Oral Report to the Alaska Board of Fisheries

Review of Salmon Escapement Goals in Upper Cook Inlet, 2011

By

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CF

and

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SF

RC 4

Oral Report:
White Tab 1

Written Report:
Color Tab 1

Presentation Objectives

- Introduce escapement goal policies
- Explain review process
- Review existing escapement goals
- Describe general methods
- Summarize results for all goals with in-depth description for those that changed
- Highlight the key points

Escapement Goal Policies

- Policy for the Management of Sustainable Salmon Fisheries (SSFP; 5 AAC 39.222)

- Policy for Statewide Salmon Escapement Goals (5 AAC 39.223)

- Adopted to ensure salmon stocks are conserved, managed, and developed using the sustained yield principle

Two important terms defined in the SSFP:

- *biological escapement goal* (BEG):

"***escapement that provides the greatest potential for maximum sustained yield***; BEG will be the primary management objective for the escapement unless an optimal escapement or inriver run goal has been adopted; BEG will be developed from the best available biological information, and should be scientifically defensible on the basis of available biological information; BEG will be determined by the department and will be ***expressed as a range based on factors such as salmon stock productivity and data uncertainty***; the department will seek to maintain evenly distributed salmon escapements within the bounds of a BEG;"

- *sustainable escapement goal* (SEG):

"***a level of escapement, indicated by an index or an escapement estimate, that is known to provide for sustained yield over a 5 to 10 year period, used in situations where a BEG cannot be estimated or managed for***; the SEG is the primary management objective for the escapement, unless an optimal escapement or inriver run goal has been adopted by the board; the SEG will be developed from the best available biological information; and should be scientifically defensible on the basis of that information; the SEG will be determined by the department and ***will take into account data uncertainty and be stated as either a "SEG range" or "lower bound SEG"***; the department will seek to maintain escapements within the bounds of the SEG range or above the level of a lower bound SEG;"

Escapement Goal Review Process

1) Establish escapement goal committee (CF, SF)
2) Evaluate existing goals
3) Consider new goals and goals to be eliminated
4) Develop a memo to divisional directors for approval of recommended escapement goals
5) Present preliminary findings at board Work Session
6) Complete a written and oral report

Existing UCI Escapement Goals

King salmon: 21 stocks

Alexander, Campbell, Clear, Crooked, Goose, Lake, Little Willow, Montana, Peters, Prairie, Sheep, and Willow creeks; and Chuitna, Chulitna, Deshka, Kenai (early and late run), Lewis, Little Susitna, Talachulitna, and Theodore rivers

Chum salmon: 1 stock

Clearwater Creek

Coho salmon: 3 stocks

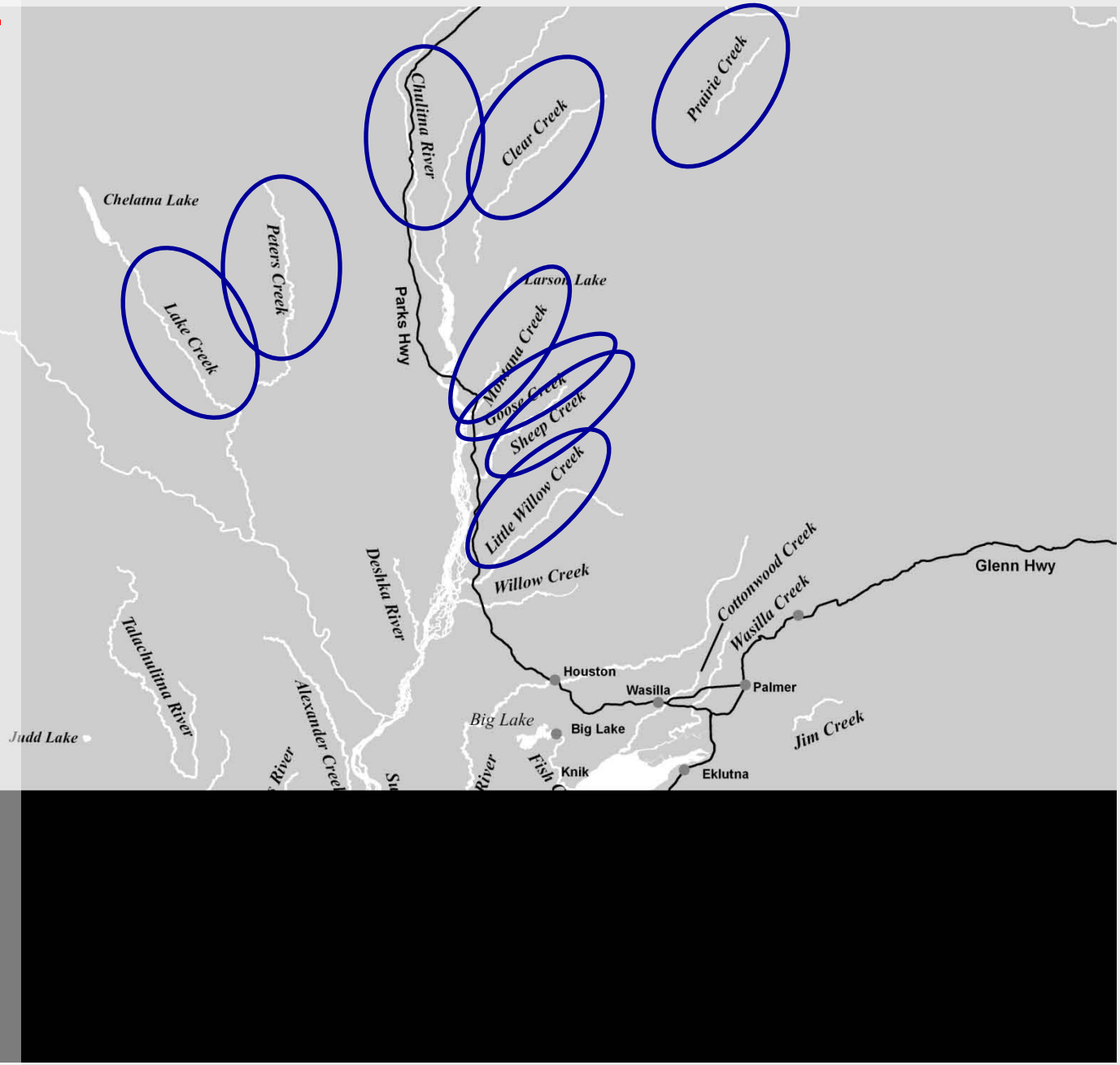
Fish and Jim creeks; and Little Susitna River

Sockeye salmon: 10 stocks

Fish and Packers creeks; Chelatna, Judd, and Larson lakes; and Crescent, Kasilof, Kenai, and Russian (early and late run) rivers

King Salmon – No Changes

1. **Lake Creek**
   SEG: 2,500 to 7,100
2. **Peters Creek**
   SEG: 1,000 to 2,600
3. **Chulitna River**
   SEG: 1,800 to 5,100
4. **Clear Creek**
   SEG: 950 to 3,400
5. **Prairie Creek**
   SEG: 3,100 to 9,200
6. **Montana Creek**
   SEG: 1,100 to 3,100
7. **Goose Creek**
   SEG: 250 to 650
8. **Sheep Creek**
   SEG: 600 to 1,200
9. **Little Willow Creek**
   SEG: 450 to 1,800



