

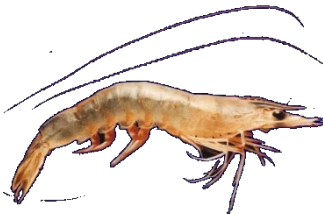


NOAA
FISHERIES

Gulf of Mexico Penaeid Shrimp Stock Assessment Update for 2016

Rick A. Hart, Ph.D.
NOAA Fisheries Service
Southeast Fisheries Science Center
Galveston Laboratory
Galveston, TX USA

Gulf of Mexico Fisheries Management Council Shrimp AP
February 2017

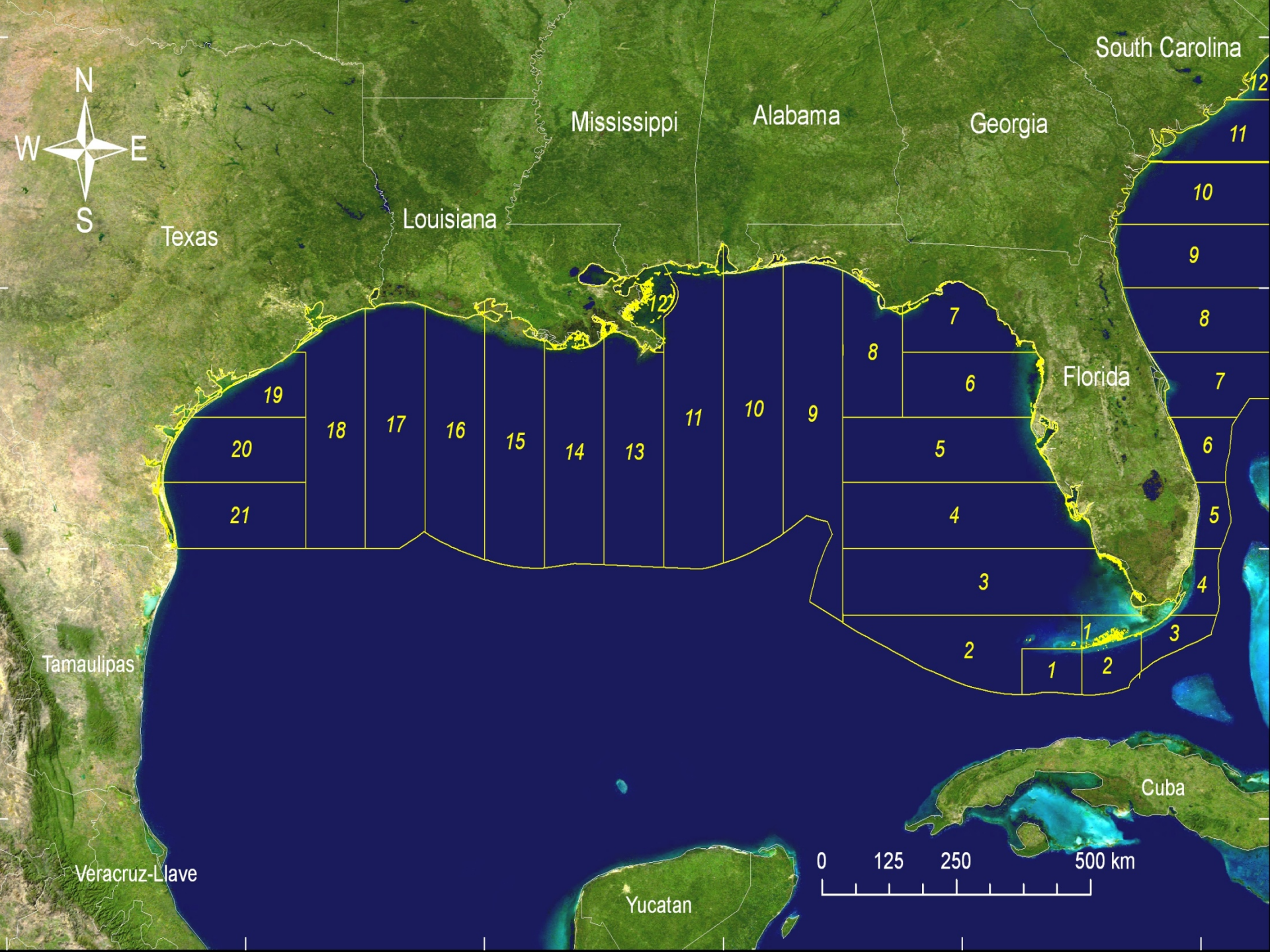


Assessment Updates



Stock Synthesis stock assessment update for SSBmsy and Fmsy estimates for:

