



C-1

# SAINT MATTHEW BLUE KING CRAB STOCK STATUS

&

# REBUILDING PROJECTIONS, PROGRESS, AND PLANS

KATIE PALOF, DIANA STRAM, JIE ZHENG, JIM IANELLI, AND  
ANDRÉ PUNT

# NOTIFICATION AND IMPLICATIONS

- Council notified October 22, 2018 that the Saint Matthew blue king crab stock was overfished.
- MSA requires that a rebuilding plan be prepared and implemented within 2 years
  - Must specify a time frame to rebuild
  - Time frame not to exceed ten years (unless this cannot be accomplished in the absence of all fishing mortality)

# What to consider in Rebuilding Plan?

First steps to  
determine  $T_{\text{MIN}}$  and  
 $T_{\text{MAX}}$

This will depend upon  
final assessment in  
September due to  
potential for modified  
 $B_{\text{MSYPROXY}}$  and  
recruitment

# $T_{\text{MIN}}$ and $T_{\text{MAX}}$

$T_{\text{MIN}}$  = time the stock or stock complex to rebuild to its MSY biomass level in the absence of any fishing mortality ( $\geq 50\%$  probability)

$T_{\text{MAX}}$  = maximum time for rebuilding linked to biology of stock

If  $T_{\text{MIN}}$  for the stock or stock complex is 10 years or less, then  $T_{\text{MAX}}$  is 10 years.

# What if $T_{\text{MIN}} > 10$ years?

If  $T_{\text{MIN}}$  for the stock or stock complex exceeds 10 years, then one of the following methods can be used to determine  $T_{\text{MAX}}$ :

$T_{\text{MIN}}$  + one generation time. "Generation time" = average length of time between when an individual is born and the birth of its offspring,

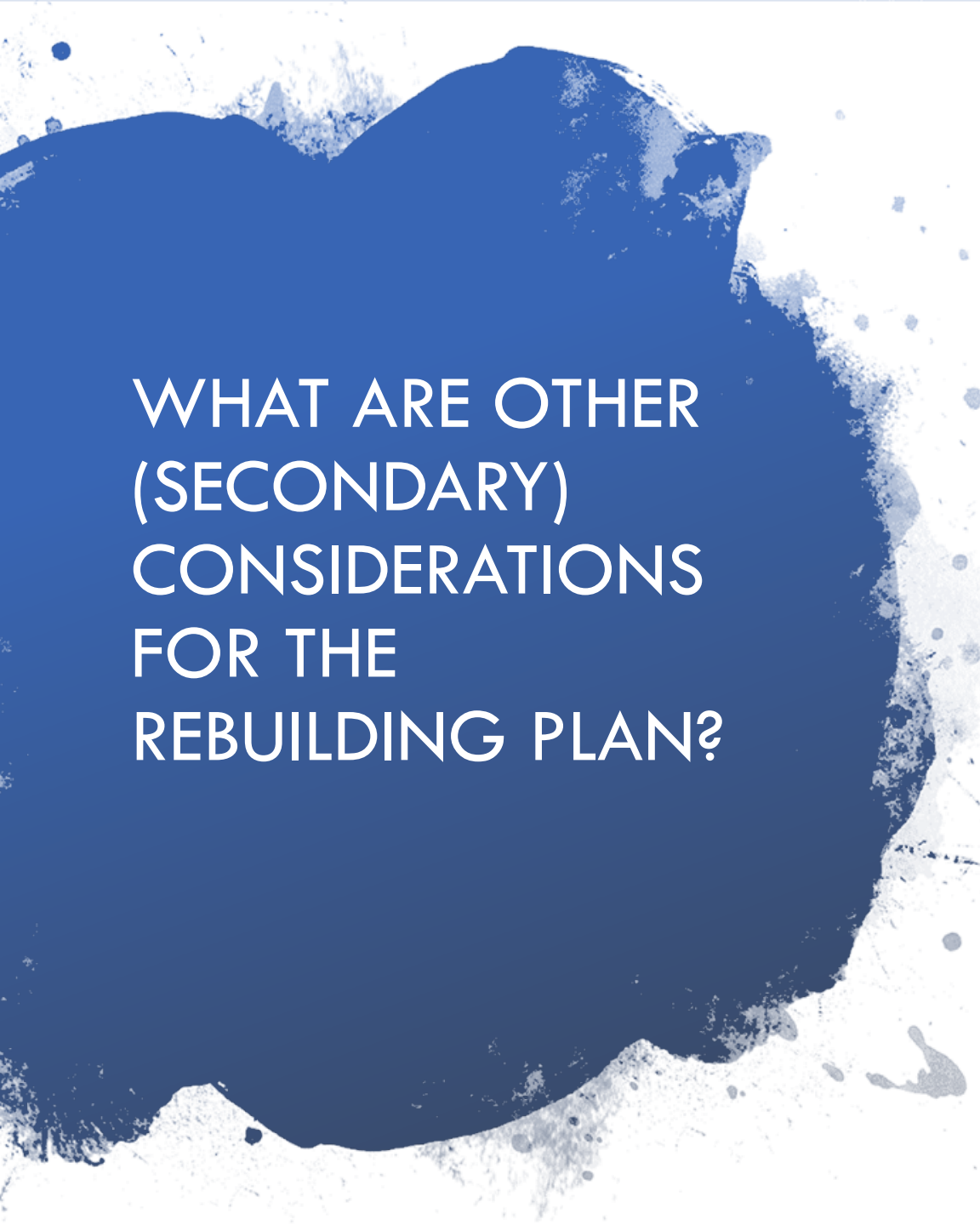
Time to rebuild to  $B_{\text{msy}}$  if fished at 75 percent of MFMT, or

$T_{\text{MIN}}$  multiplied by two.

# CURRENT DECISION POINTS WITH ASSESSMENT RELATIVE TO DEVELOPING A REBUILDING PLAN

- 2019/20 Saint Matthew blue king crab assessment under development.
- Assessment changes reviewed by CPT/SSC for final September assessment are related to the appropriate timeframes to define recruitment and  $B_{MSYPROXY}$ 
  - Breakpoint analysis to identify appropriate periods of productivity
- Changes to the recruitment and  $B_{MSYPROXY}$  affect projections for rebuilding and the determination of  $T_{MIN}$  and  $T_{MAX}$





WHAT ARE OTHER  
(SECONDARY)  
CONSIDERATIONS  
FOR THE  
REBUILDING PLAN?

