

# Big Muddy Metrics:

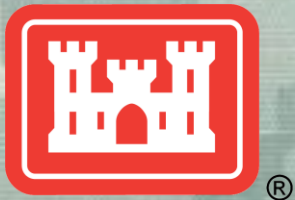
## Using Tern and Plover Nesting and Habitat Data to Improve Decision Making

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US Army Corps of Engineers  
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# Contributors

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- Mike Anderson – PNNL
- Joe Bonneau – USACE
- Kate Buenau – PNNL
- Craig Fleming – USACE
- Carol Hale – FWS
- Coral Huber – USACE
- Greg Pavelka – USACE
- Dawn Rodriguez – USACE
- Adam Schapaugh – UNL
- Larry Strong – USGS
- Ron Thom – PNNL
- Brad Thompson – USACE
- Drew Tyre – UNL



# Topics

- Update on Adaptive Management
- Overview of Draft ESH Adaptive Management Strategy
- Data and trends from 2004-2010
- Recommendations for adjustments to ESH Program



# Missouri River Recovery Program Adaptive Management

- Recommended by the BiOp (multiple RPA elements)
- Reinforced by recommendations of NAS Sediment Study
- WRDA 2007 and subsequent guidance



# MRRP AM Process Framework

- Currently being updated to reflect recent changes in the program; incorporate recently developed MRRIC AM Engagement Approach
- Seeks to institutionalize data collection and analysis and incorporate it into decision making
  - ▶ Development of AM Strategies
  - ▶ Annual Assessments
  - ▶ Periodic Reviews (3-5 years)



# Where are we in the AM Continuum?



AM Lite



AM Stout



# Draft ESH AM Strategy

- Scoped specifically to the Draft Programmatic EIS
- Covers the BiOp target segments:
  - ▶ Ft Peck River
  - ▶ Garrison River
  - ▶ Ft Randall River
  - ▶ Lewis and Clark Lake Delta
  - ▶ Gavins Point River



# PEIS Acreage Alternatives

	<b>Alt 1: BiOp (2015)</b>	<b>Alt 2: BiOp (2005)</b>	<b>Alt 3: 1998 Measured</b>	<b>Alt 3.5 Average between Alt 3 and Alt 4</b>	<b>Alt 4: 2005 Measured</b>	<b>Alt 5: Measured Nesting Habitat 1998-2005</b>	<b>Existing Program</b>
<b>Target (acres)</b>	11,886	5,502	6,754	4,370	1,985	1,315	883
<b>Annual Work (acres)</b>	4,802	1,786	2,140	1,182	347	164	150





# Objectives and Performance Metrics

- **Objective 1: Meet or exceed tern and plover productivity targets**
  - ▶ Metric: Fledge Ratios
- **Objective 2: Increase and subsequently stabilize tern and plover populations**
  - ▶ Metric: Population Size and Population Growth Rate
- **Objective 3: Meet ESH acreage targets**
  - ▶ Metric: Area of ESH
- **Objective 4: Minimize negative impacts due to ESH construction activities**
  - ▶ Metric: Cubic yards of dredged material
- **Objective 5: Reduce uncertainty to improve projections and reduce risk**
  - ▶ Coefficient of Variation