King Salmon – No Changes

10. **Talachulitna River**
    SEG: 2,200 to 5,000

11. **Alexander Creek**
    SEG: 2,100 to 6,000

12. **Willow Creek**
    SEG: 1,600 to 2,800

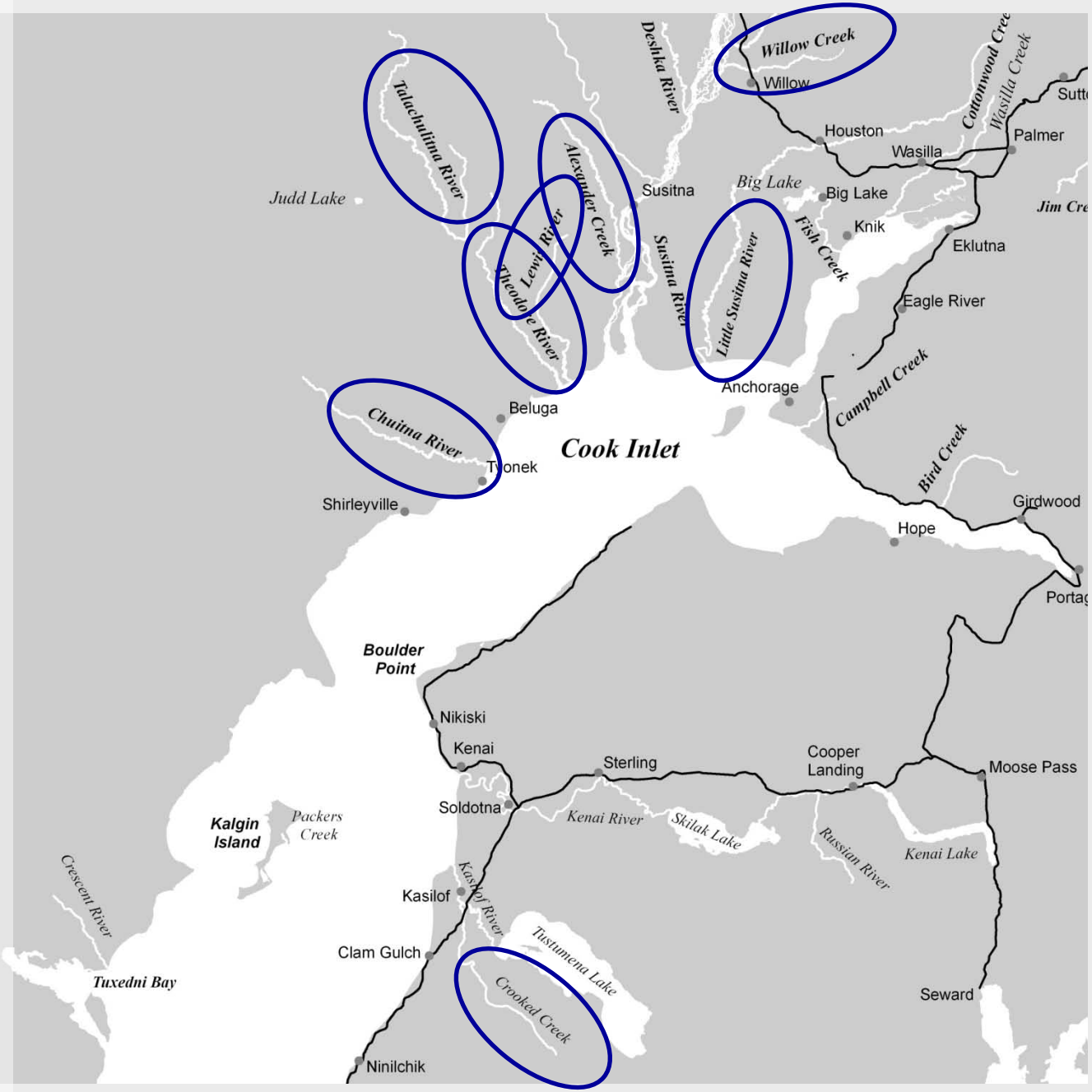
13. **Lewis River**
    SEG: 250 to 800

14. **Theodore River**
    SEG: 500 to 1,700

15. **Little Susitna River**
    SEG: 900 to 1,800

16. **Chuitna River**
    SEG: 1,200 to 2,900

17. **Crooked Creek**
    SEG: 650 to 1,700



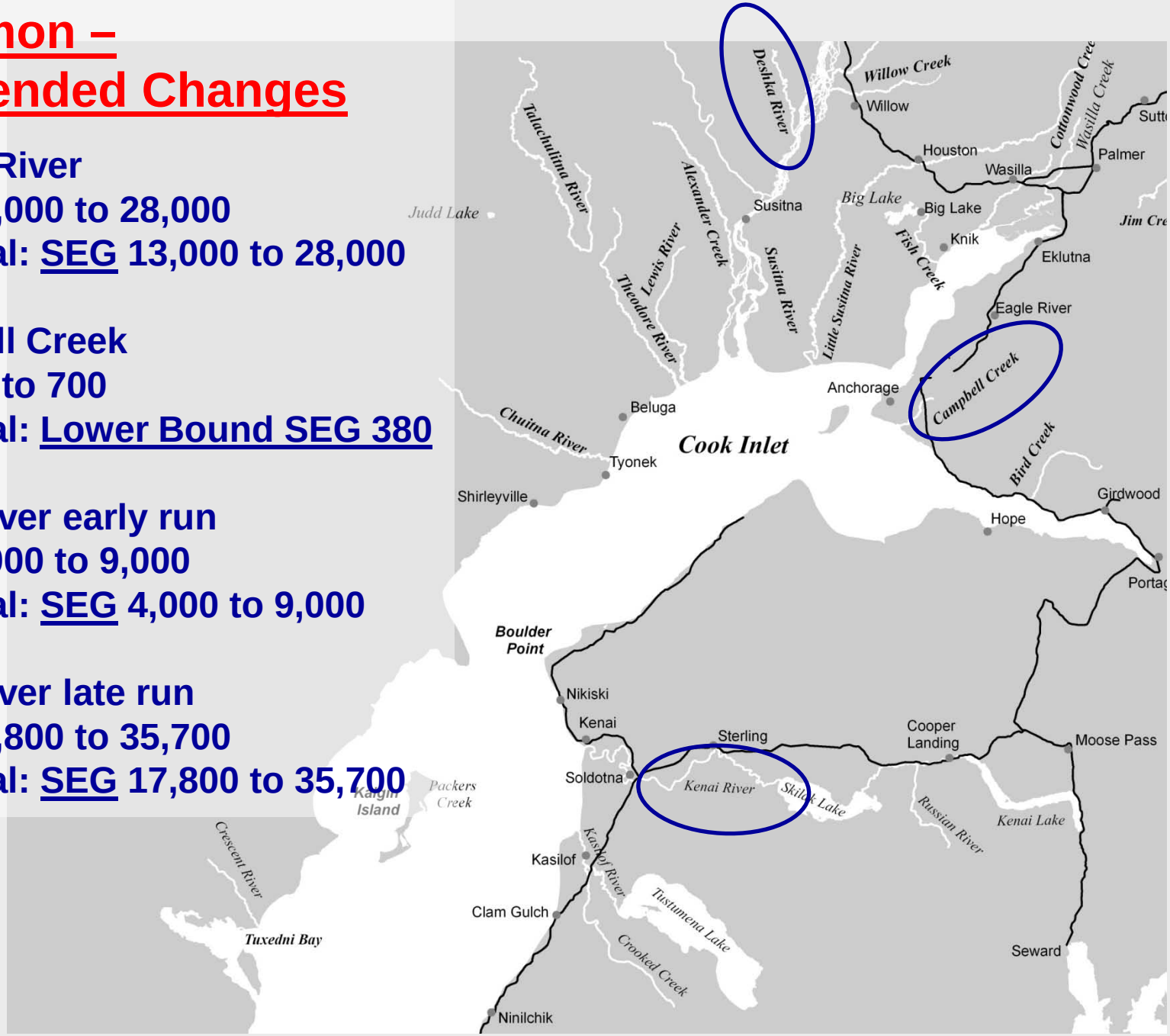
King Salmon – Recommended Changes

18. **Deshka River**
    BEG: 13,000 to 28,000
    New Goal: SEG 13,000 to 28,000

19. **Campbell Creek**
    SEG: 50 to 700
    New Goal: Lower Bound SEG 380

20. **Kenai River early run**
    BEG: 4,000 to 9,000
    New Goal: SEG 4,000 to 9,000

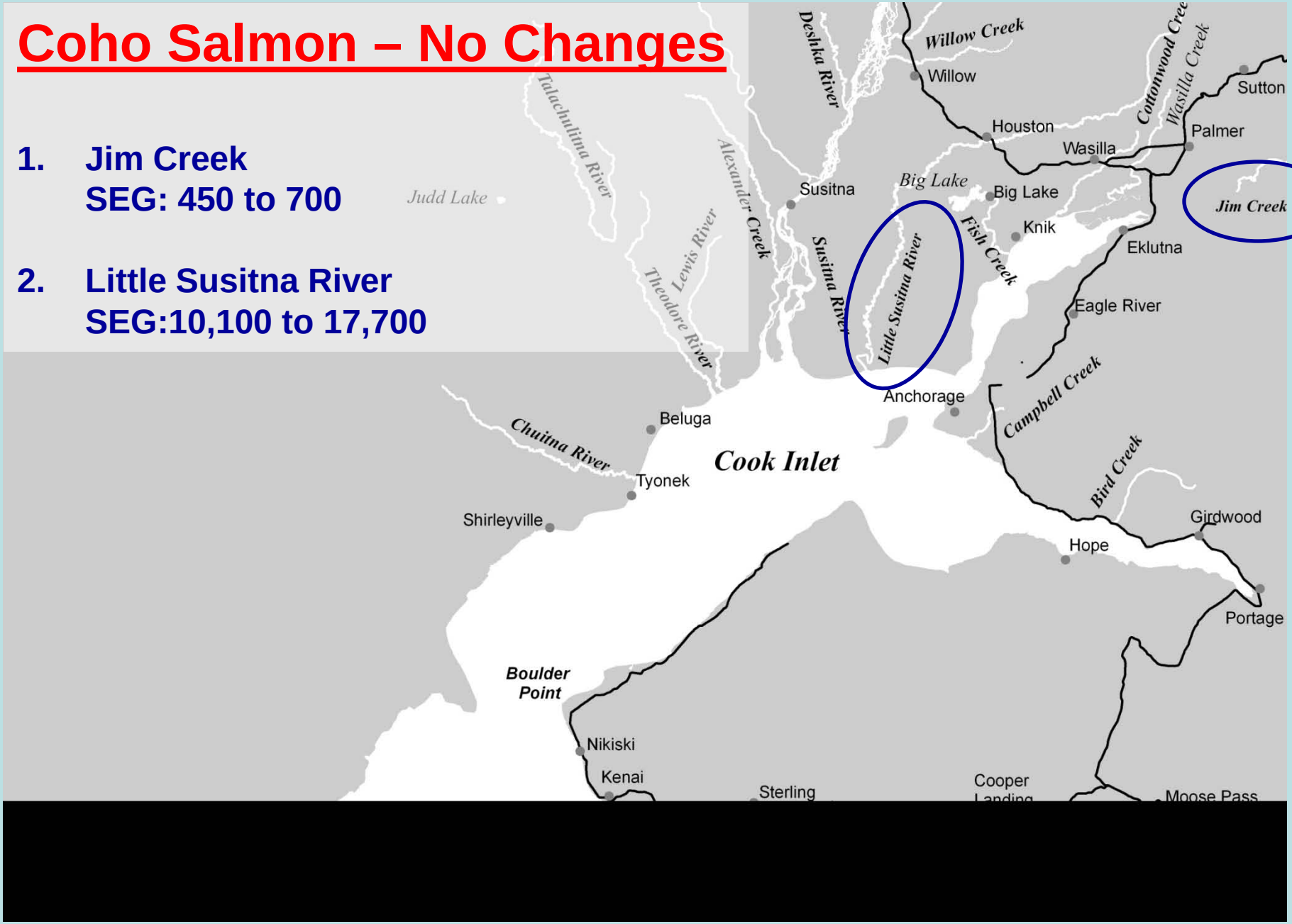
21. **Kenai River late run**
    BEG: 17,800 to 35,700
    New Goal: SEG 17,800 to 35,700