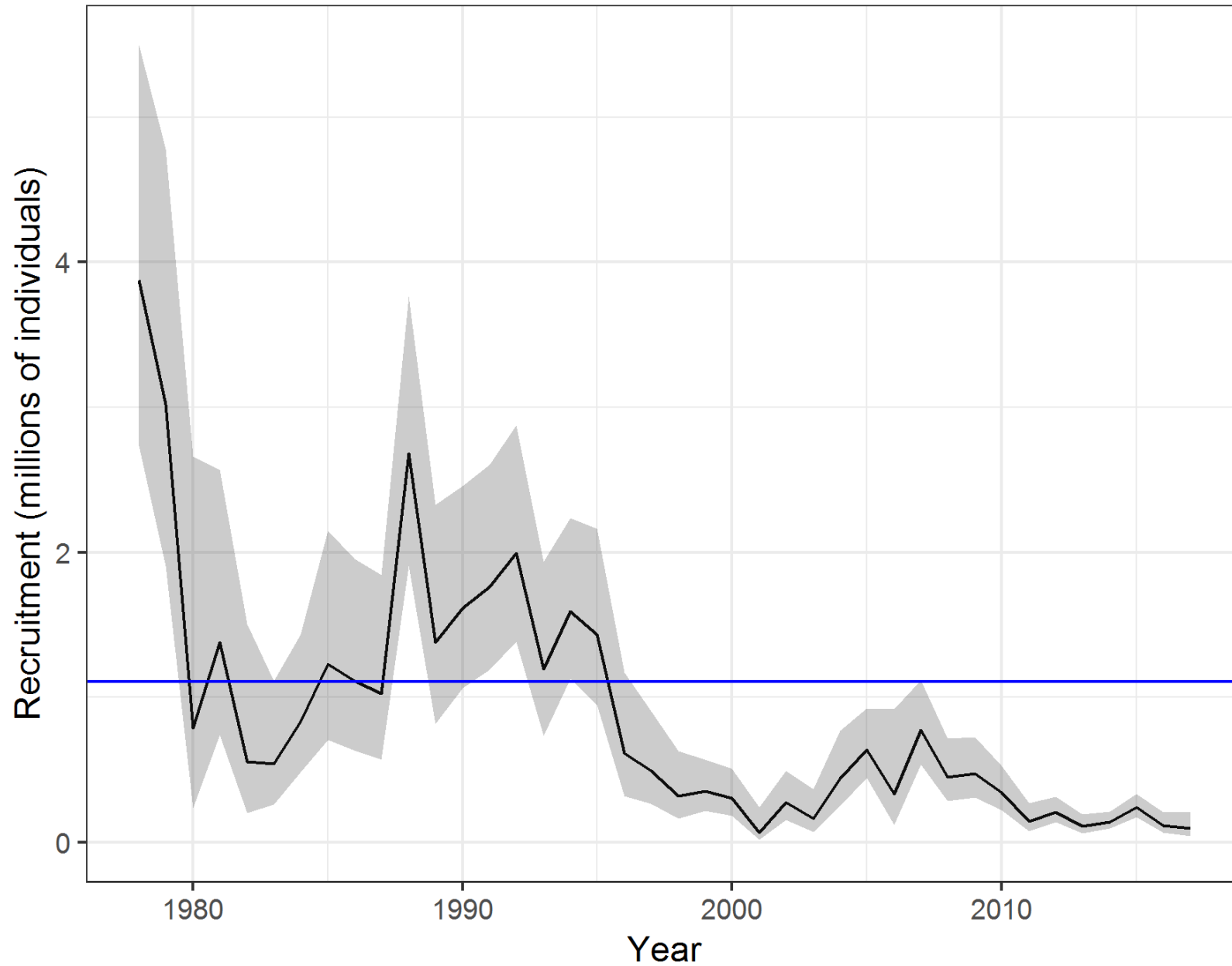
- Potential revisions to the State harvest strategy?
- Are there reasons to consider additional groundfish fishery measures to increase likelihood of rebuilding (habitat or other area closures)?