- Pink Shrimp statistical zones 1-11
- Brown Shrimp statistical zones 7-21
- White Shrimp statistical zones 7-21



Pink Shrimp Model Inputs

- 1984-2015 GOM monthly catch (lbs. tails)
- 1984-2015 GOM monthly catch by size category
- 1984-2015 GOM monthly catch rate (CPUE)
- 1987-2015 SEAMAP Summer and Fall Survey Data
 - Catch by size
 - Nominal CPUE Index
- 2008-2015 SEAMAP Summer and Fall Survey Data
 - Delta lognormal CPUE Index

Brown Shrimp Model Inputs

- 1984-2015 GOM monthly catch (lbs. tails)
- 1984-2015 GOM monthly catch by size category
- 1984-2015 GOM monthly catch rate (CPUE)
- 1984-2015 Louisiana monthly shrimp trawl surveys (Western subset)
 - Catch by size
 - Delta lognormal CPUE Index
- 1987-2015 SEAMAP Summer and Fall Survey Data
 - Catch by size
 - Delta lognormal CPUE Index

White Shrimp Model Inputs

- 1984-2015 GOM monthly catch (lbs. tails)
- 1984-2015 GOM monthly catch by size category
- 1984-2015 GOM monthly catch rate (CPUE)
- 1984-2015 Louisiana monthly shrimp trawl surveys (Western subset)
 - Catch by size
 - Delta lognormal CPUE Index
- 1987-2015 SEAMAP Summer and Fall Survey Data
 - Catch by size
 - Delta lognormal CPUE Index