Coho Salmon – No Changes

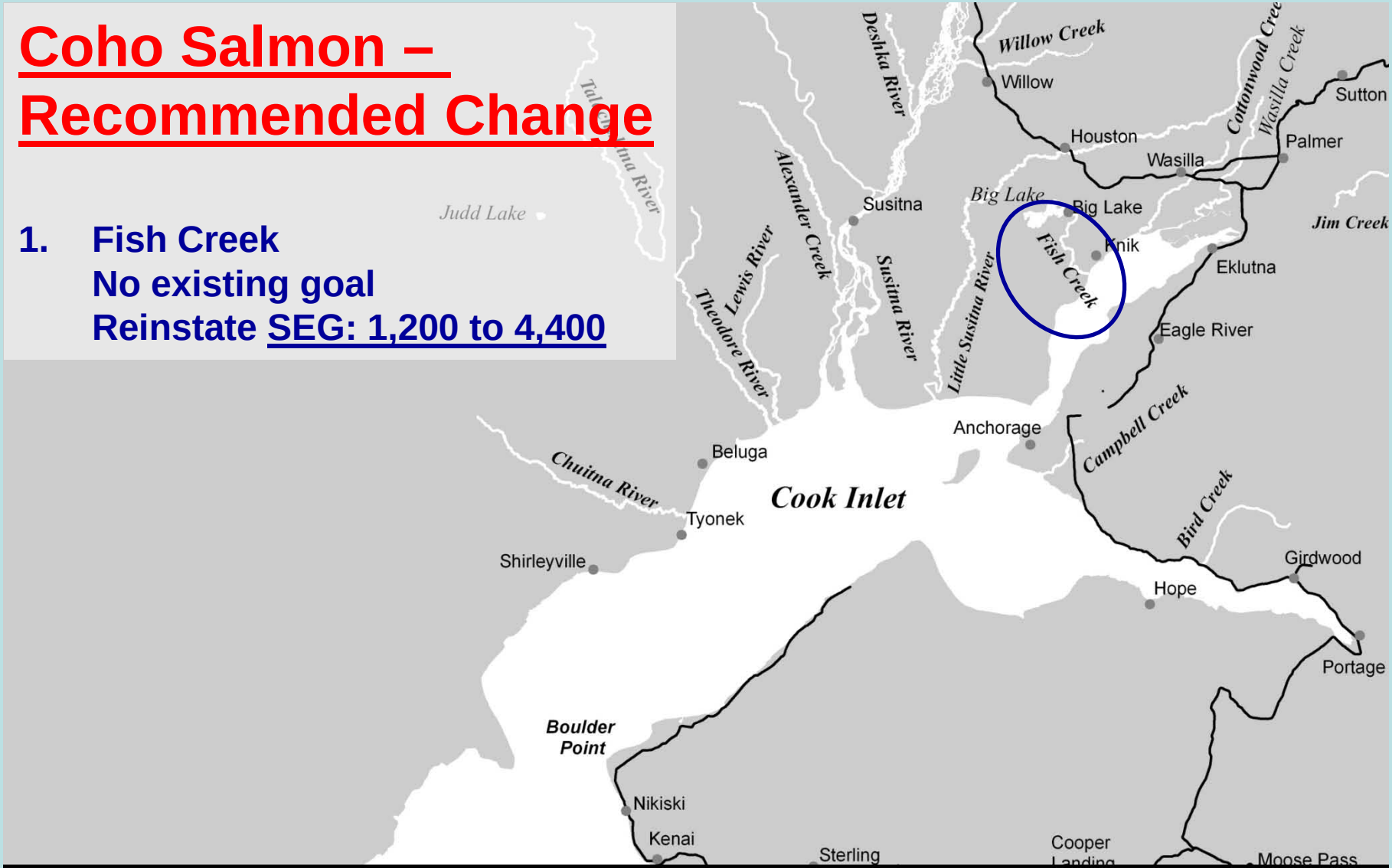
1. **Jim Creek**
   SEG: 450 to 700

2. **Little Susitna River**
   SEG:10,100 to 17,700



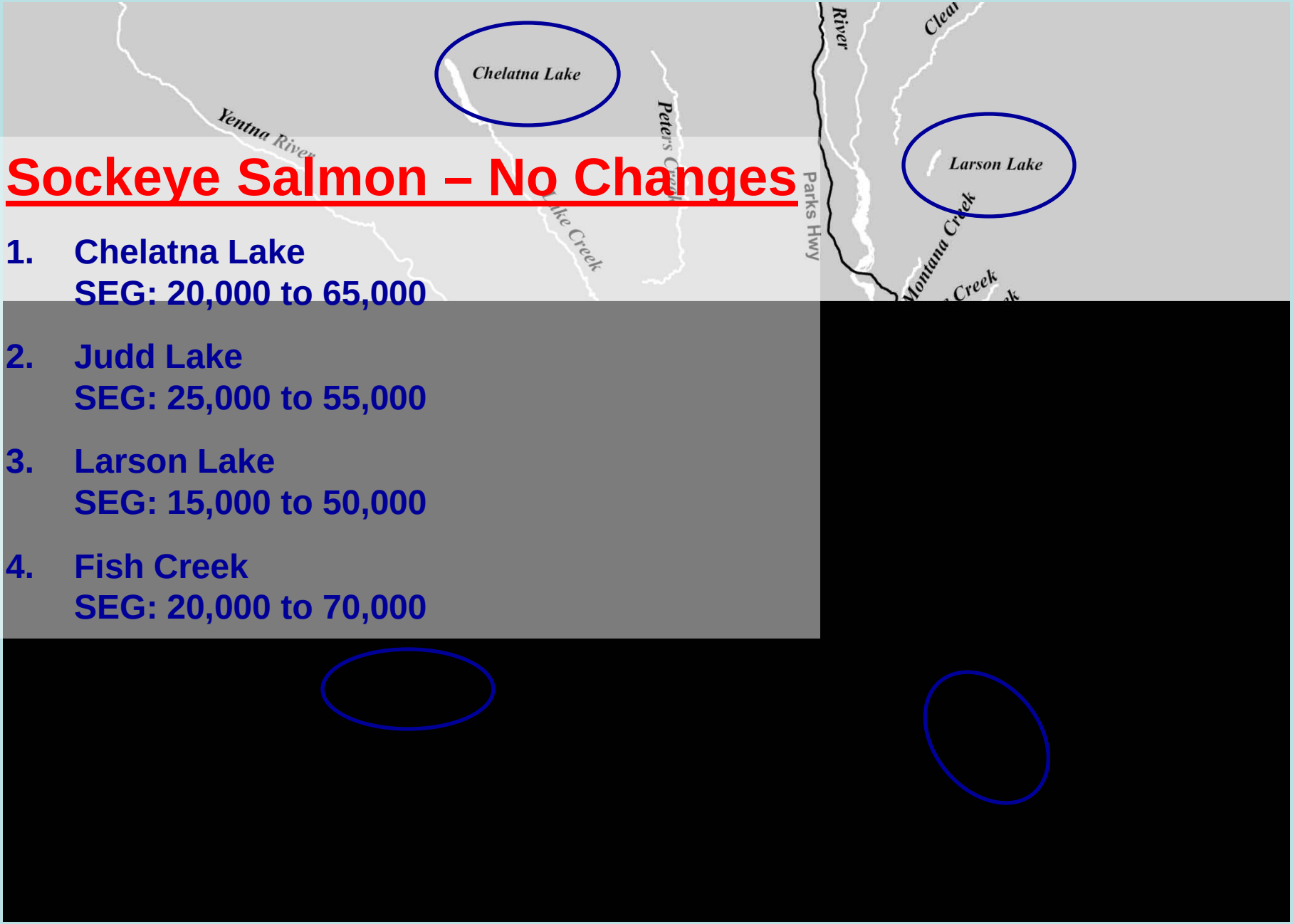
Coho Salmon – Recommended Change

1. **Fish Creek**
   No existing goal
   Reinstate SEG: 1,200 to 4,400



Sockeye Salmon – No Changes

1. **Chelatna Lake**
   SEG: 20,000 to 65,000
2. **Judd Lake**
   SEG: 25,000 to 55,000
3. **Larson Lake**
   SEG: 15,000 to 50,000
4. **Fish Creek**
   SEG: 20,000 to 70,000

