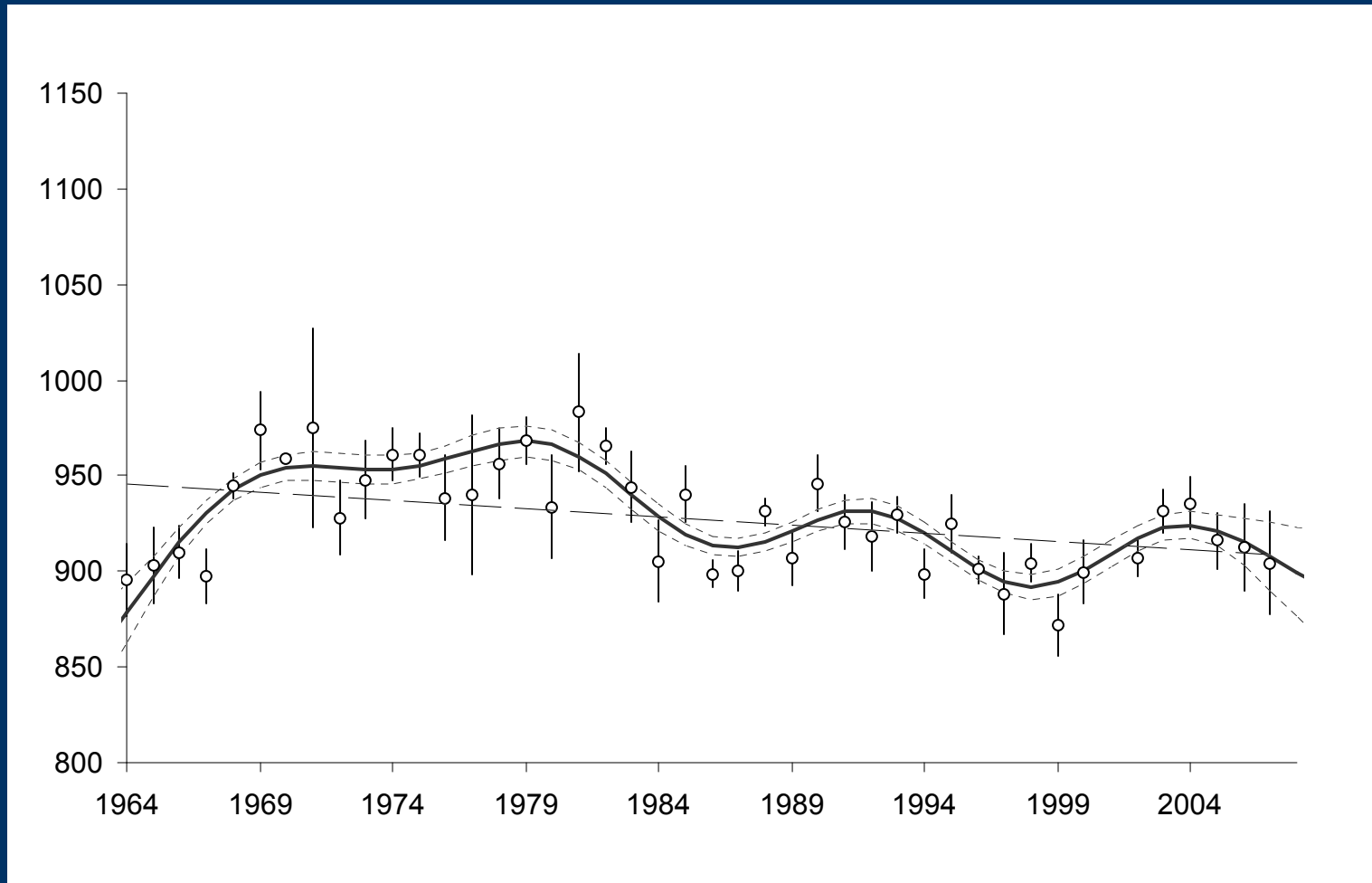
Decrease (0.4 mm per year $P < 0.0001$) GAM, $P < 0.0001$