- Recommendations on ‘rebuild’, 1 vs 2 years  $> B_{MSY}$



# ASSESSMENT UPDATE: ISSUES AND PROJECTIONS

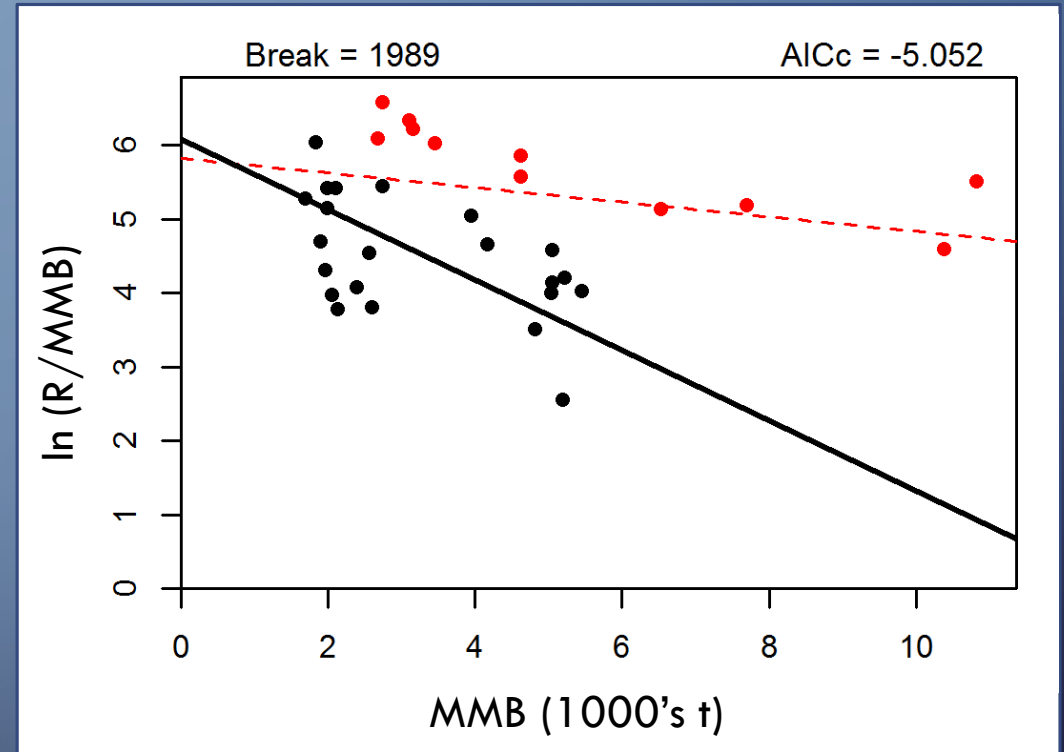
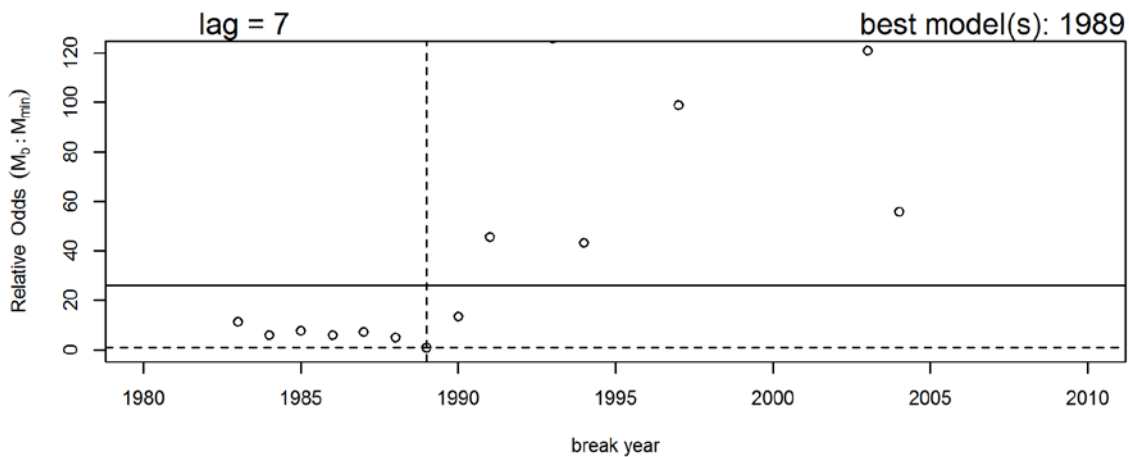
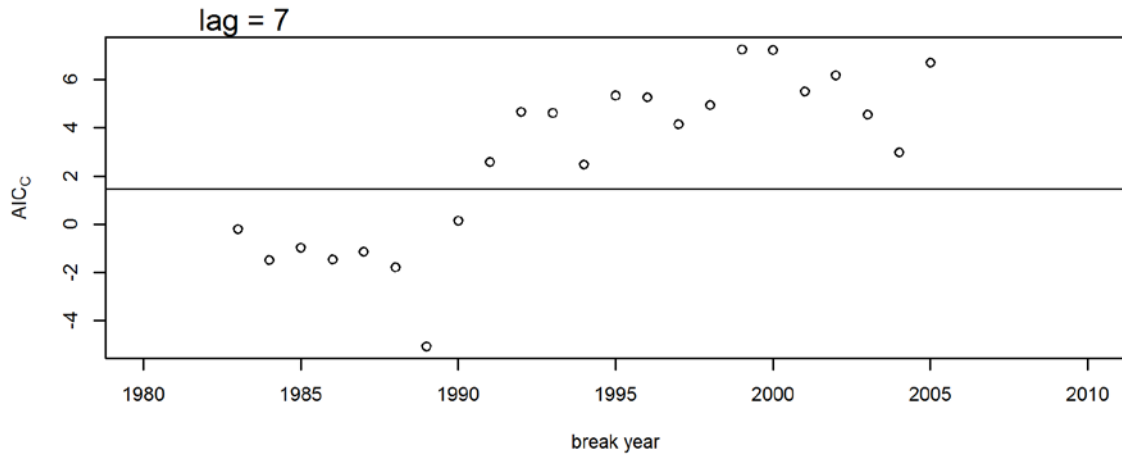