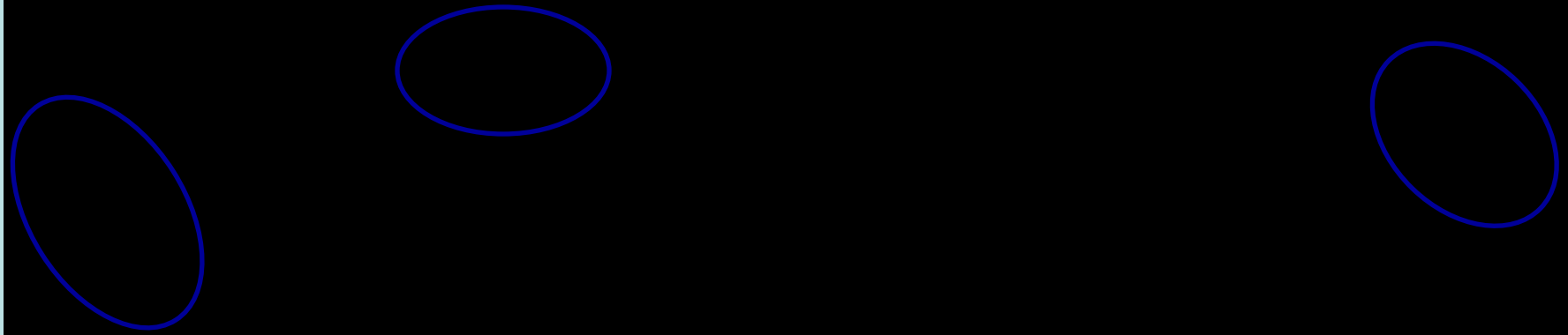


Sockeye Salmon – No Changes

5. **Crescent River**
   BEG: 30,000 to 70,000

6. **Packers Creek**
   SEG: 15,000 to 30,000

7. **Russian River late run**
   SEG: 30,000 to 110,000

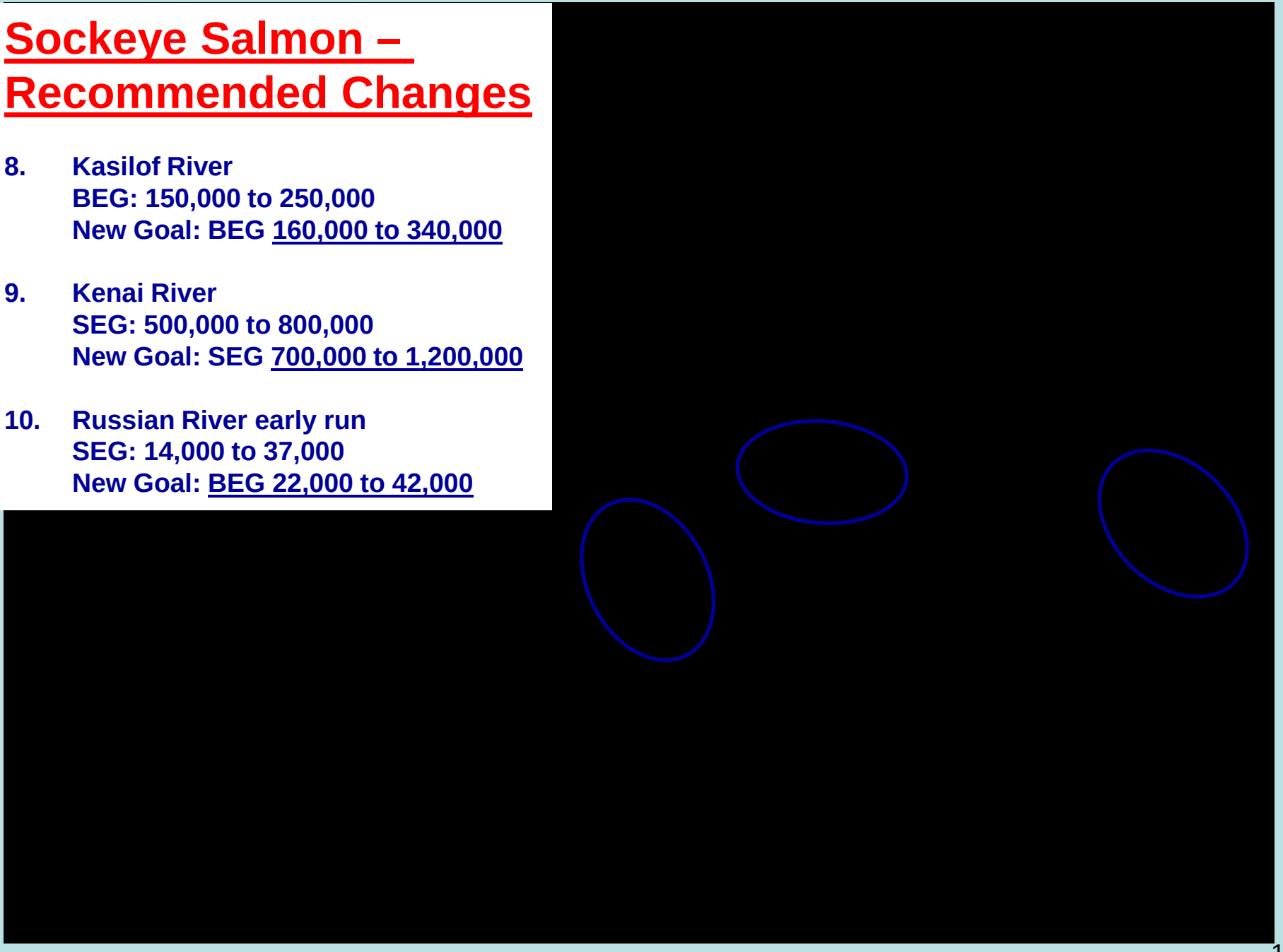


Sockeye Salmon – Recommended Changes

8. **Kasilof River**
   BEG: 150,000 to 250,000
   New Goal: BEG 160,000 to 340,000

9. **Kenai River**
   SEG: 500,000 to 800,000
   New Goal: SEG 700,000 to 1,200,000

10. **Russian River early run**
    SEG: 14,000 to 37,000
    New Goal: BEG 22,000 to 42,000



Results

Presented in more detail – goals having a change in range with at least moderate exploitation

- Kasilof River sockeye
- Kenai River sockeye
- Russian River early-run sockeye
- Susitna River drainage sockeye
  - ➢ Changes occurred in 2009 out of cycle