Mean length of age-1.5 (7-year-old) Male



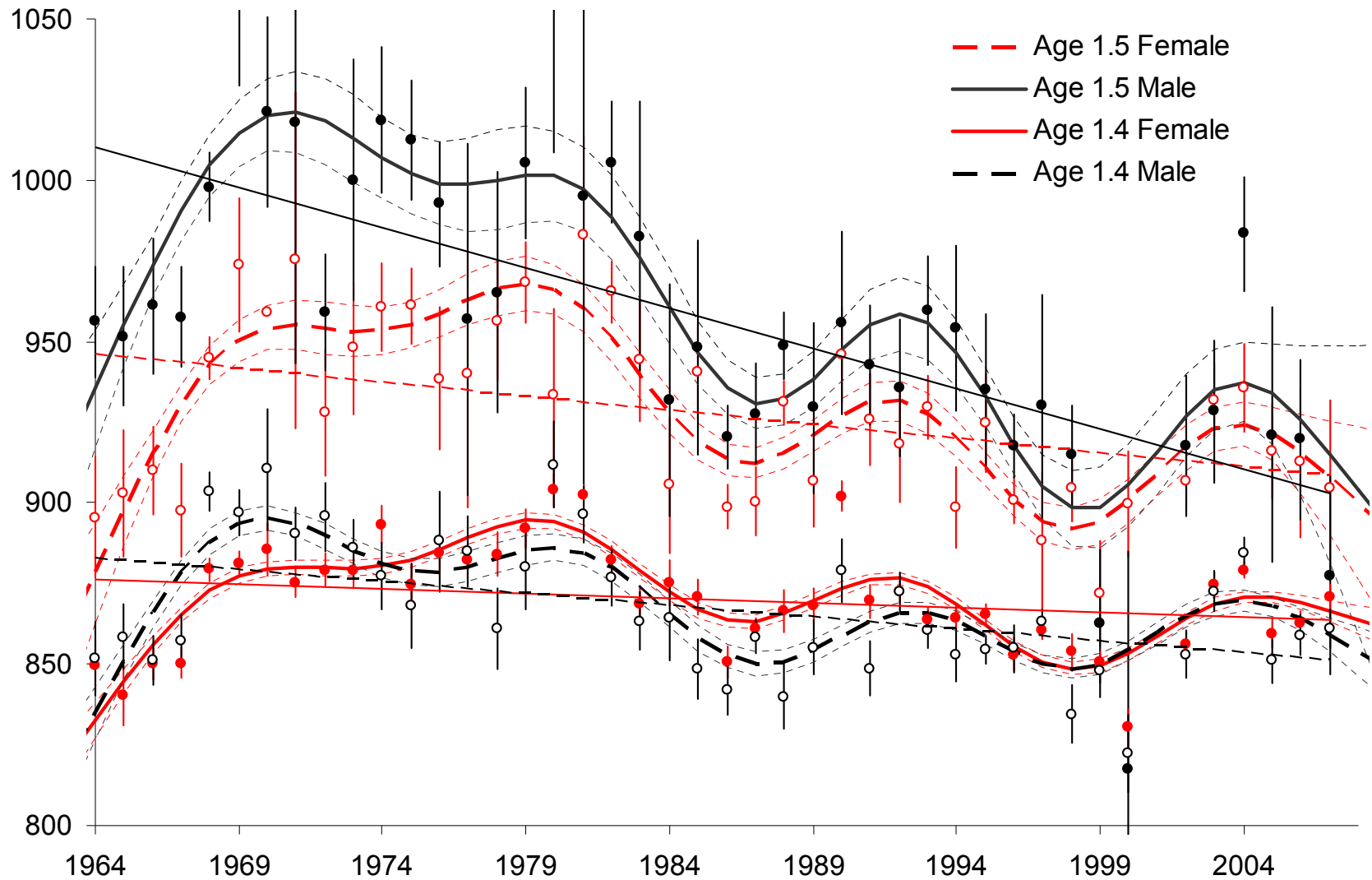
Decrease (2.5 mm per year $P < 0.0001$) GAM, $P < 0.0001$