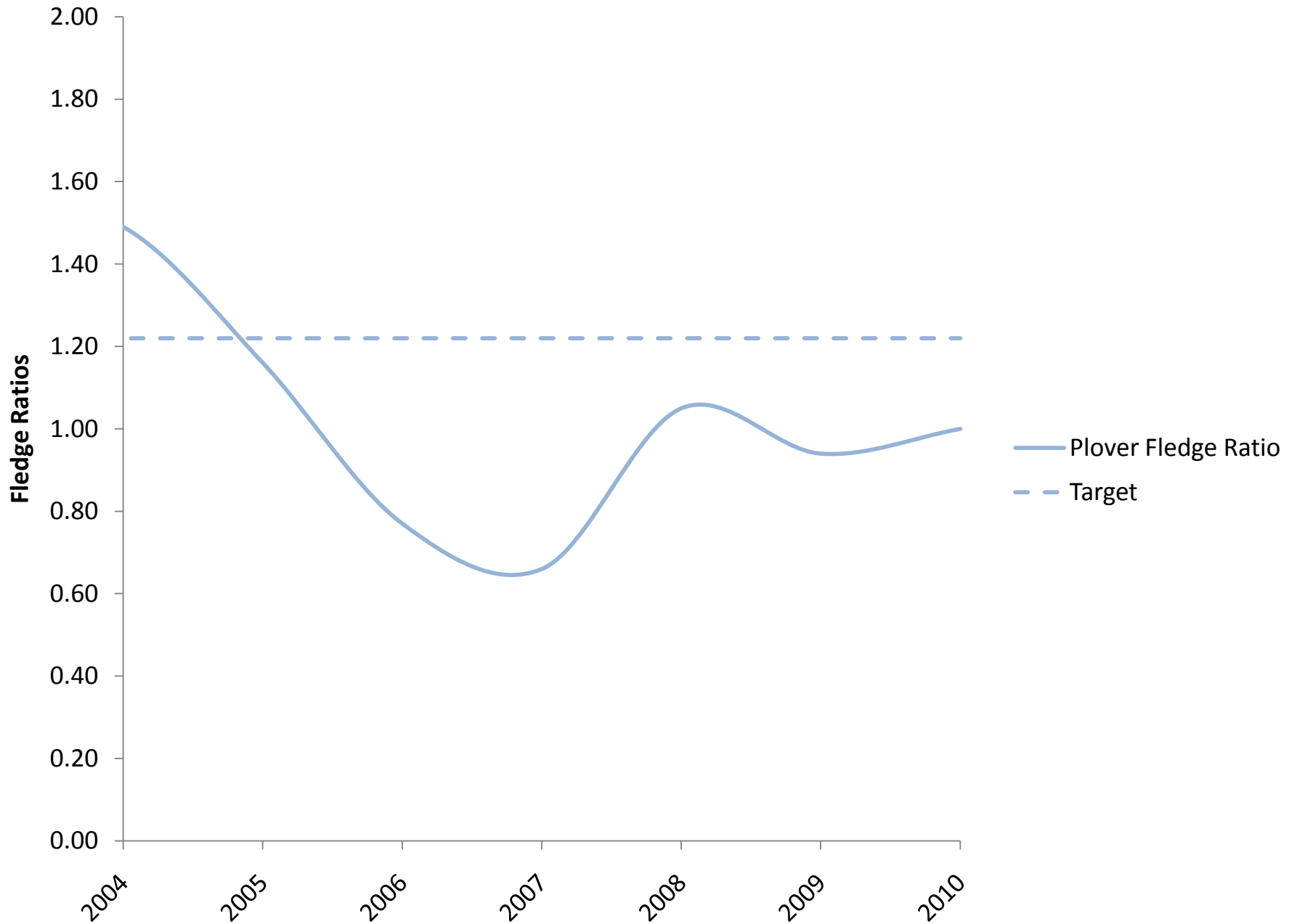


# Objective 1

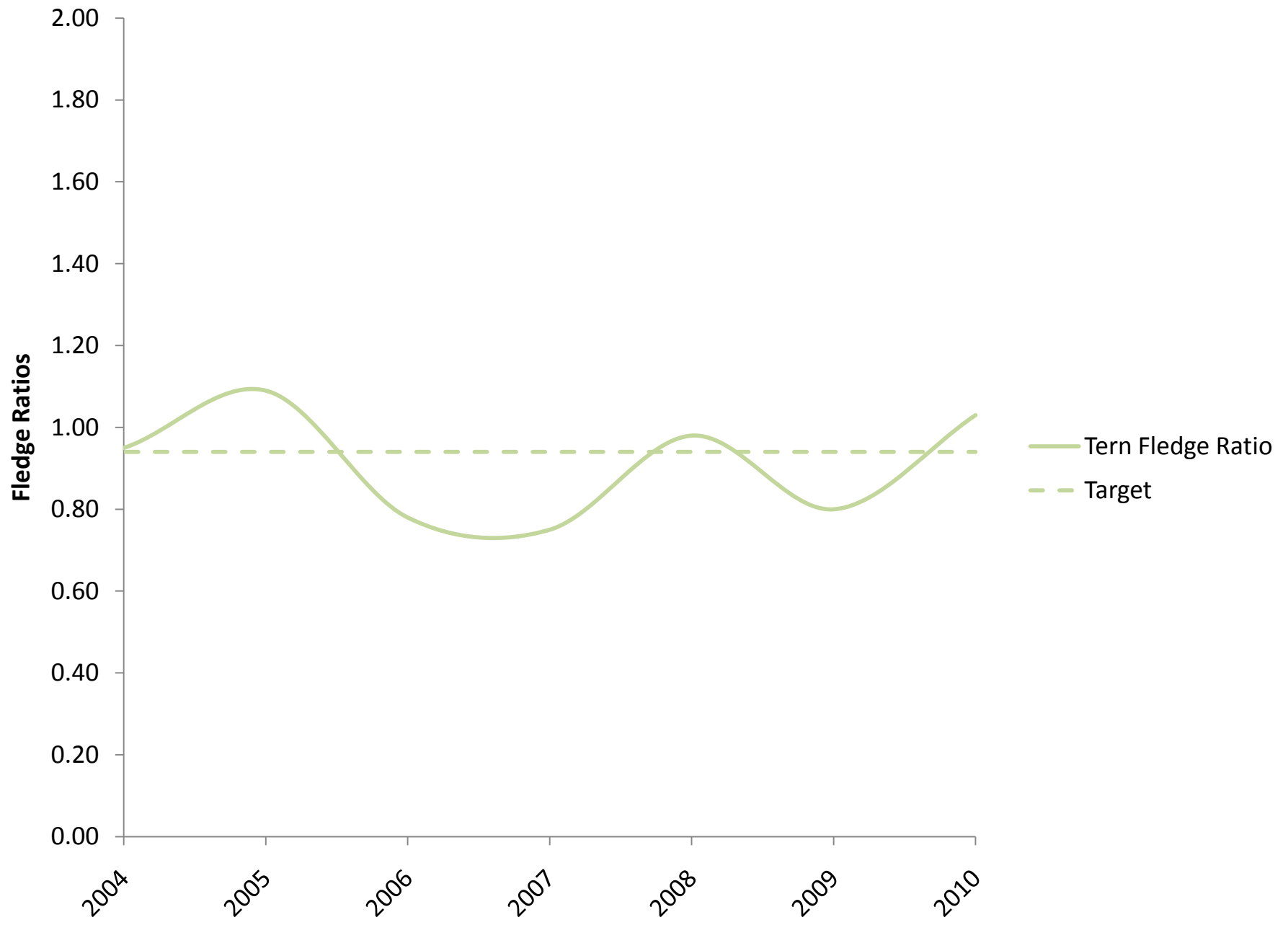
- Meet or exceed tern and plover productivity Targets
- Metric: Fledge Ratios
- Targets: Tern – 0.94, Plover – 1.22