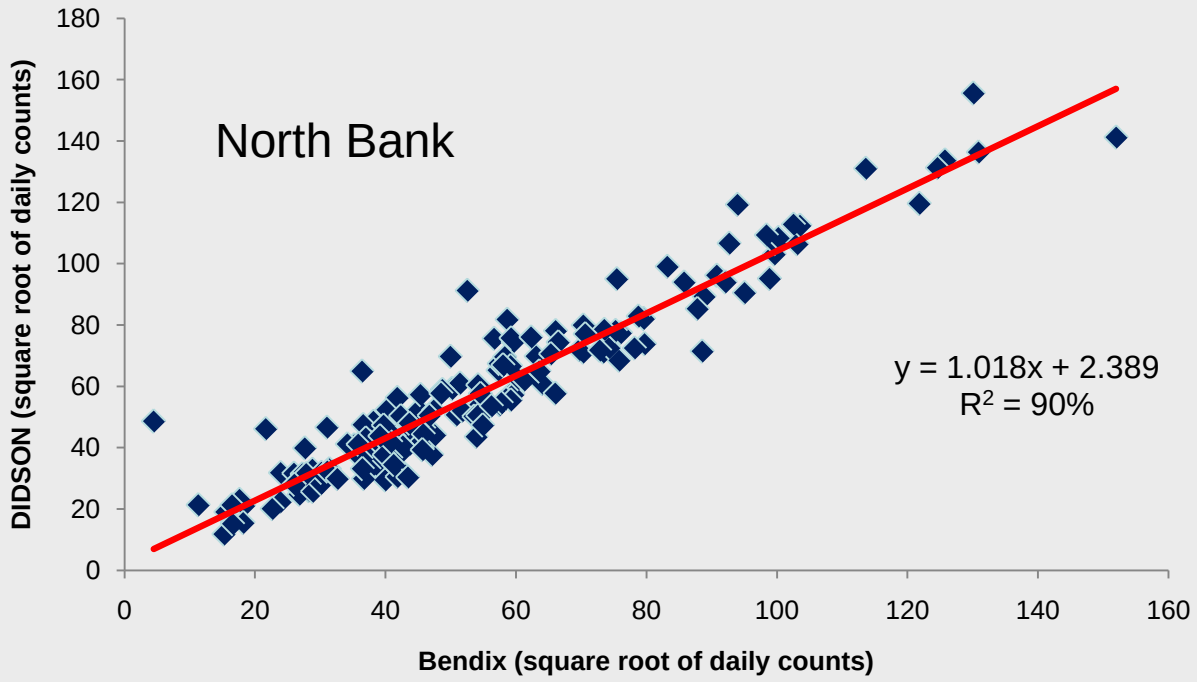
Kasilof River Sockeye

Revised historical brood table

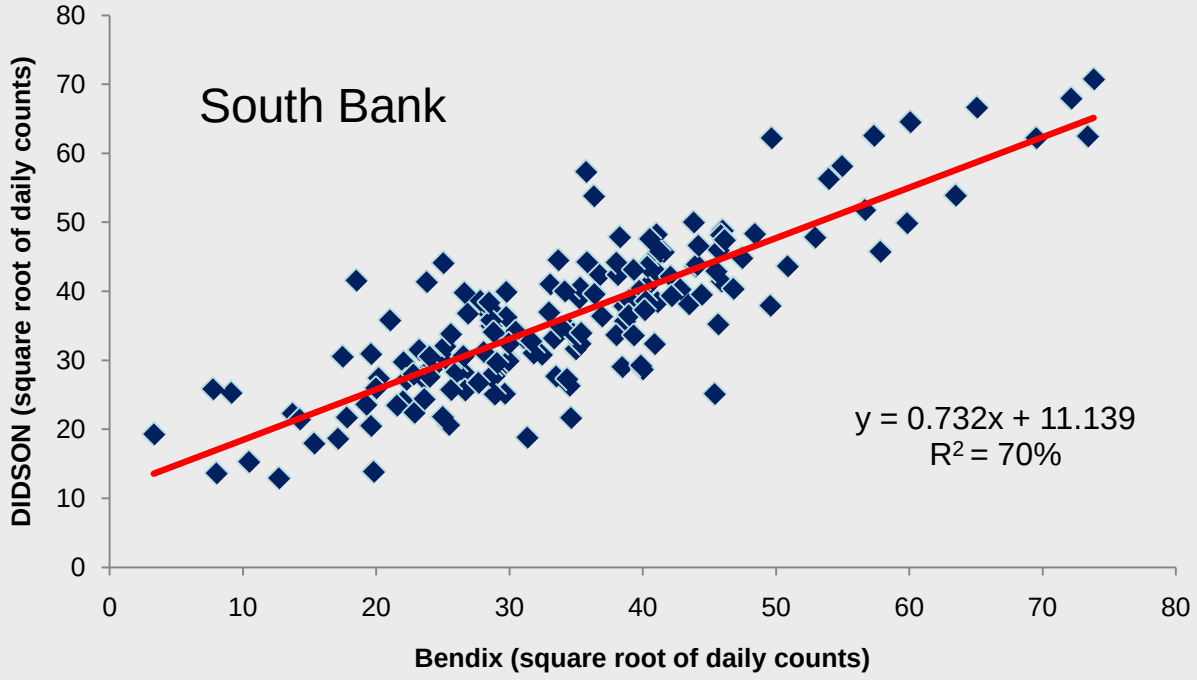
- 37 updated brood years
- 2 primary adjustments
  - Inclusion of GSI harvest estimates
  - Bendix sonar counts to DIDSON-equivalents – new escapement estimates

Sonar conversion based on side-by-side comparison data from 2006–2009 for north (n=167 d) and south (n=163 d) banks

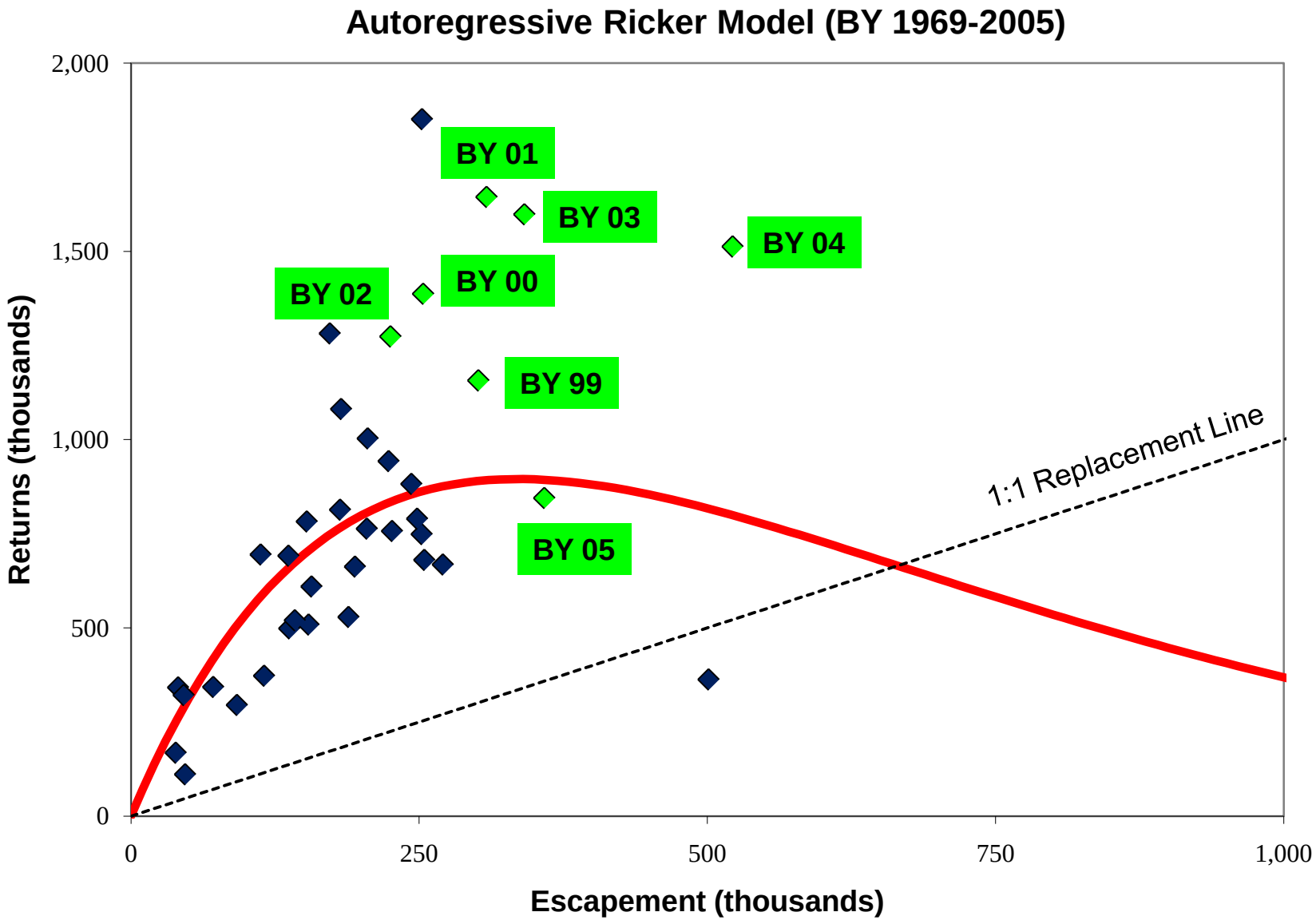
Kasilof Bendix-DIDSON Relationship



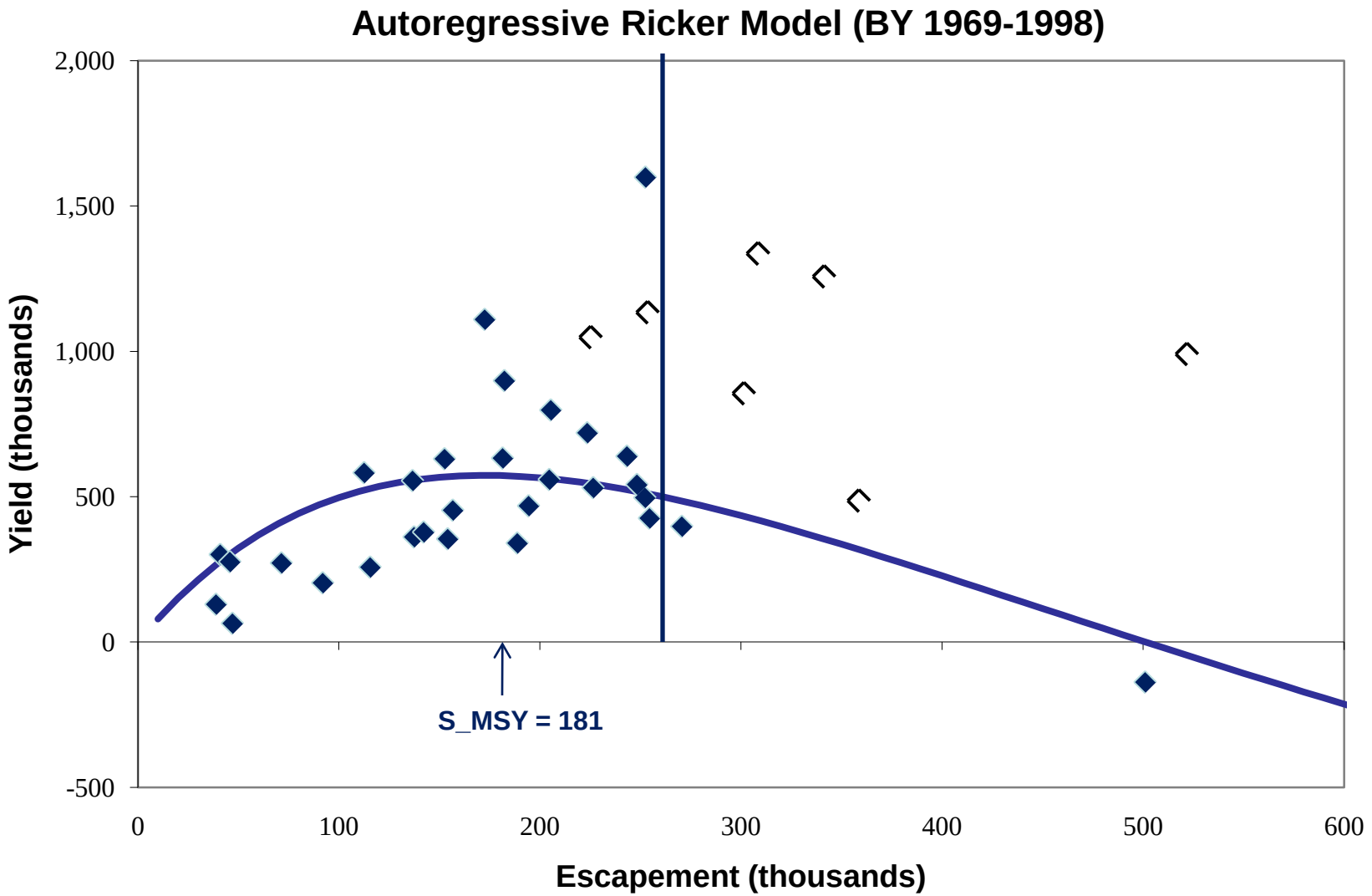
Average DIDSON:Bendix Ratio of Converted Historical Data = 1.02