Mean Length age-1.5 Female

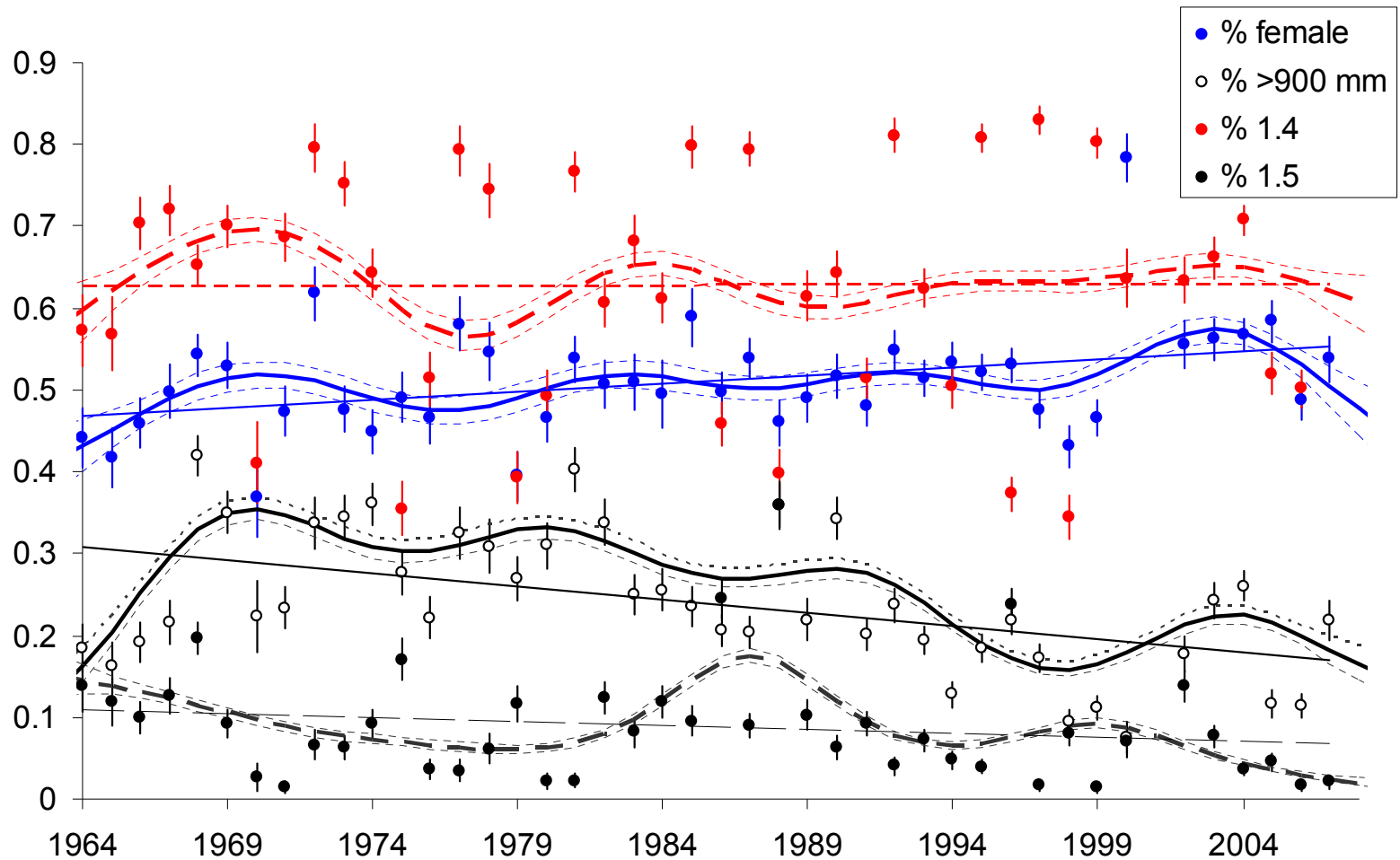


Decline (0.9 mm per year $P < 0.0001$) GAM, $P < 0.0001$

All Length Together



All proportions combined



Results Summary





1. Has the proportion of female declined over time?

No, results showed increasing trend (0.2% per year)

2. Has the proportion of large (≥ 900 mm) declined over time?

Yes, results showed decreasing trend (0.3% per year)



3. Has the proportion of 6- (age-1.4) and 7-year-old (age-1.5) declined over time?

Results showed no change in the proportion of 6-year-old, but decreasing trends in the proportion of 7-year-old (0.1% per year)