# Plover Fledge Ratios (2004-2010)



# Tern Fledge Ratios (2004-2010)

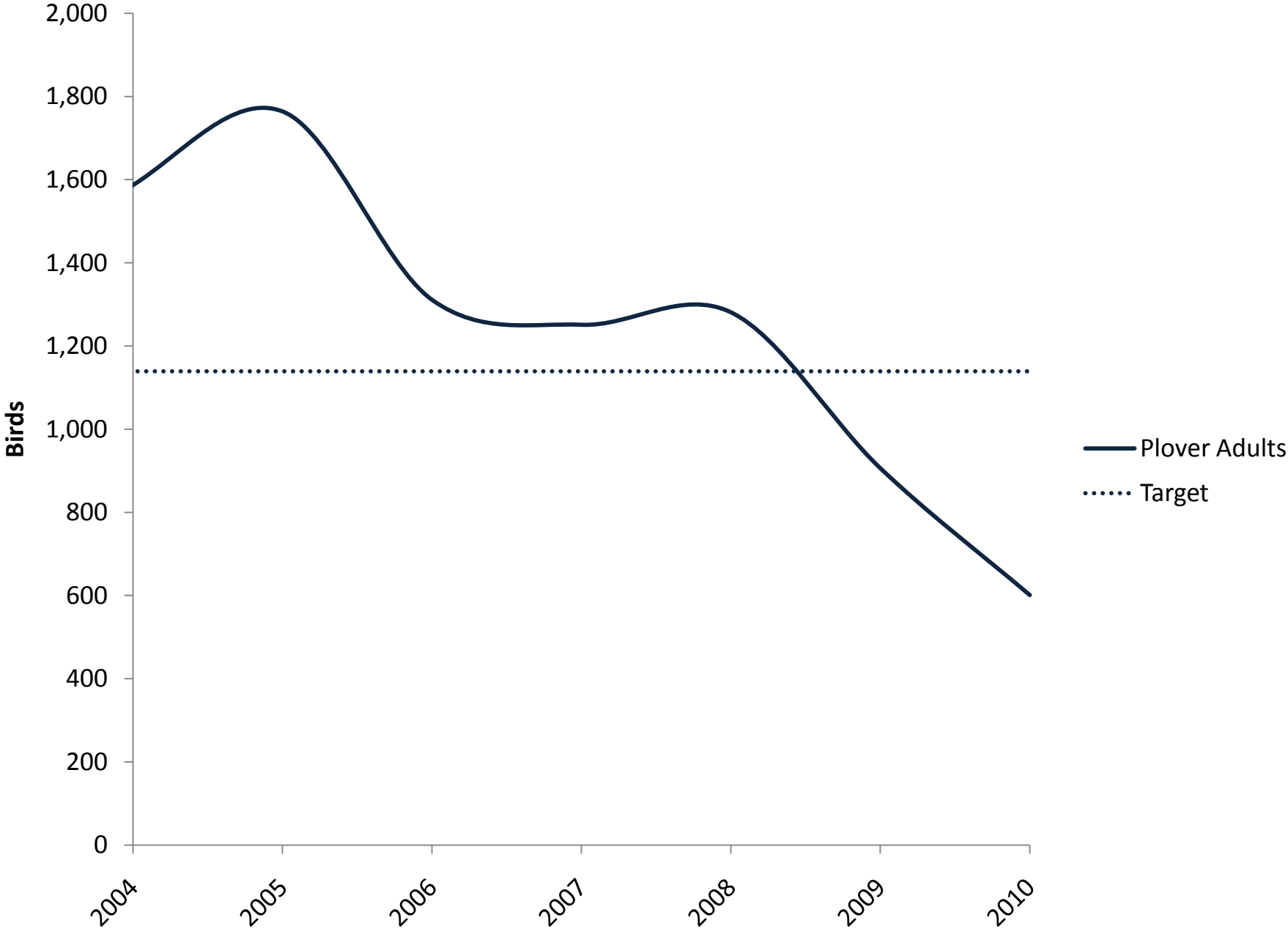


# Objective 2

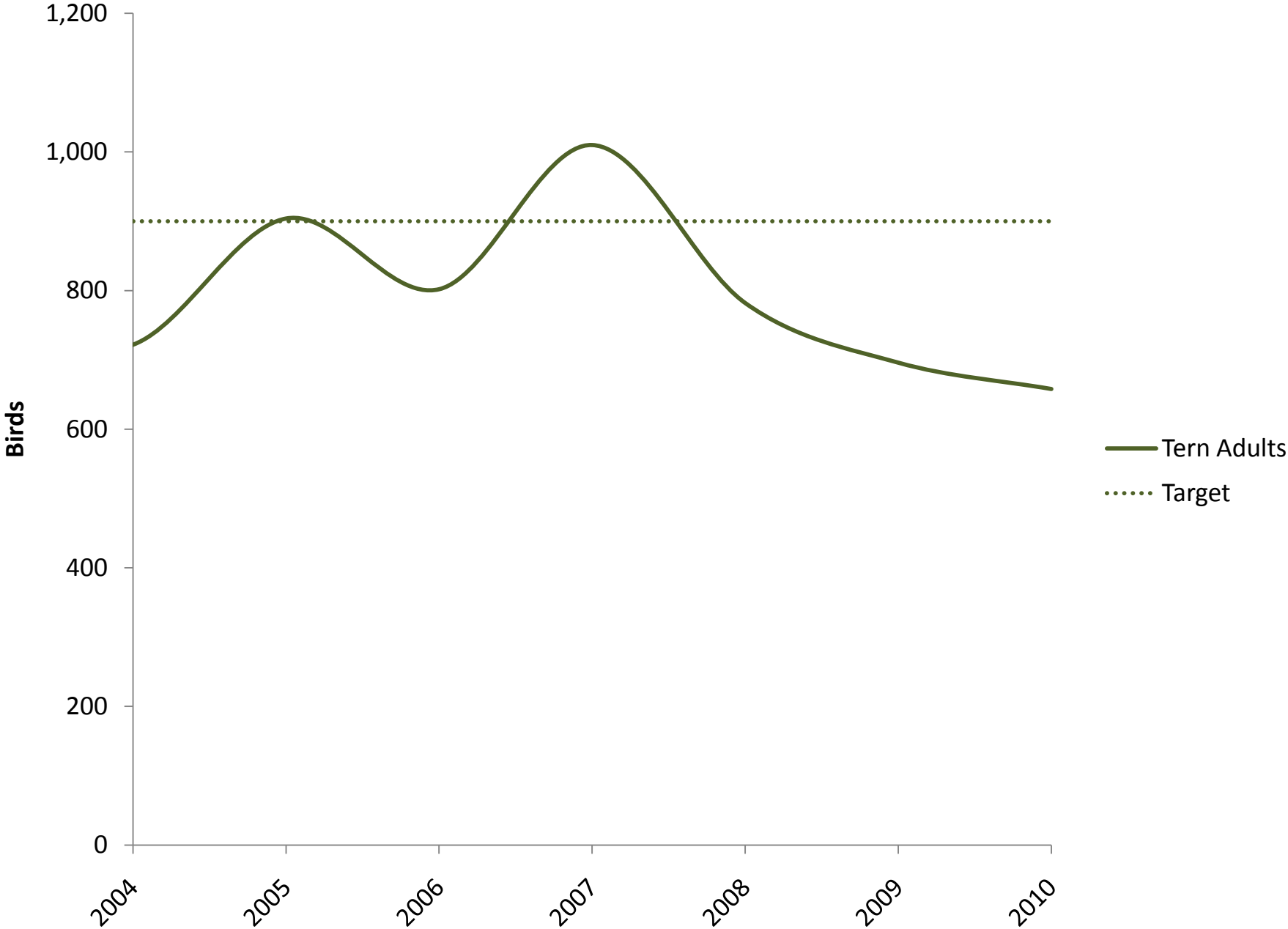
- Increase and subsequently stabilize tern and plover populations
- Metrics: Adult Population Size; Population Growth Rate
- Targets: Tern – 900; Plover – 1,139; Growth Rate  $> 1$