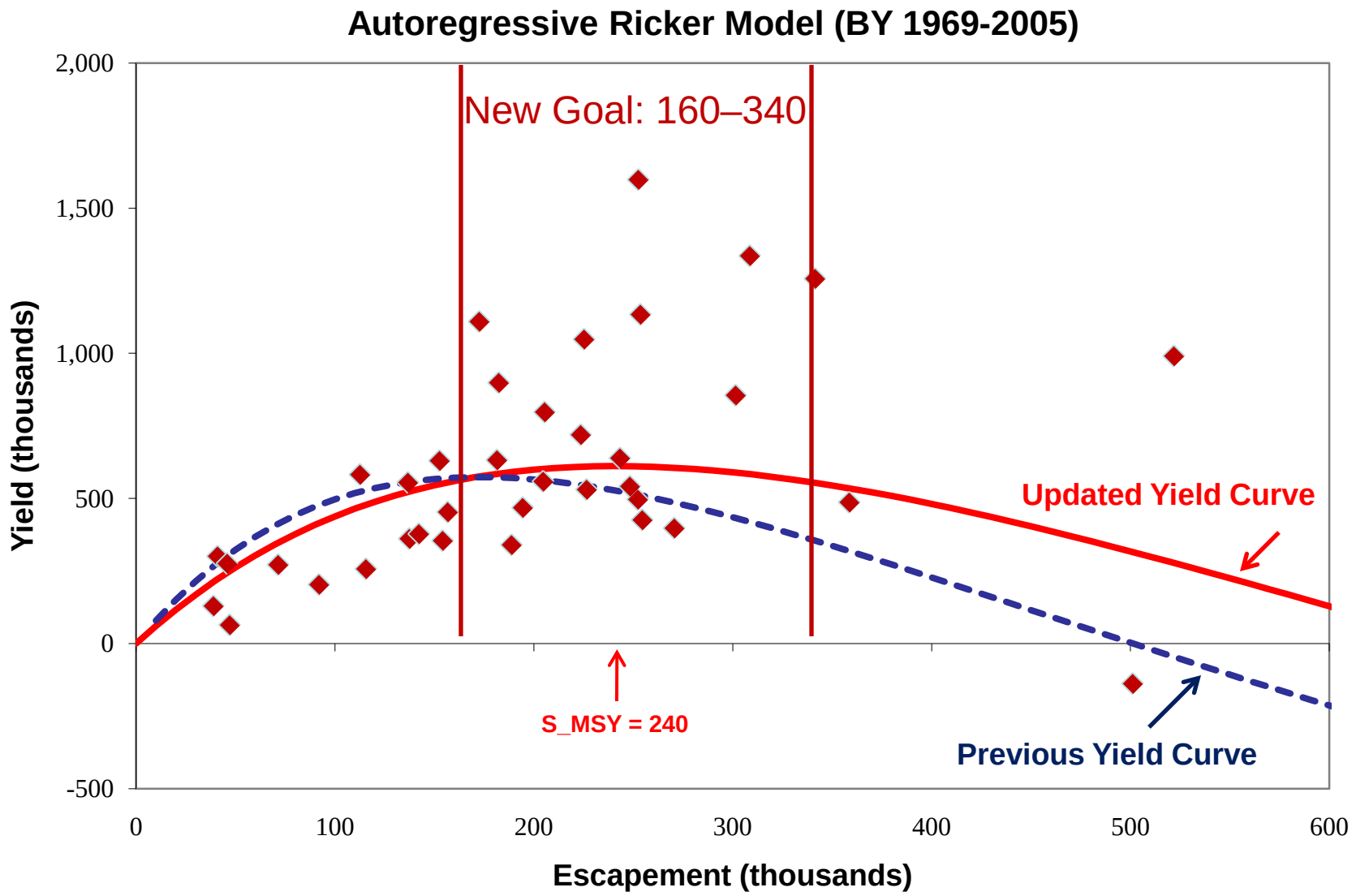
Kasilof River Sockeye Stock-Recruitment



Profile of Kasilof Yield - Previous Model



Profile of Kasilof Yield - Updated Model



Kenai River Sockeye

Stock-recruitment and yield analyses

- Series of S-R models
  - Brood-year interaction models

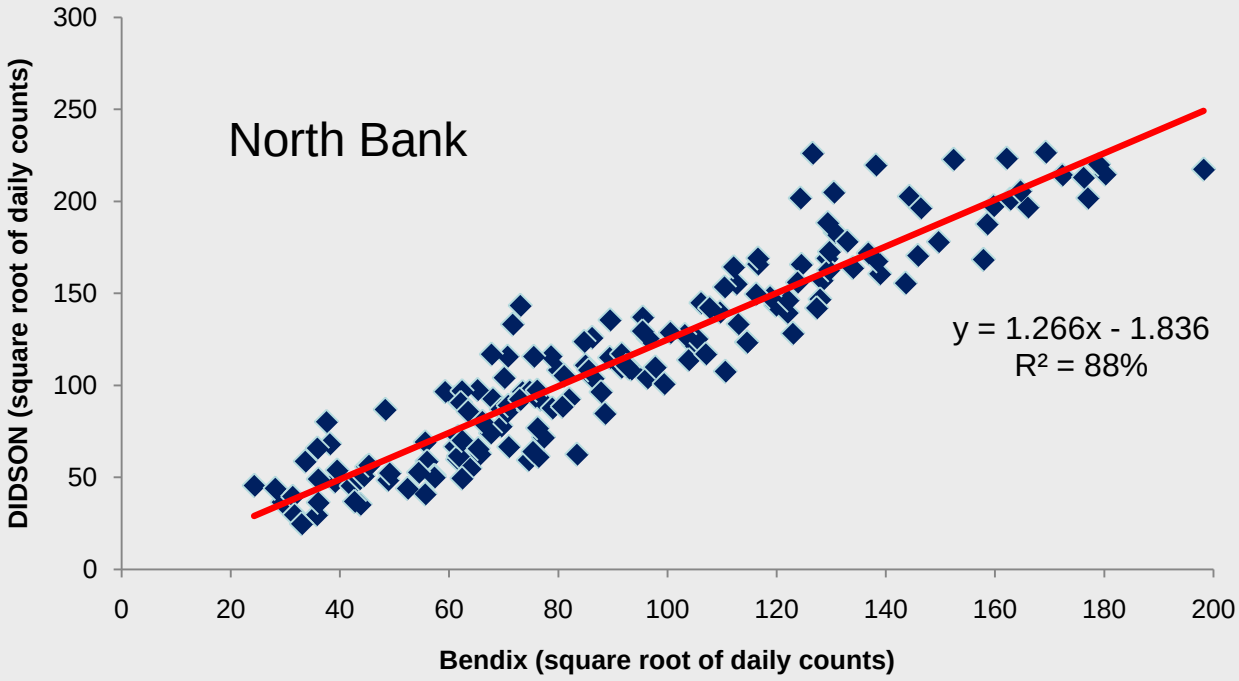
Revised historical brood table

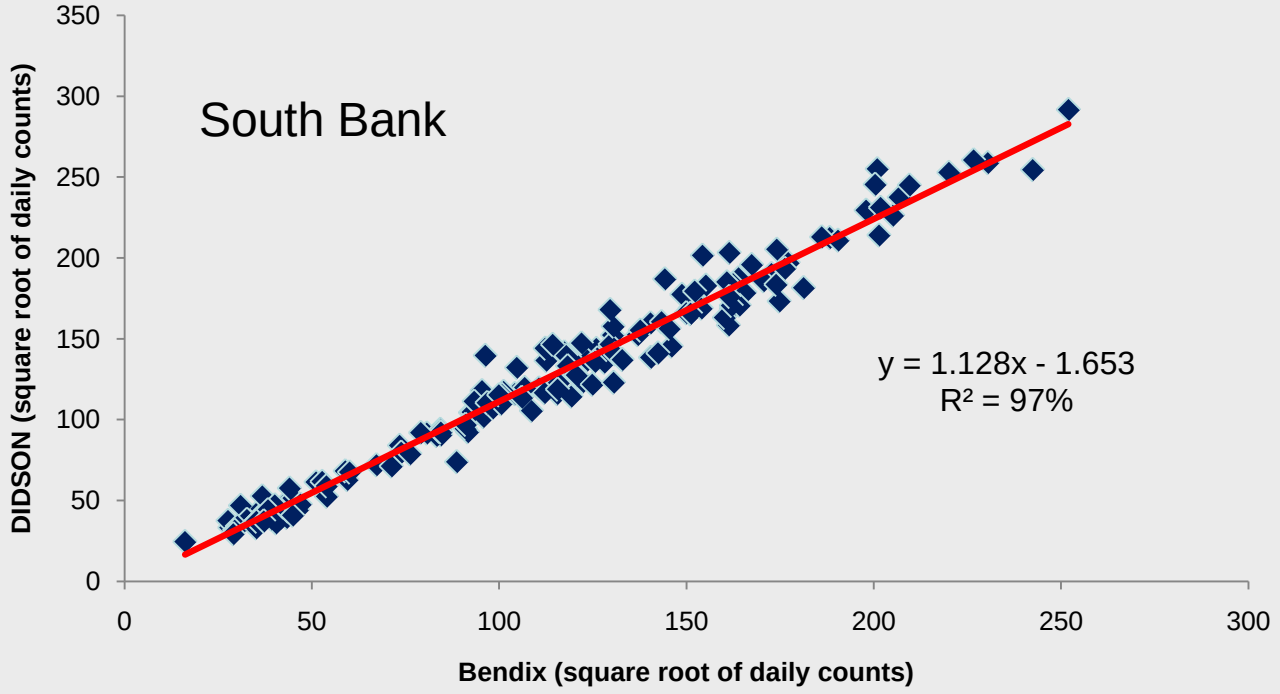
- 37 updated brood years
- 2 primary adjustments
  - Inclusion of GSI harvest estimates
  - Bendix sonar counts to DIDSON-equivalents – new escapement estimates

Sonar conversion based on side-by-side comparison data from 2005–2007 for north (n=163 d) and south (n=159 d) banks

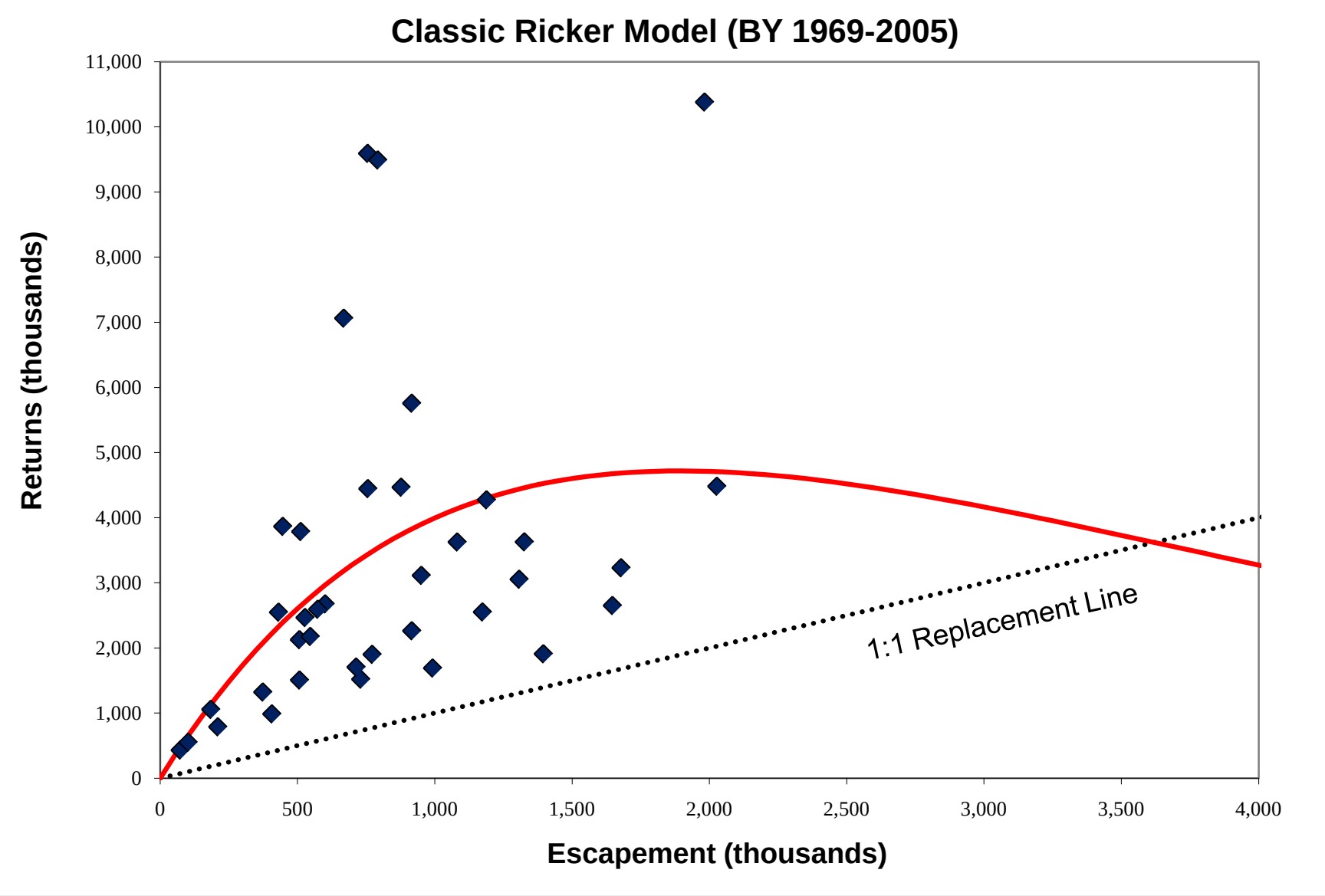
Kenai Bendix-DIDSON Relationship

Average DIDSON:Bendix Ratio of Converted Historical Data = 1.41





Kenai River Sockeye Stock-Recruitment



Kenai River Stock-Recruitment Brood-Year Interaction Model

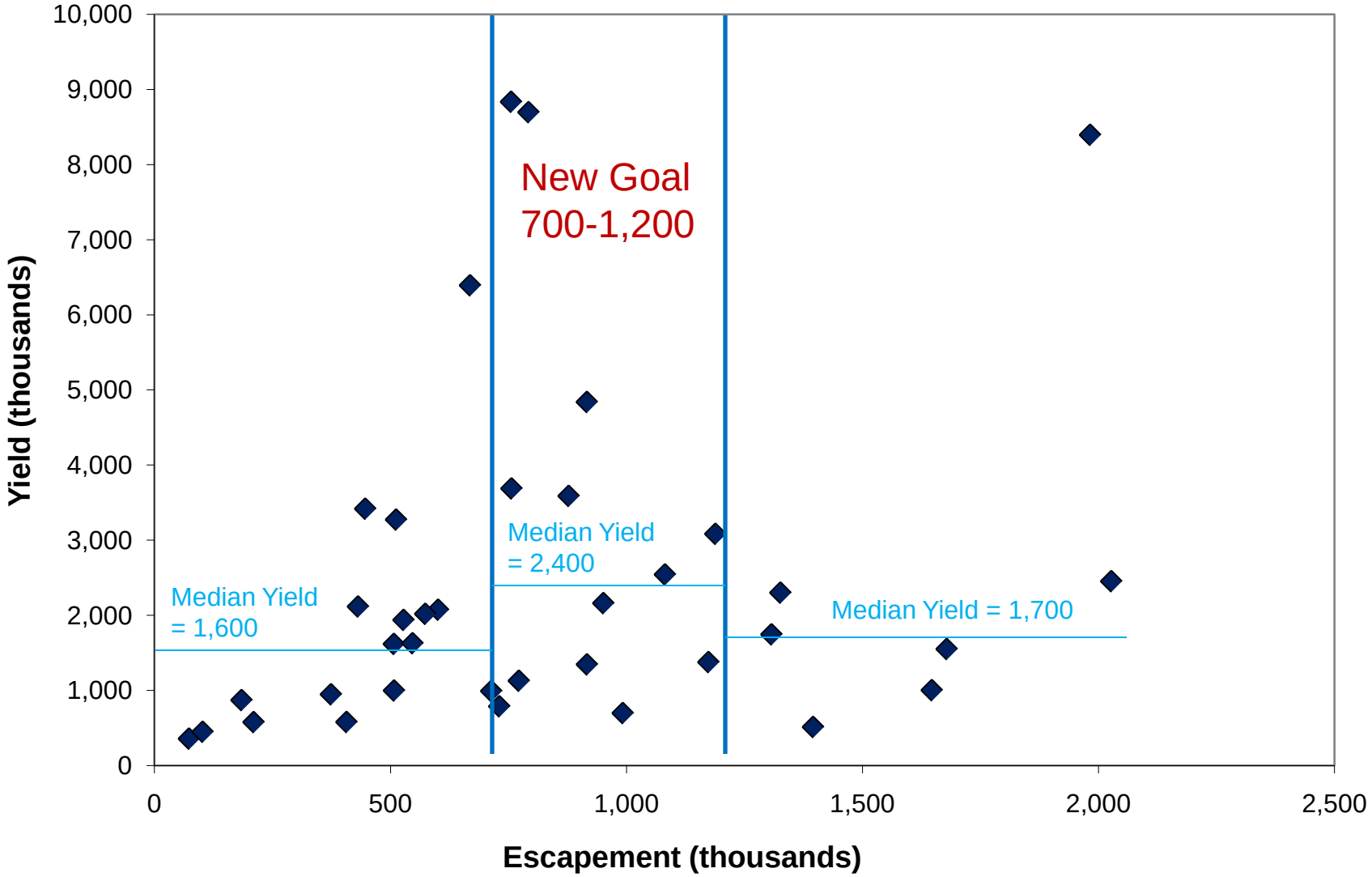