4. Has the length-at-age of 6- and 7-year-old male and female declined over time?

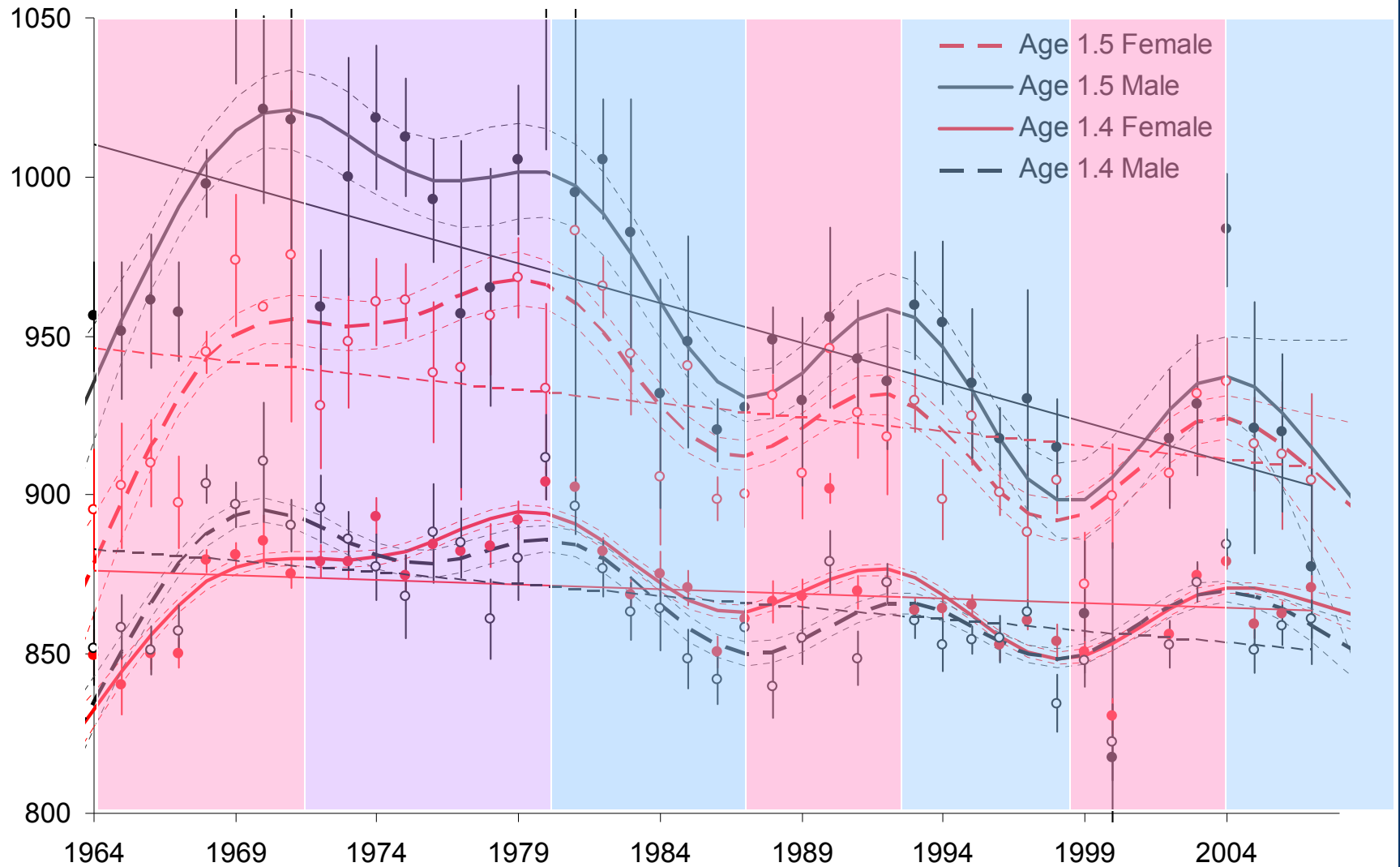
Yes, results showed decreasing trends for both 6-year-old (Male: 0.7 mm per year, Female 0.4 mm per year) and 7-year-old (Male 2.5 mm per year, Female 0.9 mm per year).