# Plover Population Size (2004-2010)



# Terns Population Size (2004-2010)



# Objective 3

## Meet ESH acreage targets

- Metric: Area of ESH
- Initial Target: 1,315 Acres
- Upper NEPA Limit: 4,370 Acres
- Addresses annual creation needed to meet acreage target (Annual Work) and adjustment of acreage target to meet biological objectives



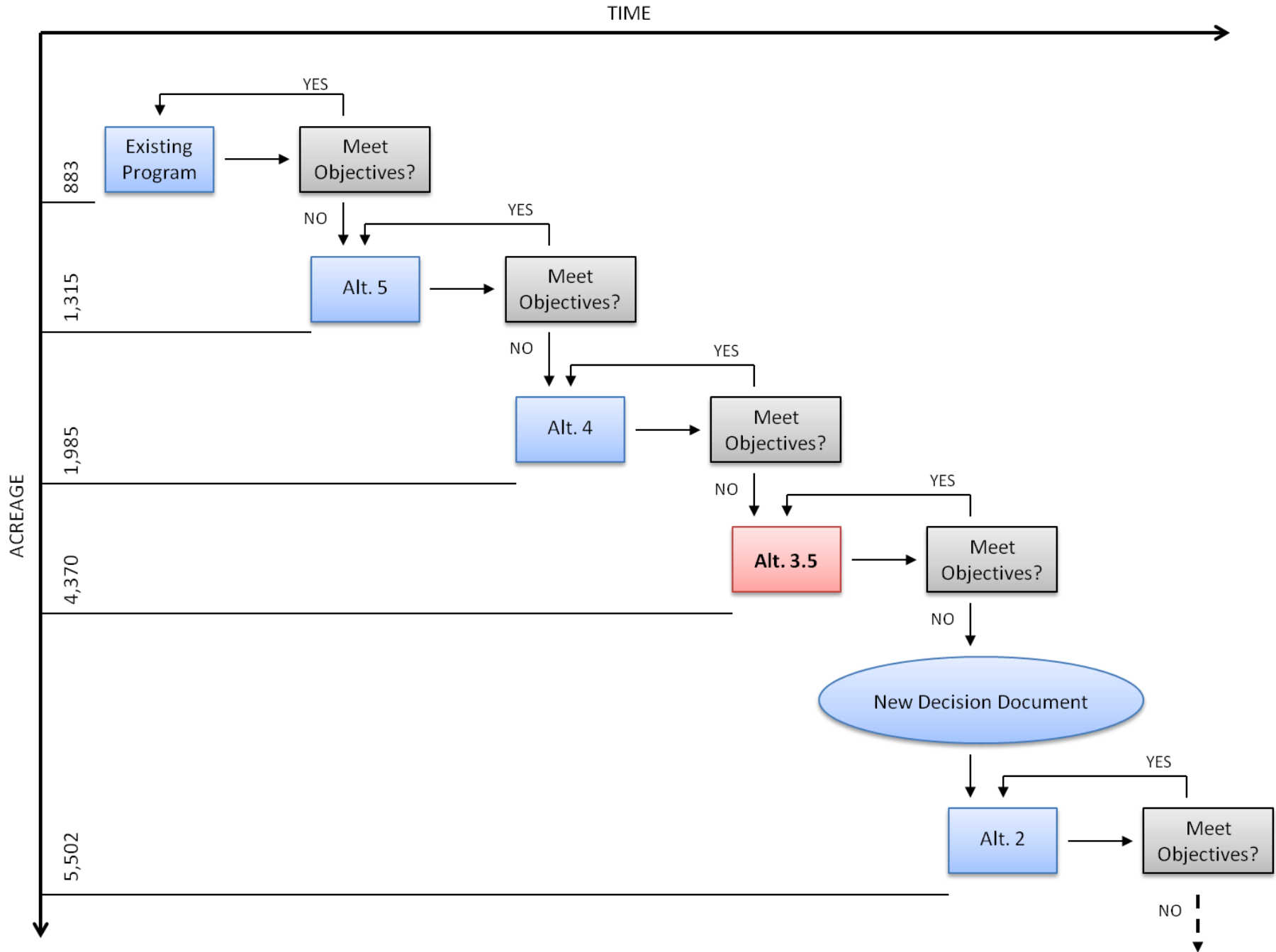


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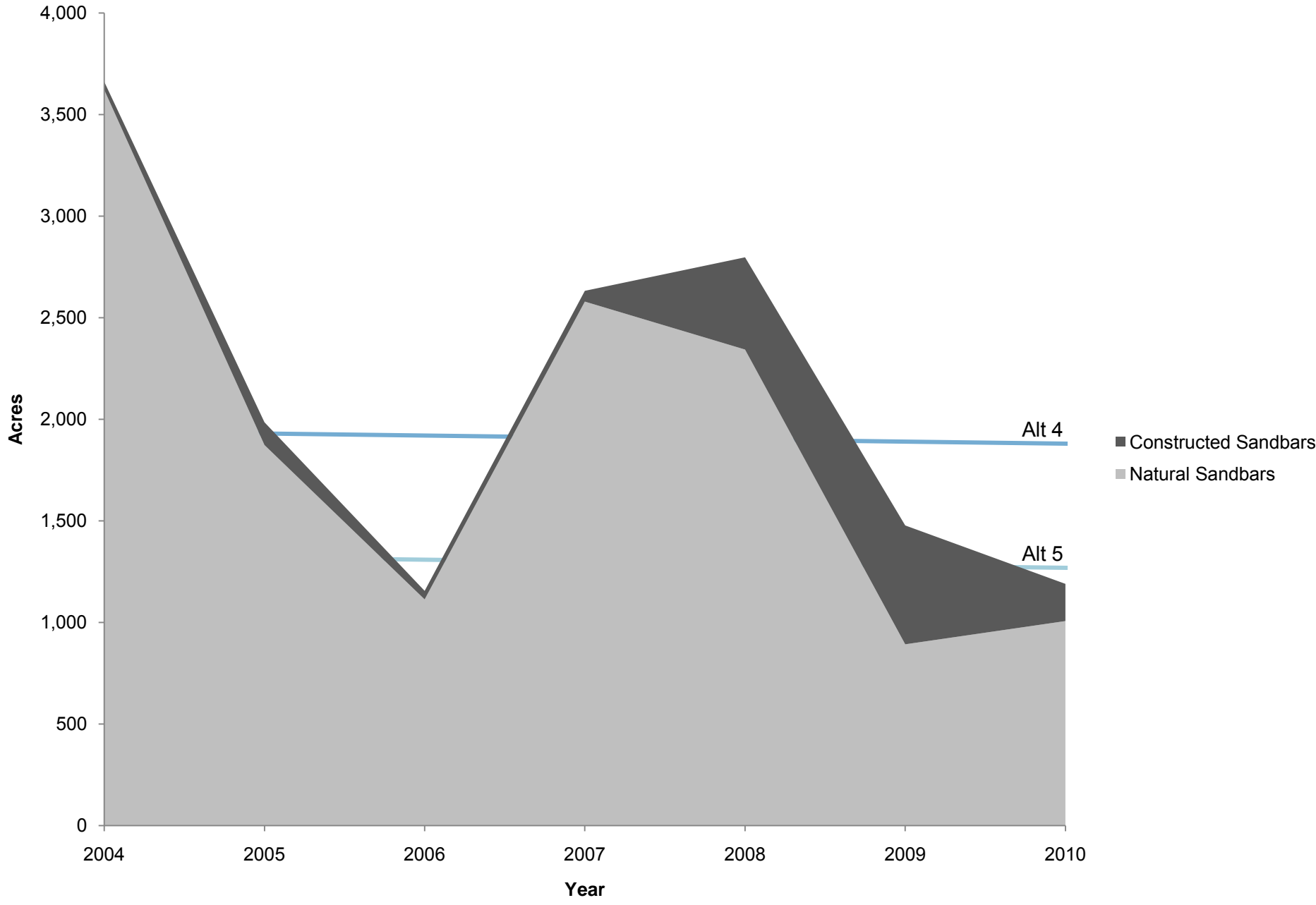
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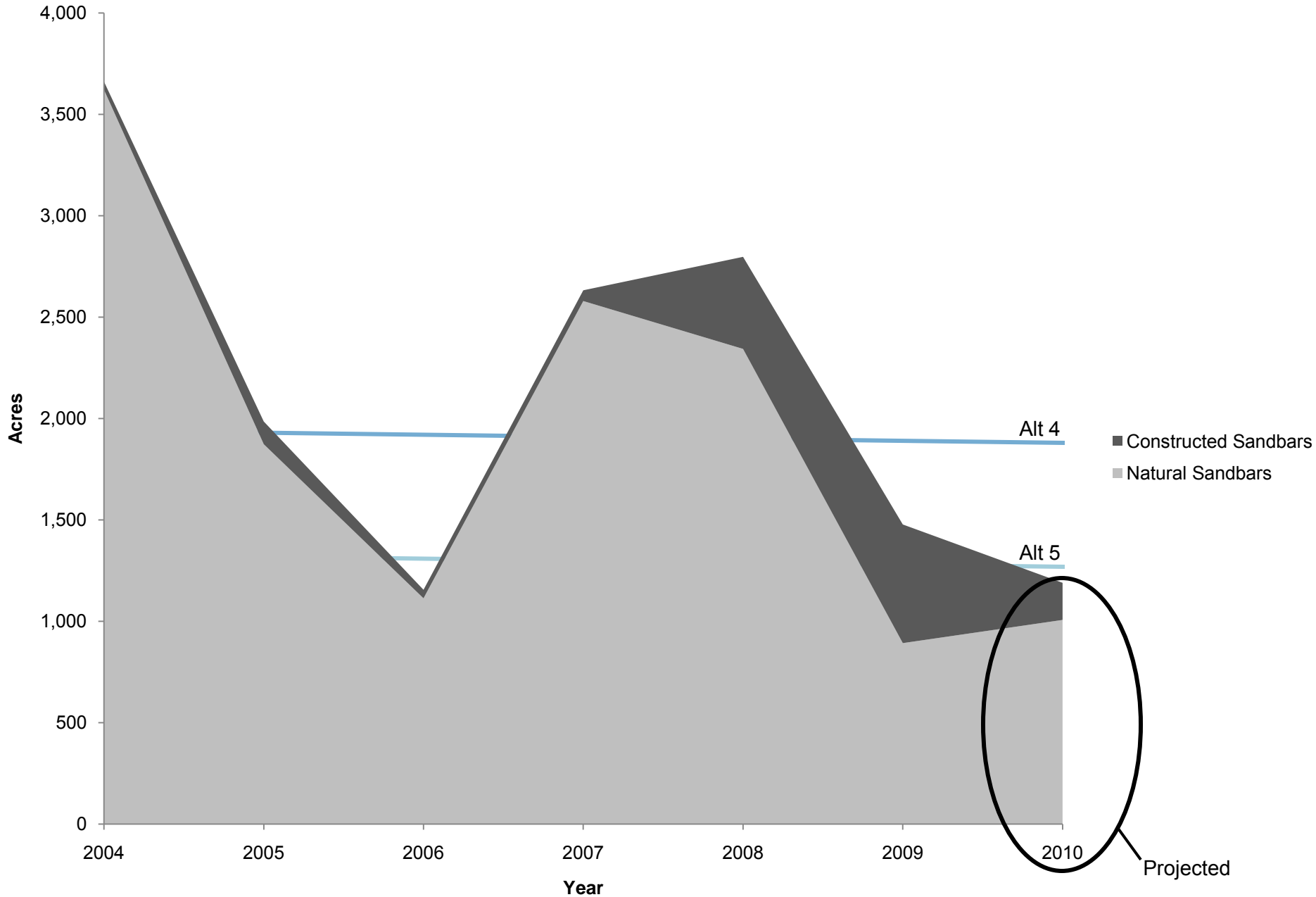
# Implementation of Alternatives Over Time