Base model 2018



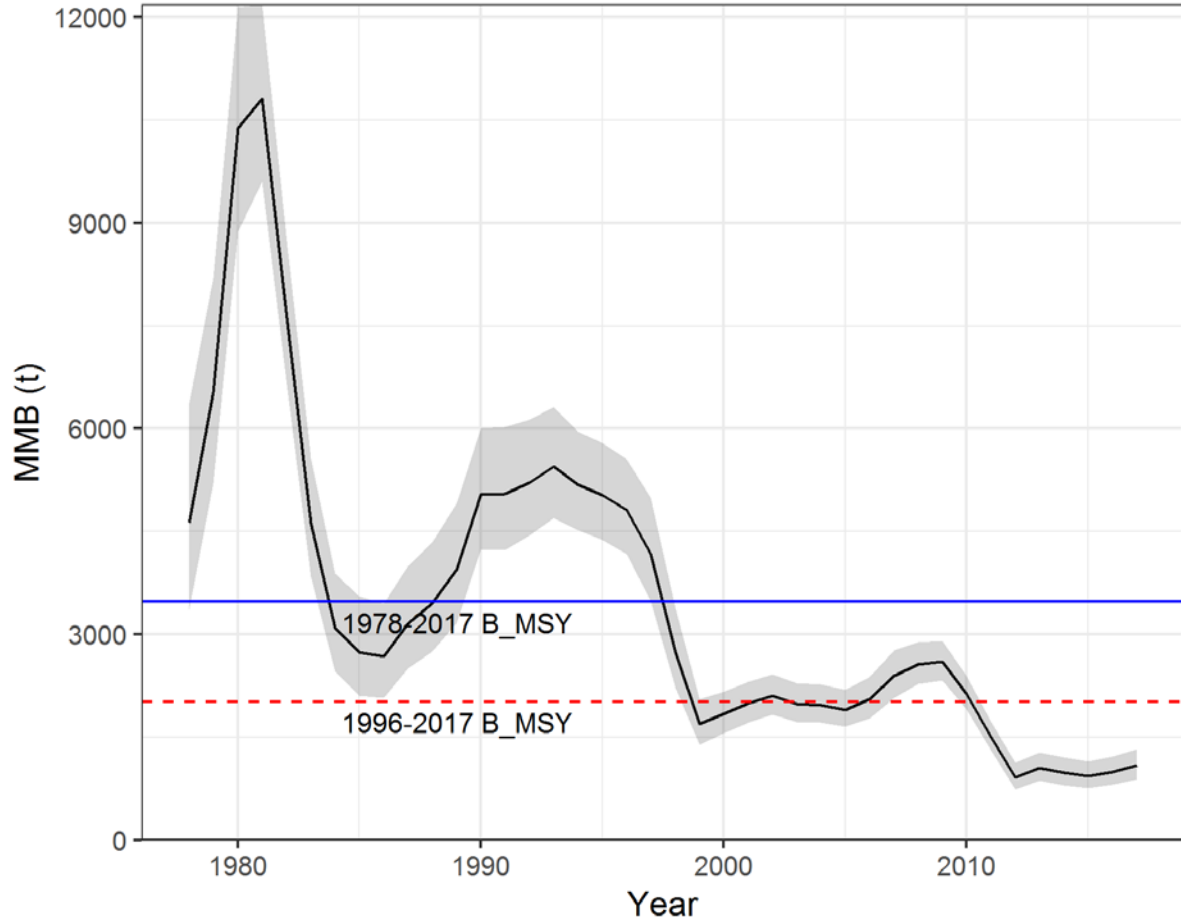
RECRUITMENT

# RECRUITMENT BREAKPOINT / PRODUCTIVITY

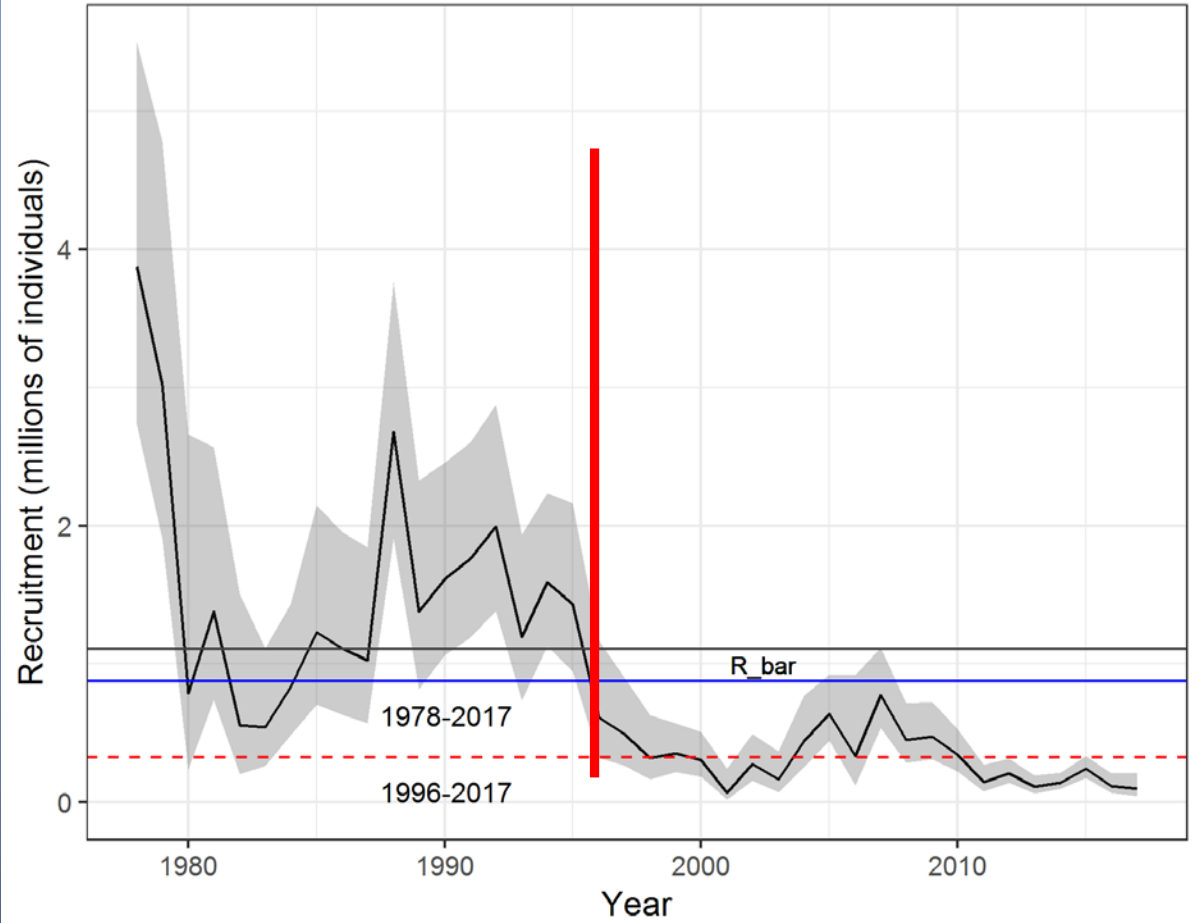


1989 brood year – 1996 recruitment

Base model - model 1 (Model 3 2018)