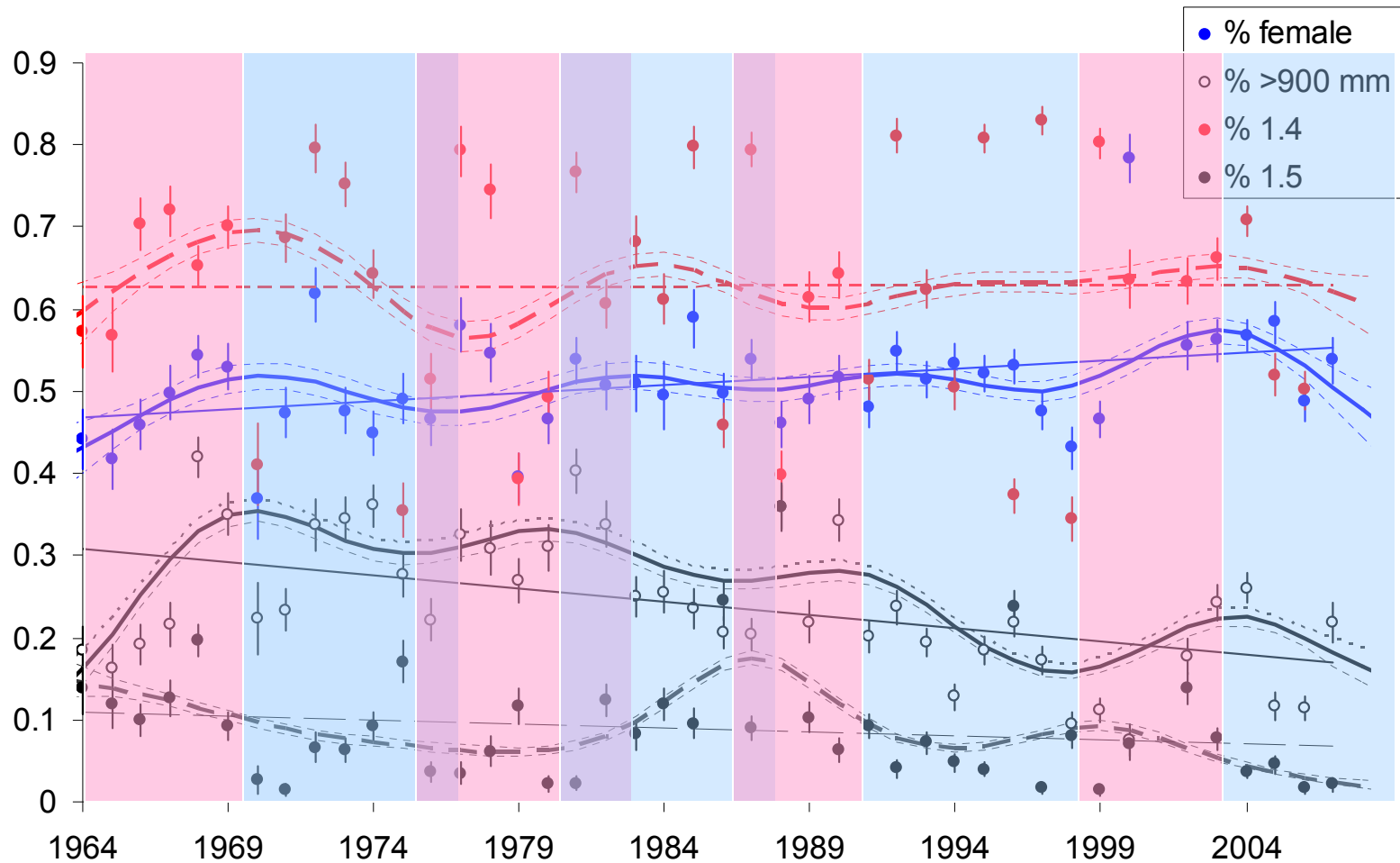
However the trends were non-linear

1. 1964 to early 1970: Largest increase
Mean length 6 and 7 year-old.
Proportion of large.
2. Early 1970s: Beginning of decrease
Mean male length 6 and 7 year-old
Proportions of large
3. Early 1980s: Beginning of decrease
Mean female lengths 6 and 7 year-old
4. Mid 1980s to early 1990s: Small increase
5. Early 1990s to 2000: Small decrease
6. 2000 to mid 2000s: Small increase
7. Mid 2000s to present: Small decrease

All Length Together



All proportions combined





Chinook Salmon Y-1 Catch Trends 1964-67 vs. 2004-07

Proportion

- Female: 45% vs. 54%
- Large: 19% vs. 18%
- 6-year-old: 64% vs. 64%
- 7-year-old: 12% vs. 3%

Mean length

- 6-year-old male: 854 mm vs. 864 mm
- 6-year-old female: 848 mm vs. 868 mm
- 7-year-old male: 956 mm vs. 925 mm
- 7-year-old female: 901 mm vs. 917 mm



Chinook Salmon Y-1 Catch Size Trends Summary

- Decreasing trend started in early 1970s after an increase from 1964 to late 1960s.
- Catch characteristics were similar between 1964-67 and 2004-07 periods.
- Declined or returned to the 1964 level?
- Catch trends = Population trends?
- Factors affecting non-linear trends?



Thank you.

Questions?