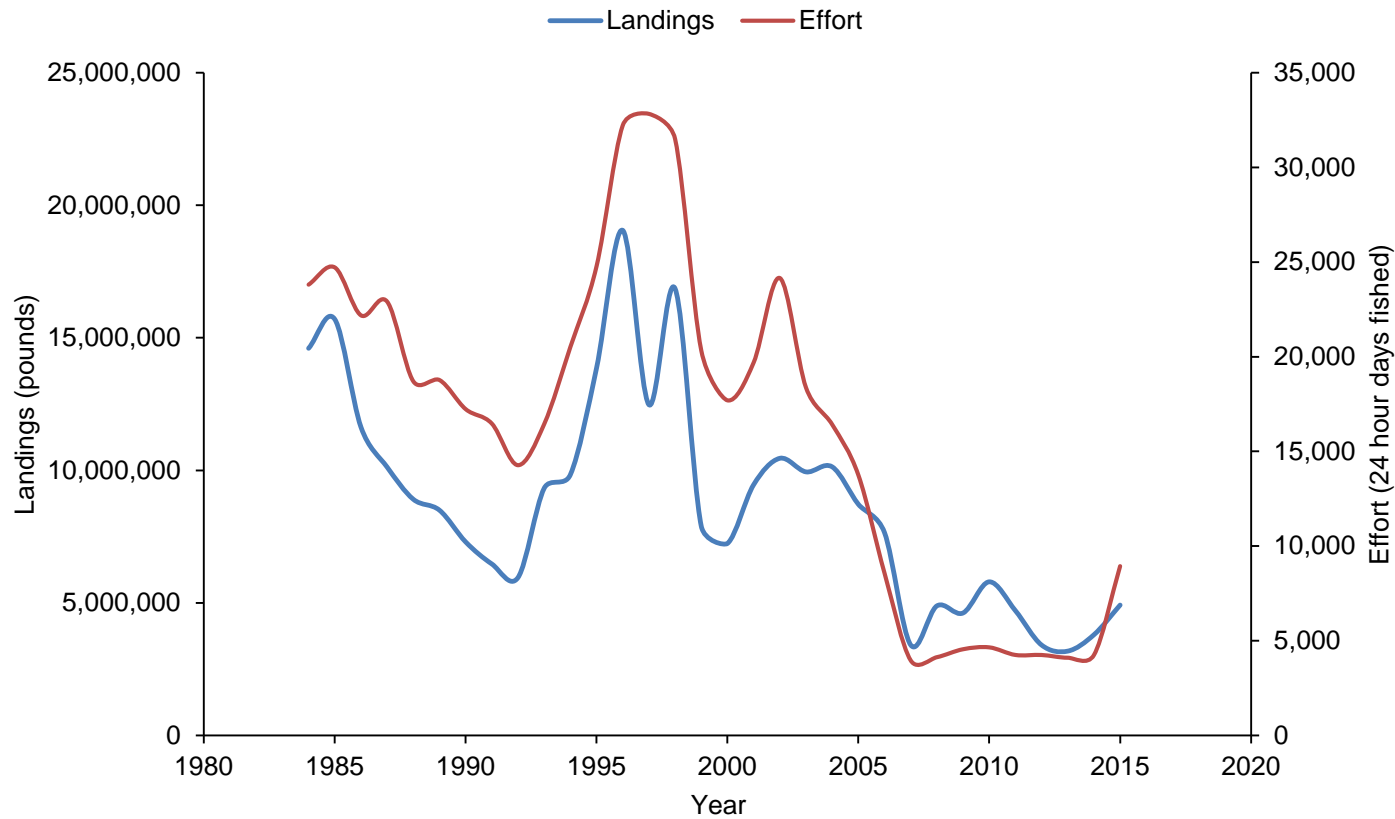
Pink Shrimp SSBmsy and Fmsy Estimates

SSBmsy - Pink shrimp spawn and recruit throughout the year. The current assessment method models these parameters on a continuous basis. Therefore we derive an annual SSBmsy by multiplying the terminal benchmark "year" SSBmsy estimate by 12.

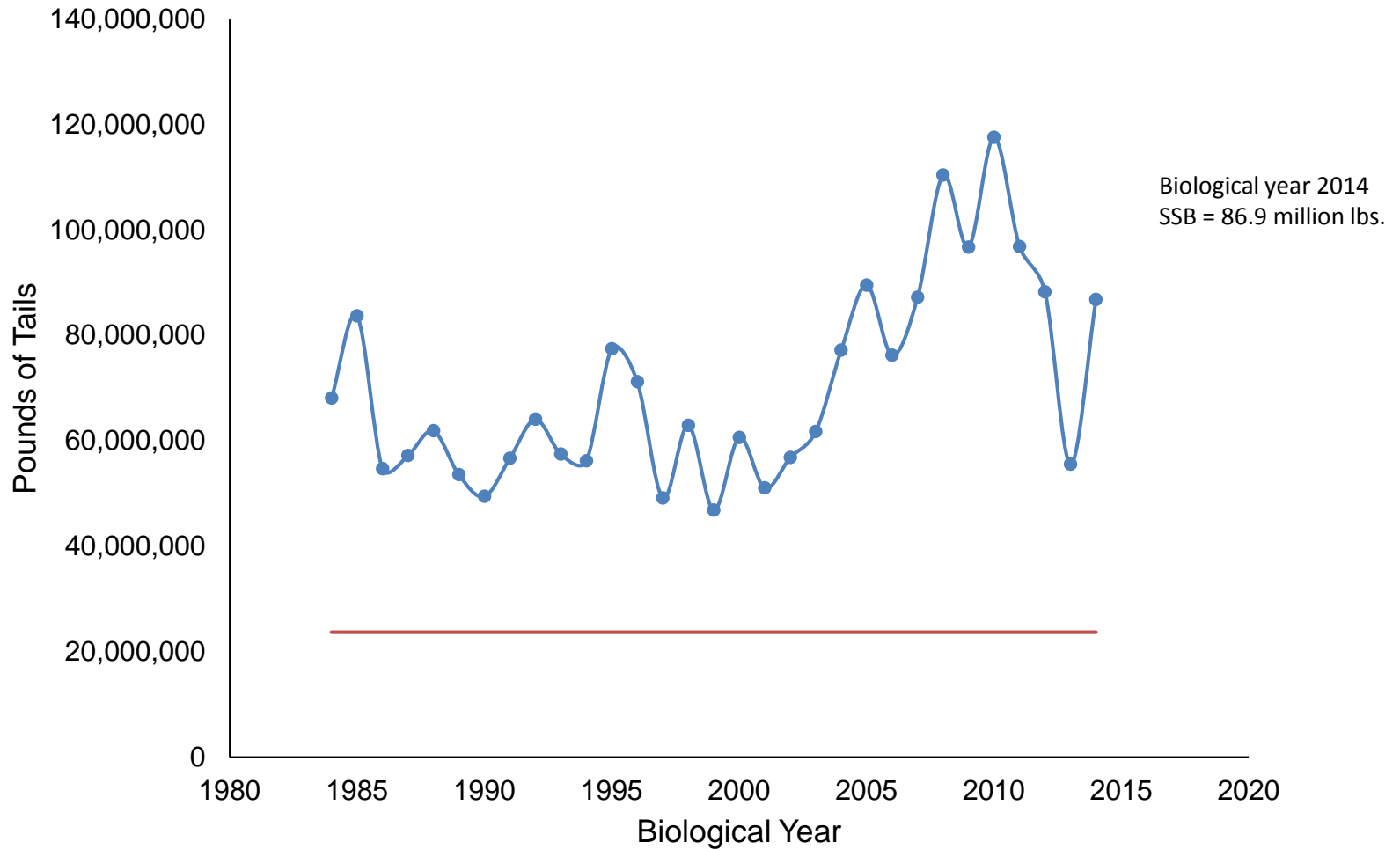
This results in an annual SSBmsy of 23,686,465 lbs. (10,744.2 metric tons) of tails.