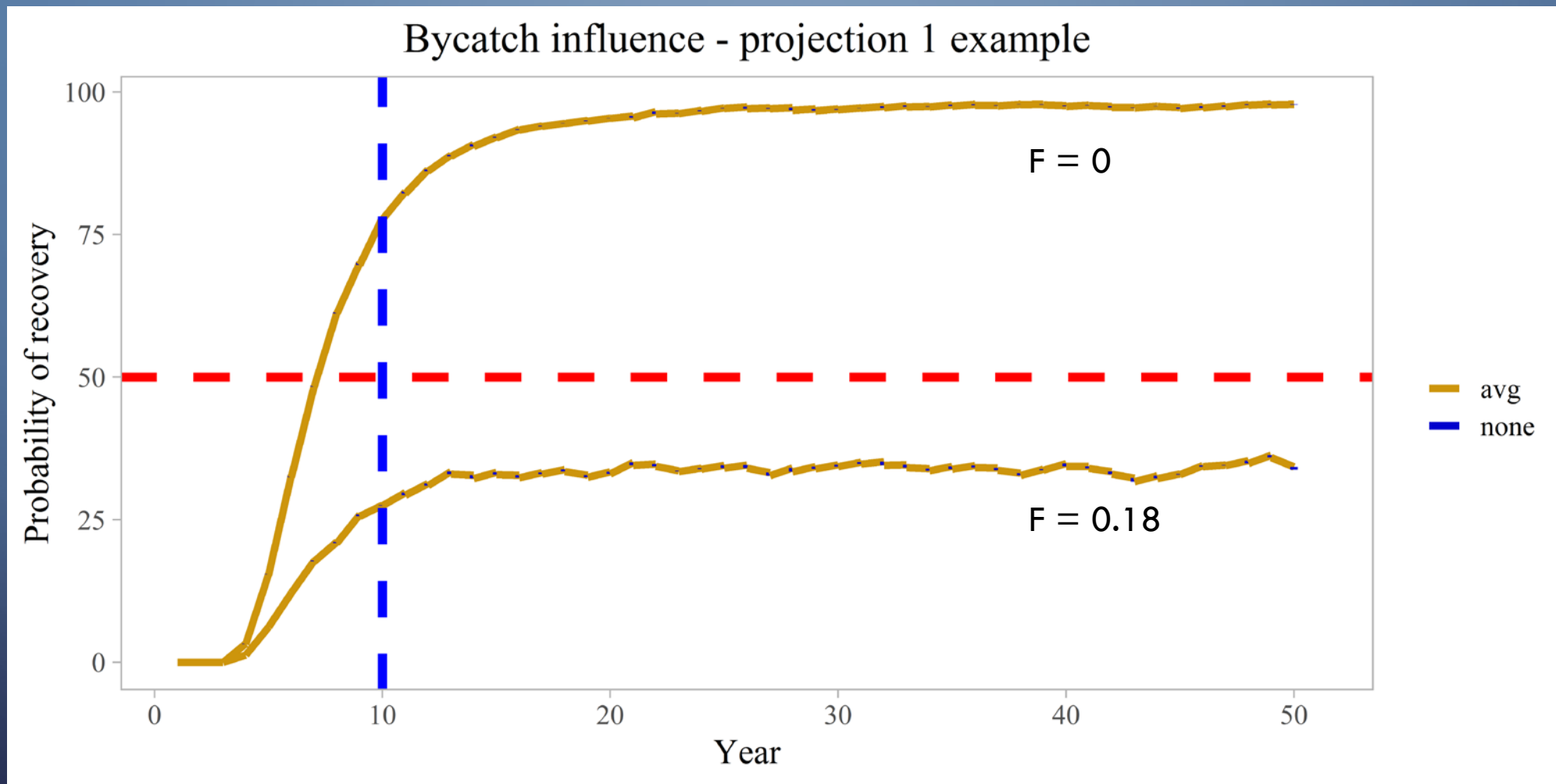
Base model 2018



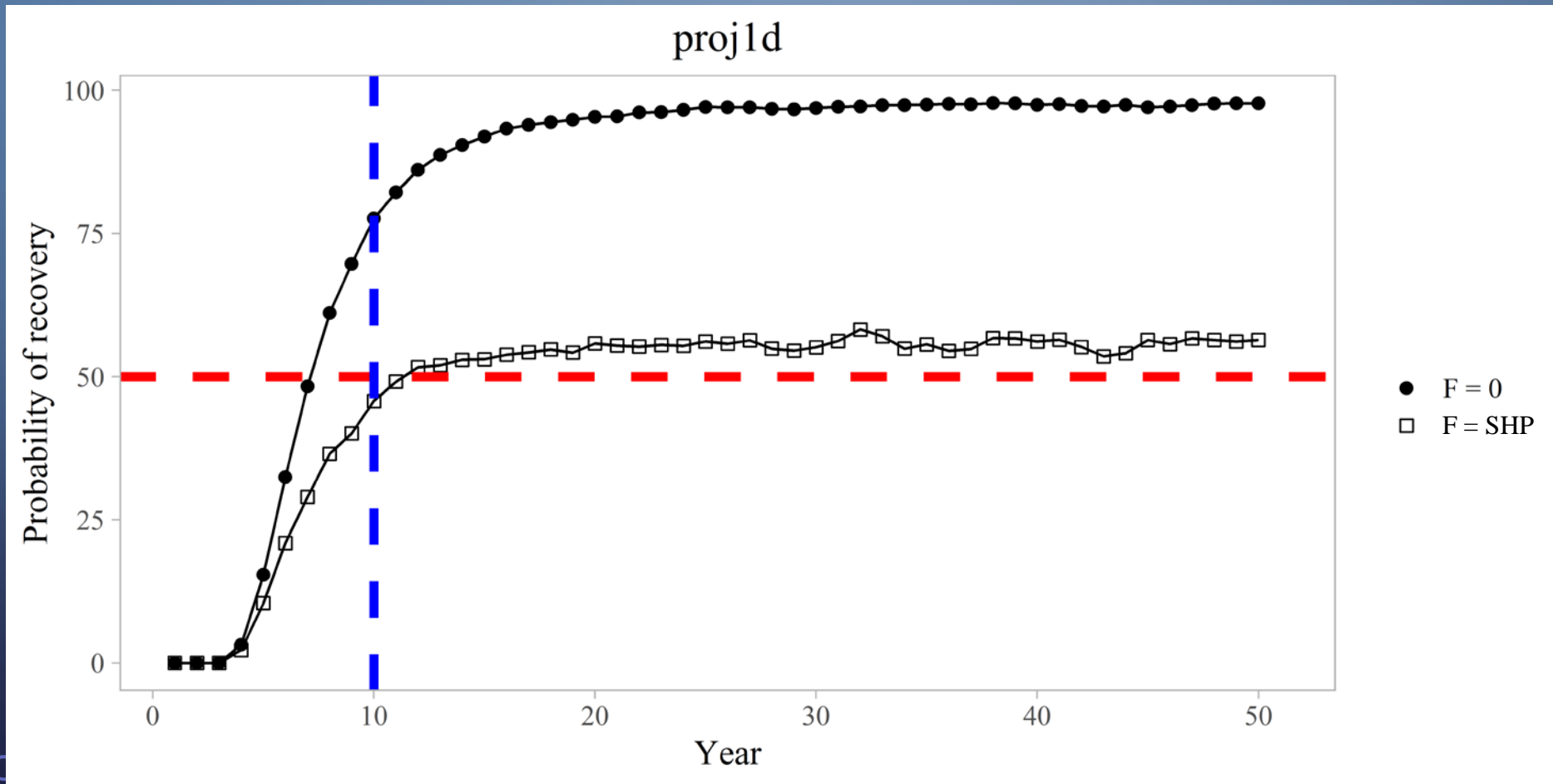
Year	Basis for $B_{MSY}$	$B_{MSY}$ proxy	MSST	Biomass (MMB <sub>matings</sub> )	$B/B_{MSY}$
2018/19	1978-2017	3.48	1.74	1.09	0.31
2018/19	1996-2017	2.03	1.015	1.09	0.53

# REBUILDING PROJECTIONS

- Gmacs projection module developed in Jan
- Assumptions:
  - Bycatch (does not influence rebuilding time)
  - State harvest policy
  - Future recruitment – **KEY ASSUMPTION**
    - S-R (A. Punt) – Ricker or B-H
    - “mean” recruitment or “random” recruitment draws