	1969-2005			
Number Spawners	Mean Run	Mean Yield	Yield CV (%)	P<1000
100	641	541	0.64	0.934
150	947	797	0.56	0.768
200	1,247	1,047	0.53	0.544
250	1,539	1,289	0.52	0.380
300	1,822	1,522	0.51	0.265
350	2,094	1,744	0.51	0.189
400	2,352	1,952	0.51	0.140
450	2,597	2,147	0.51	0.105
500	2,826	2,326	0.52	0.083
550	3,038	2,488	0.52	0.071
600	3,232	2,632	0.52	0.064
650	**3,408**	**2,758**	**0.53**	**0.059**
700	**3,565**	**2,865**	**0.53**	**0.053**
750	**3,702**	**2,952**	**0.53**	**0.050**
800	**3,820**	**3,020**	**0.54**	**0.050**
850	**3,917**	**3,067**	**0.54**	**0.050**
900	**3,995**	**3,095**	**0.55**	**0.053**
950	**4,053**	**3,103**	**0.56**	**0.058**
1,000	4,092	3,092	0.56	0.062
1,050	4,112	3,062	0.57	0.066
1,100	4,114	3,014	0.58	0.071
1,150	4,100	2,950	0.59	0.080
1,200	4,069	2,869	0.60	0.089
1,250	4,023	2,774	0.62	0.104
1,300	3,963	2,665	0.63	0.123
1,350	3,891	2,543	0.65	0.143
1,400	3,807	2,410	0.67	0.172
1,450	3,713	2,267	0.69	0.203
1,500	3,612	2,117	0.72	0.238