# Estimated ESH Acreage (Flow Corrected, 2004-2010)



# Estimated ESH Acreage (Flow Corrected, 2004-2010)



# 2010 Adaptive Management Report Card

Objective	Performance Metric	Target	2010 Value	Change from Previous Year <sup>b</sup>	3-Year Average
1	Plover Fledge Ratio	1.22	<b>1.01</b>	<b>7%</b>	<b>1.01</b>
1	Tern Fledge Ratio	0.94	<b>1.03</b>	<b>29%</b>	<b>0.94</b>
2	Plover Population Growth Rate	$\lambda > 1$	<b>0.67<sup>a</sup></b>	<b>-17%</b>	<b>0.80</b>
2	Tern Population Growth Rate	$\lambda > 1$	<b>0.95<sup>a</sup></b>	<b>-26%</b>	<b>0.87</b>
2	Plover Population Size	1,139	<b>604</b>	<b>-33%</b>	<b>930</b>
2	Tern Population Size	900	<b>658</b>	<b>-5%</b>	<b>692</b>
3	Amount of ESH (acres)	1,315	<b>1,189<sup>c</sup></b>	<b>-19%</b>	<b>1,821</b>
4	Area affected by construction (annual yd <sup>3</sup> )	<960,712	<b>290,000</b>	<b>-74%</b>	<b>1,140,290</b>
5	Reduce uncertainty	Minimize CV <sup>d</sup>	Plover: 17.71 Tern: 6.60	Plover: <b>-0.1%</b> Tern: <b>-1.5%</b>	-

# EXAMPLE: Decision Matrix

		Acreage < target	Acreage = target
Growing Population	Population ≥ target	<b>Unexpected outcome</b> Maintain habitat Reduce acreage target	<b>Overbuilding</b> Maintain habitat Consider reducing acreage target
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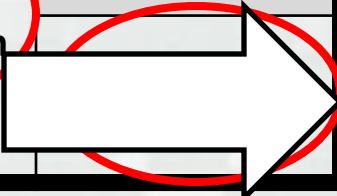
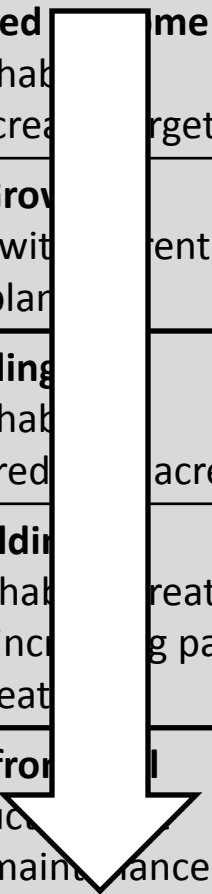
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**Acreage < target**

**Declining Population**



# Summary of Recommendations

- Create more ESH annually
- Expand efforts to other river segments
  - ▶ Garrison
  - ▶ Ft Randall
- Test the efficacy of other methodologies
  - ▶ Vegetation Removal
  - ▶ Geotubes and other deposition-inducing structures
  - ▶ Off-channel habitat
  - ▶ Several small sites



# Summary of Recommendations

(cont.)

- Undertake investigations to reduce uncertainties
  - ▶ Erosion and vegetation rates
  - ▶ Changes in acreage due to flows (update flow curves)
  - ▶ Non-target impacts
- Analyze existing data
  - ▶ Density dependence
  - ▶ Differences in population use and productivity



# Other Related Presentations

This afternoon:

- ESH Model (Drew Tyre)
  - ▶ Look at making these decisions on an annual basis into the future
- PEIS Status Update (Cindy Upah)

Tomorrow:

- Shallow Water Habitat AM Strategy (Joe Bonneau)





# Questions / Discussion