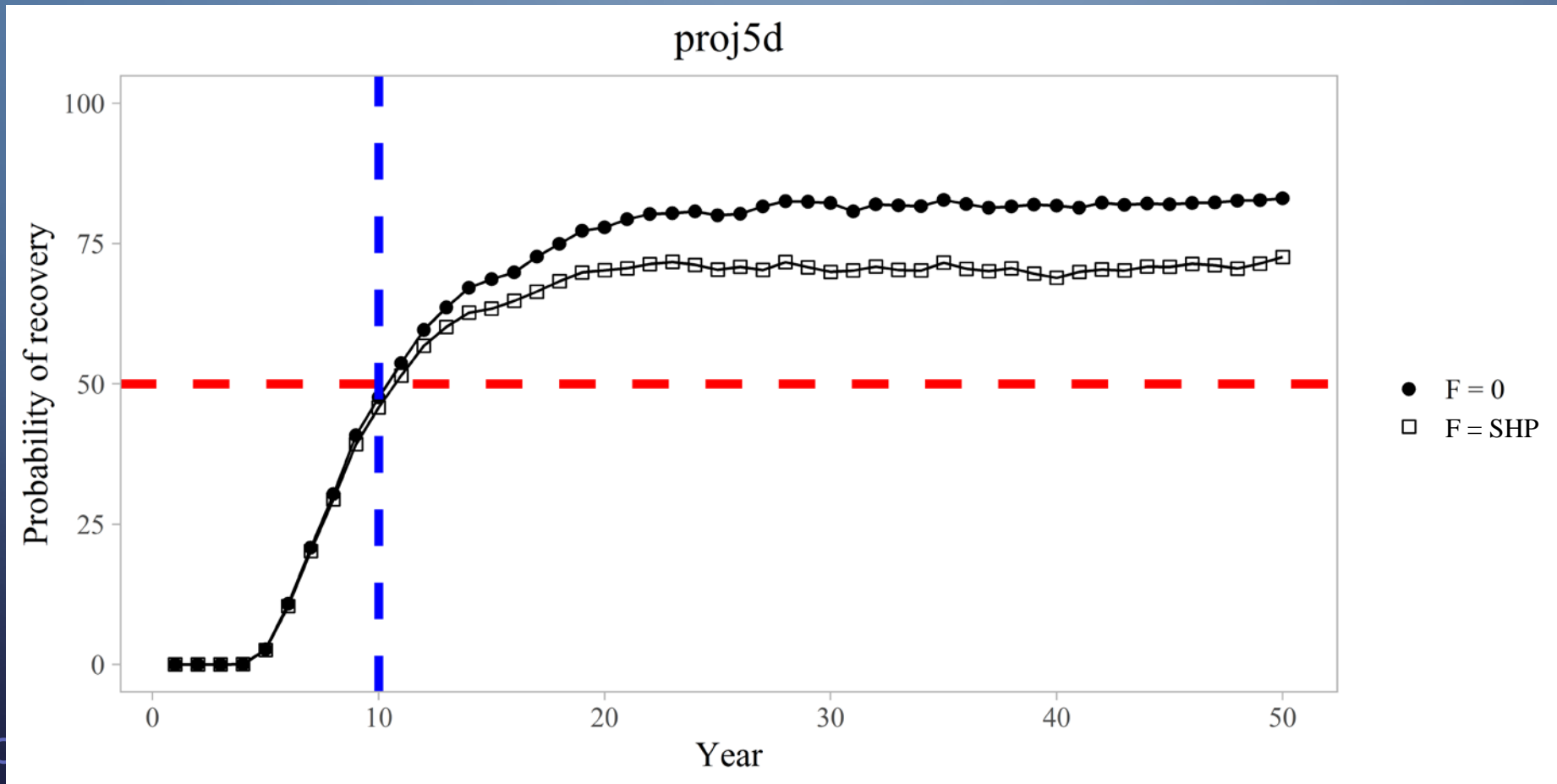


# RANDOM RECRUITMENT (1978-2017)





# RANDOM RECRUITMENT (1996-2017) AND $B_{MSY}$ PROXY (1996-2017)





CPT  
 recommendation  
 on recruitment  
 and Bmsy  
 relative to T<sub>min</sub>

Table 7: T<sub>min</sub> for each projection version d with no directed fishing (F=0).

Projection	recruitment	B <sub>MSY</sub> proxy	recruitment years	T <sub>min</sub>
1	random	1978-2017	1978-2017	7.5 years
2	Ricker	1978-2017		16.5 years
3	Beverton-Holt	1978-2017		14.5 years
4	random	1978-2017	1996-2017	100+ years
5	random	1996-2017	1996-2017	10.5 years
6	random	1978-2017	1999-2008	100+ years
7	random	1978-2017	1989-2017	10 years

What should be considered in a range of alternatives?

## Considerations:

- harvest strategy
- habitat considerations
- probability of rebuilding
- bycatch in groundfish fisheries
- other considerations?

# Previous SMBKC rebuilding plan

harvest strategy	bycatch controls	habitat protection	Other considerations
<ol style="list-style-type: none"><li>1. SQ 20% Mature male abundance</li><li>2. <b>New harvest strategy:</b><ol style="list-style-type: none"><li>a. min stock threshold</li><li>b. min GHL</li><li>c. threshold on harvest rates</li><li>d. cap on legal males</li></ol></li></ol>	<ol style="list-style-type: none"><li>1. SQ</li><li>2. <b>BOF gear mod measures and area closure</b></li></ol>	<ol style="list-style-type: none"><li>1. SQ</li><li>2. <b>EFH</b></li><li>3. <b>BOF state waters habitat protection areas</b></li></ol>	No fishing until the stock is rebuilt

# Additional habitat protection measures (not part of RBP)

## **St. Matthew Island Habitat Conservation Area**

Amd 89 to FMP implemented  
2008

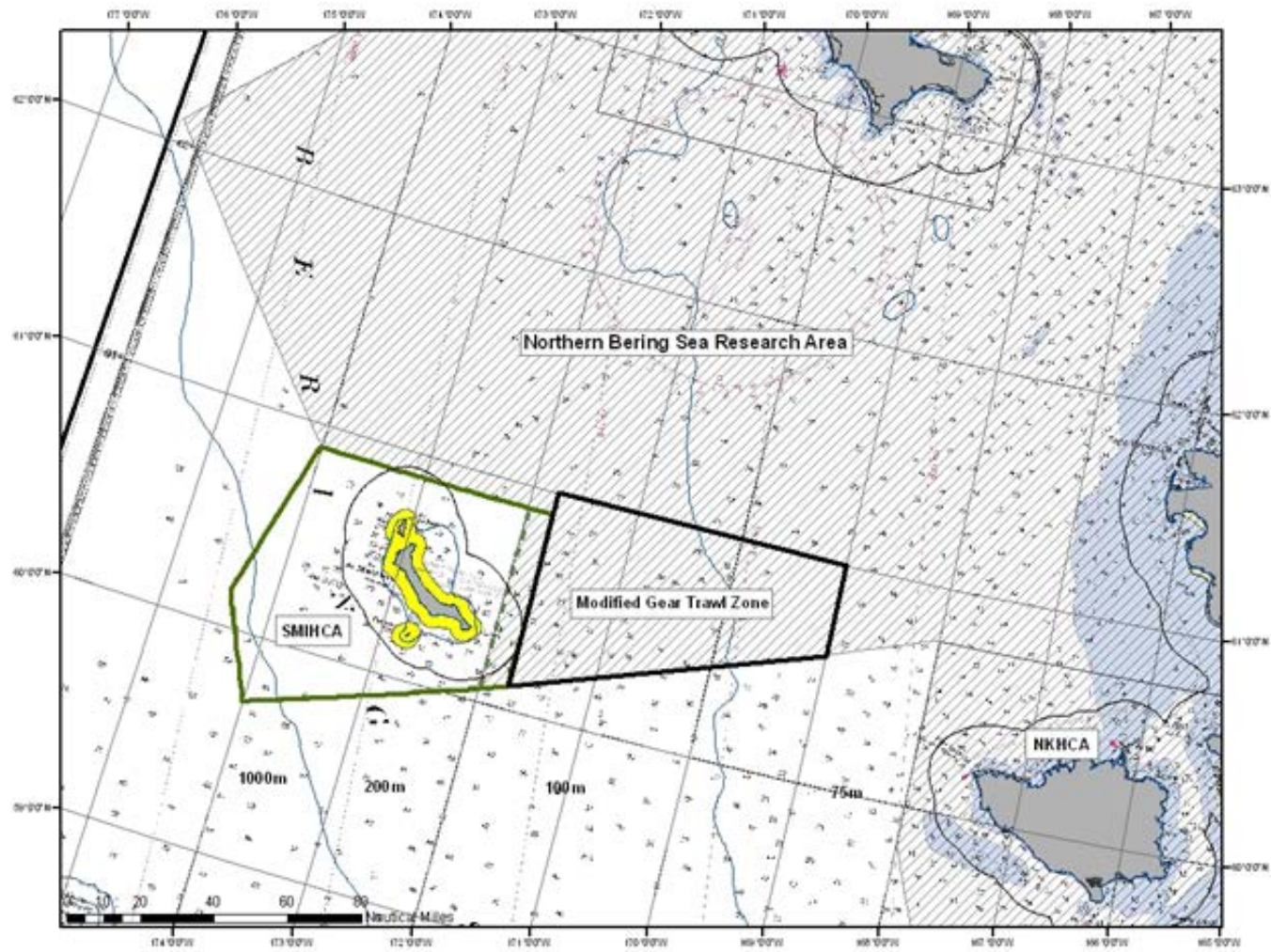
- primary goal to protect BKC habitat
- done in conjunction with much broader analysis of non-pelagic closures