S_{MSY} = 950

Numbers (in thousands) in red represent the range using simulation criteria: 6% risk of a yield < 1 million.

90-100% MSY range is shaded.

Profile of Kenai River Sockeye Yield



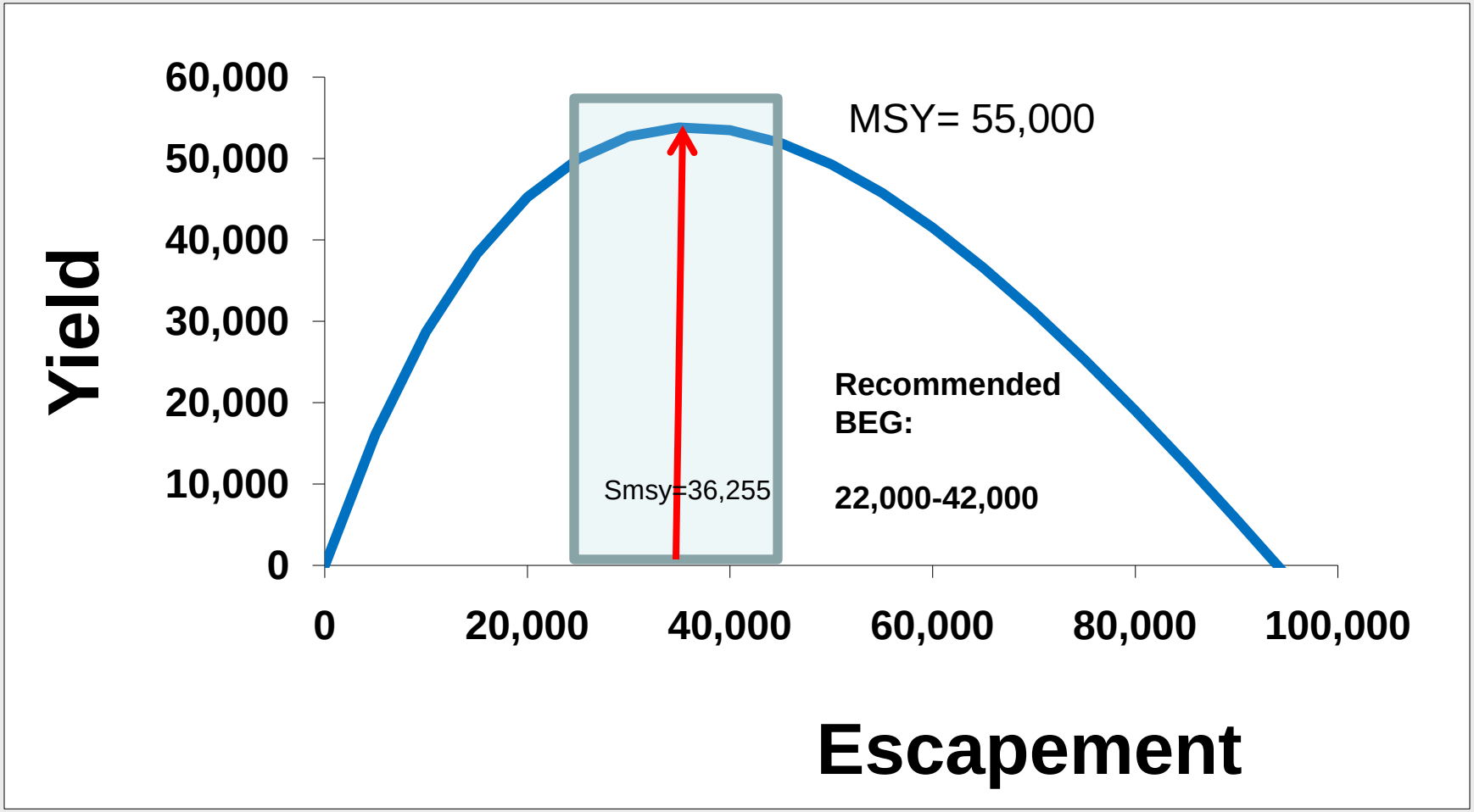
Primary Factor for Increase in Kenai River Sockeye Goal

- Conversion of historical Bendix sonar estimates to DIDSON-equivalent estimates
  - Sonar conversion ratio (D:B) = 1.41
  - Escapement equals sonar count minus upriver harvest
  - Average ratio of updated:original escapement is 1.52
  - 500,000 (lower bound) * 1.52 = 760,000
  - 800,000 (upper bound) * 1.52 = 1,216,000
  - Similar to recommended range of 700,000 to 1,200,000

- Overall effect from updating the analysis with recent data and using GSI was small

Russian River Early Run Sockeye

(Ricker analysis -- brood years 1970-2003)



Susitna River Drainage Sockeye

- Eliminated Yentna River sockeye goal based on sonar
  - 2009; out of cycle with the board
- Replaced with SEGs assessed with weirs on 3 lake outlets
  - Chelatna, Judd: Yentna River
  - Larson: Mainstem Susitna River

Review Summary

- **No Changes to 29 Goals**
  - Clearwater Creek chum
  - Jim Creek coho
  - Little Susitna River coho and king
  - Chelatna Lake sockeye
  - Crescent River sockeye
  - Fish Creek sockeye
  - Judd Lake sockeye
  - Larson Lake sockeye
  - Packers Creek sockeye
  - Russian River late-run sockeye
  - Alexander Creek king
  - Chuitna River king
  - Chulitna River king
  - Clear Creek king
  - Crooked Creek king
  - Goose Creek king
  - Lake Creek king
  - Lewis River king
  - Little Willow Creek king
  - Montana Creek king
  - Peters Creek king
  - Prairie Creek king
  - Sheep Creek king
  - Talachulitna Creek king
  - Theodore River king
  - Willow Creek king
- **8 Recommended Changes**
  - Fish Creek coho: reinstate SEG of 1,200 to 4,400
  - Kasilof River sockeye: BEG 160,000 to 340,000
  - Kenai River sockeye: SEG 700,000 to 1,200,000
  - Russian River early-run sockeye: BEG 22,000 to 42,000
  - Campbell Creek king: LB SEG 380
  - Deshka River king: SEG 13,000 to 28,000
  - Kenai River early-run king: SEG 4,000 to 9,000
  - Kenai River late-run king: SEG 17,800 to 35,700

Key Points

- Kasilof Sockeye Goal
  - Increased primarily because recent large escapements produced good returns
- Kenai Sockeye Goal
  - Increased primarily because of sonar conversion
  - Greatest uncertainty at upper end (lack of information)
  - In 3 more years after returns from consecutive large escapements in 2004 (complete), 2005 (mostly complete) & 2006 (partially complete - 3rd largest) are finalized, S-R models will be more robust at the upper end of the goal

Questions?