## **Expansion of SMIHCZ**

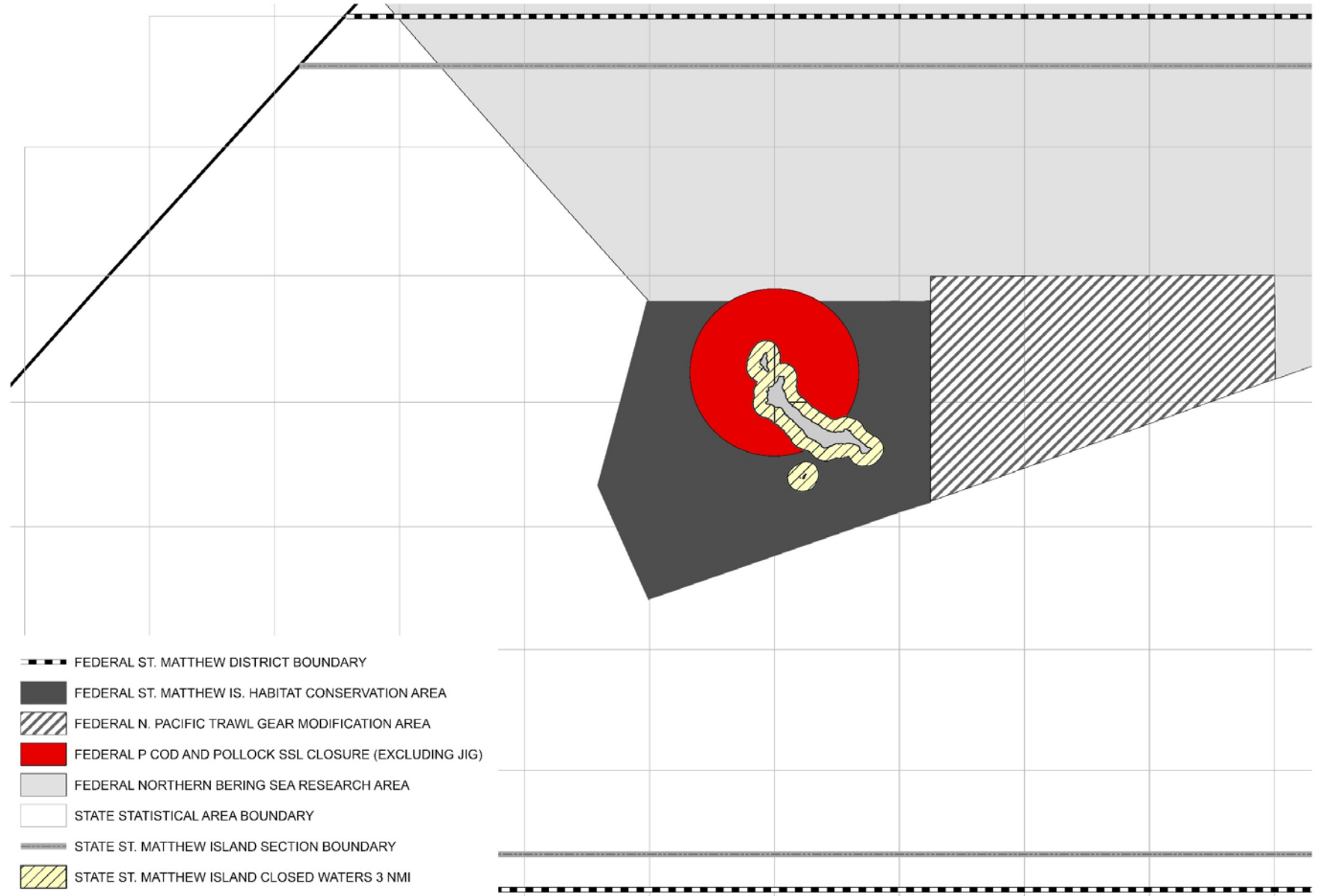
Amd 94 to FMP implemented  
2010

- expanded eastern boundary of SMIHCZ

SMIHCZ  
including  
revised  
boundary

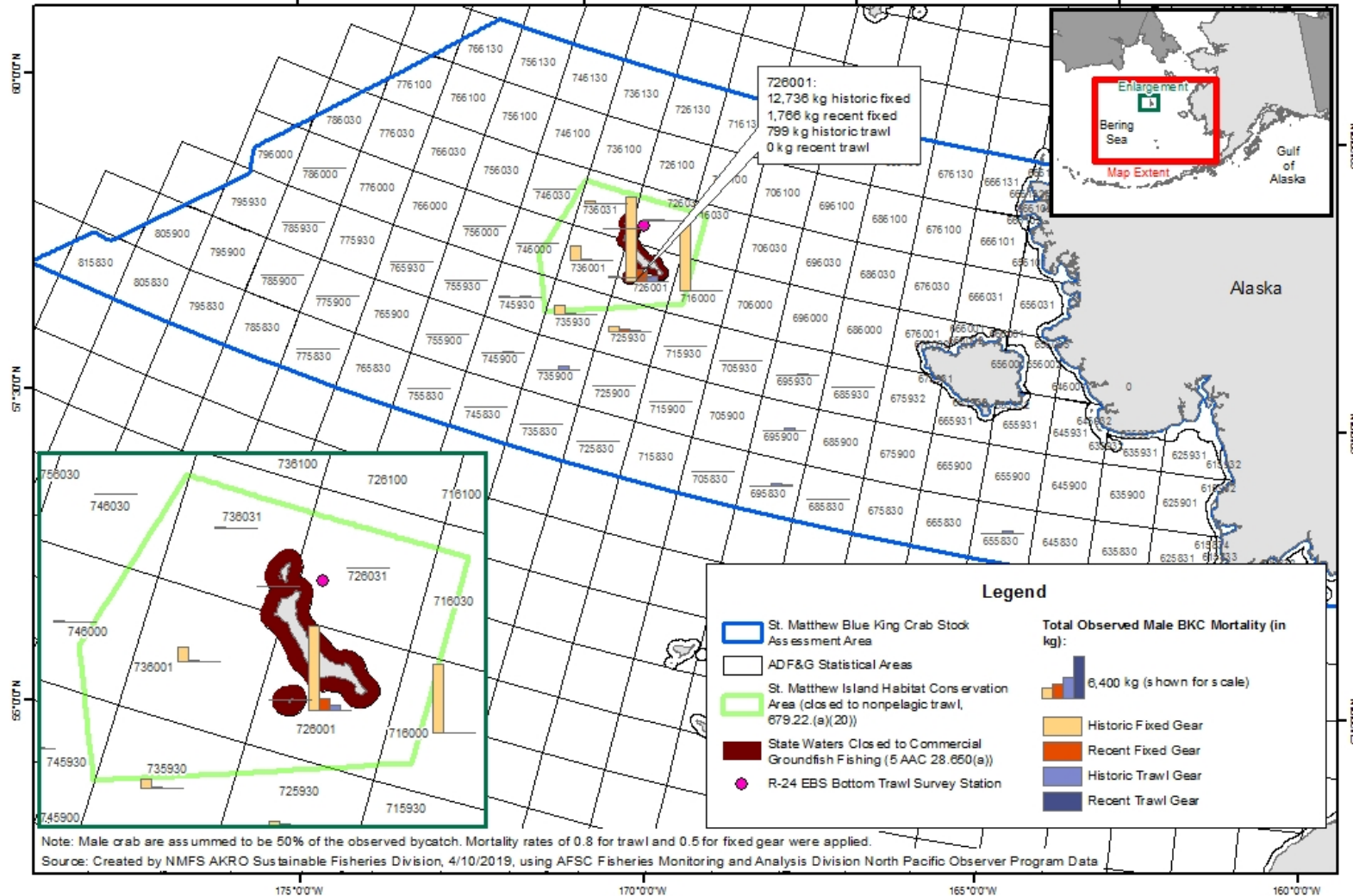


# Closure Areas



# Spatial Location of Observed Groundfish Bycatch

Comparison of Historic (1996-2018) and Recent (2014-2018)  
 Total Observed Male Mortality (in kg) of Blue King Crab Bycatch in the Groundfish Fisheries  
 in the St. Matthew Blue King Crab Stock Assessment Area by Gear (Fixed or Trawl)



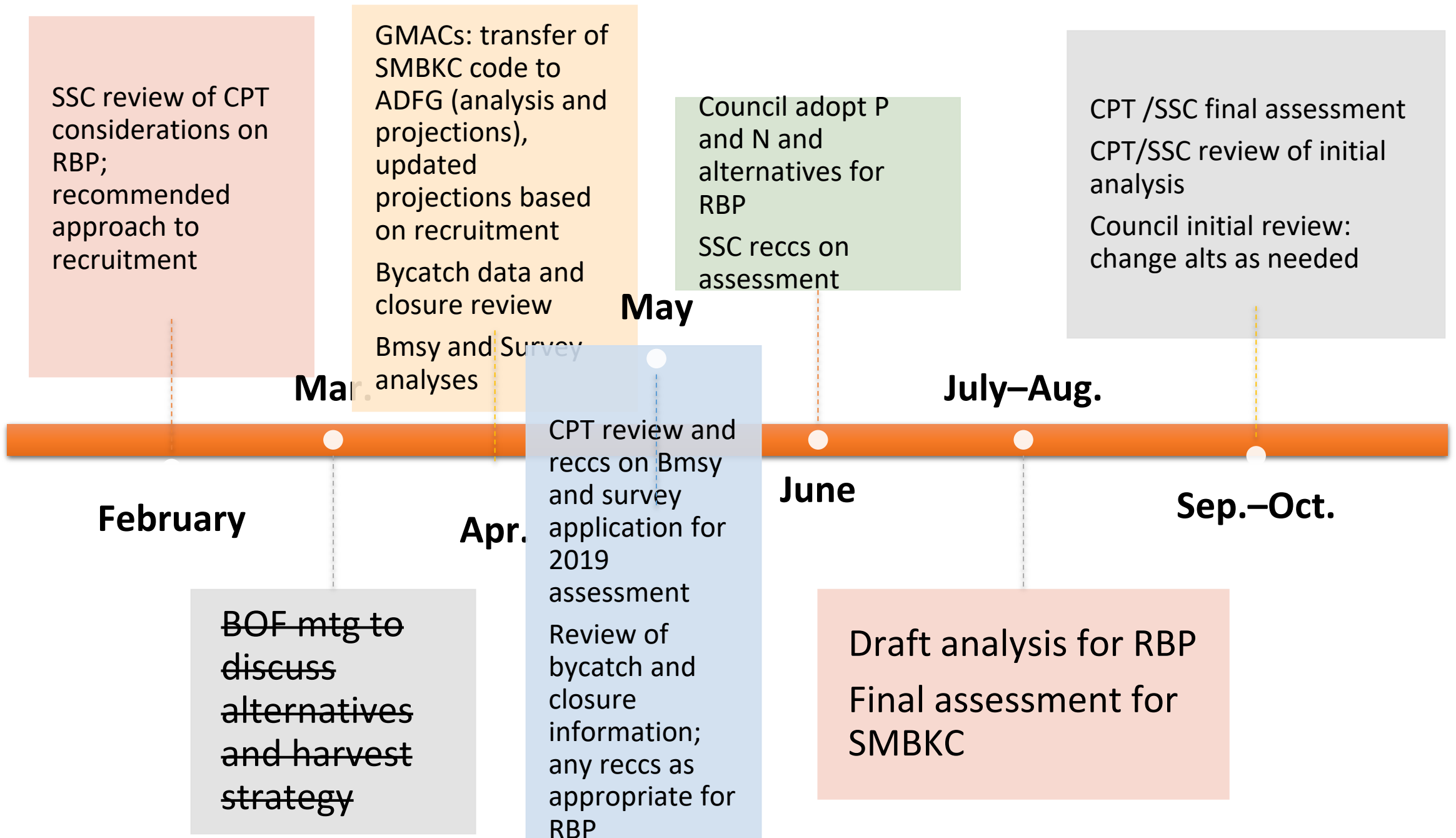


## CPT recommendations

- Scenarios with  $B_{\text{MSYPROXY}}$  and recruitment defined using same time frames (Scenarios 1 and 5)
- Assessment to present alternative status determination results for Fall 2019
  - Current (1978-2017) and breakpoint (1996-2017)
- State harvest strategy as upper bound on mortality
  - Consider amending so that no directed fishing until rebuilt
- Rebuilt should be defined in plan as first year  $> B_{\text{MSY}}$

## CPT recommendations (continued)

- Bycatch at low levels and projections insensitive to current and average levels. Therefore no additional groundfish bycatch measures are recommended.
- Rely on in-season management measures to close areas of high bycatch if OFL is approached
- Consider appropriate rebuilding OFL in specifications process
- Consider environmental factors which may affect rebuilding



# Council actions 2019-2020 following initial review draft

Dec

- Council action as necessary
- Public review draft



Feb

- Council Final action
- SOC final analysis



April/October

- NMFS approval and regulations as needed
- Implementation prior to October 2020