Fmsy - The SS model also estimates an Fmsy value. The terminal benchmark "year" value is multiplied by 12 to estimate an annual Fmsy. The sum of the monthly Fstd estimates calculated in the annual assessment is compared to this Fmsy estimate.

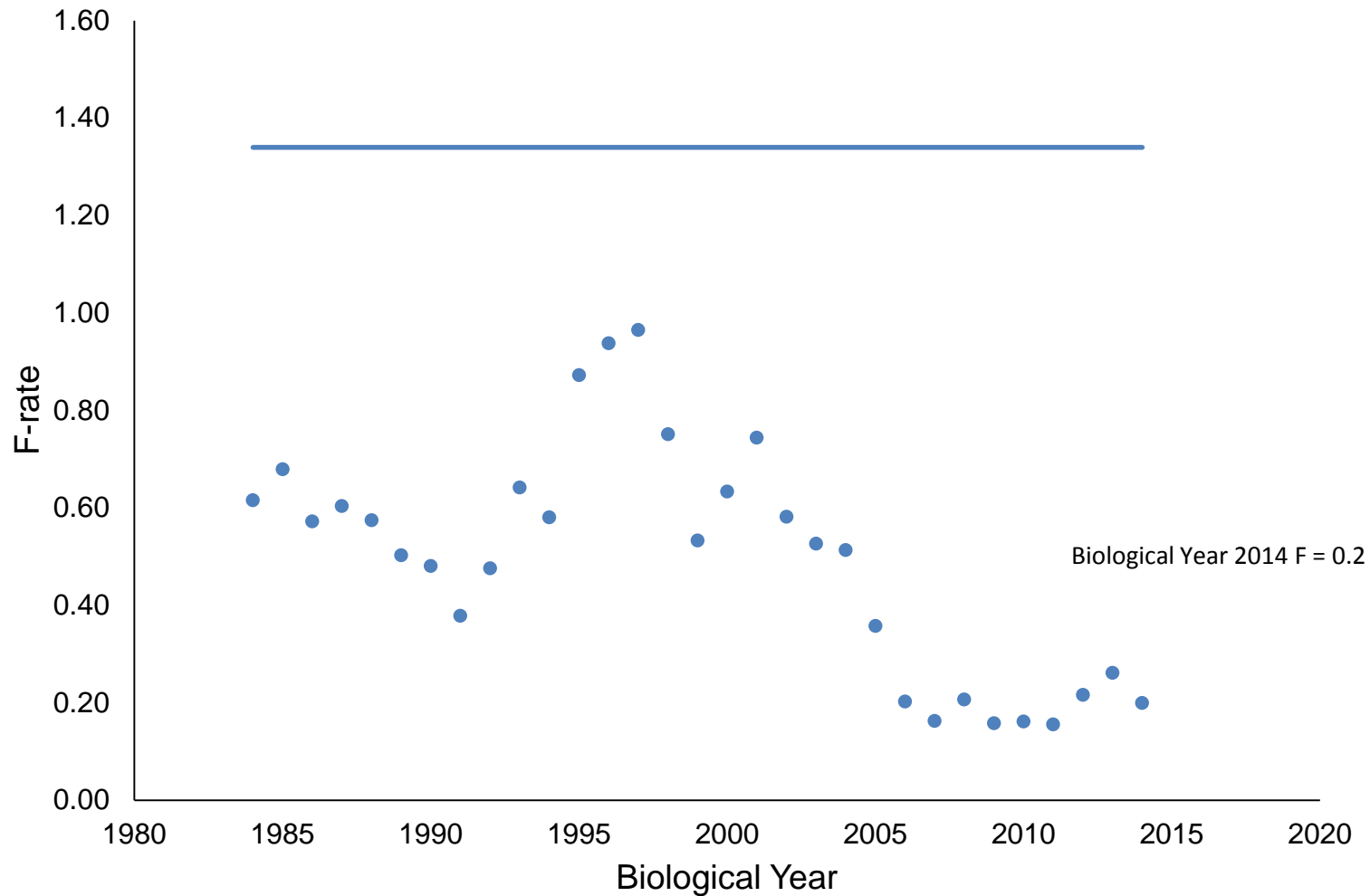
$$Fmsy_{(annual)} = 1.35$$



Pink shrimp landings and effort, 1984-2015.



Pink shrimp stock synthesis SSB and SSBmsy estimate, biological year 2014 (July 2014 – June 2015).



Pink shrimp stock synthesis annual F estimate, biological year 2014 (July 2014 – June 2015).

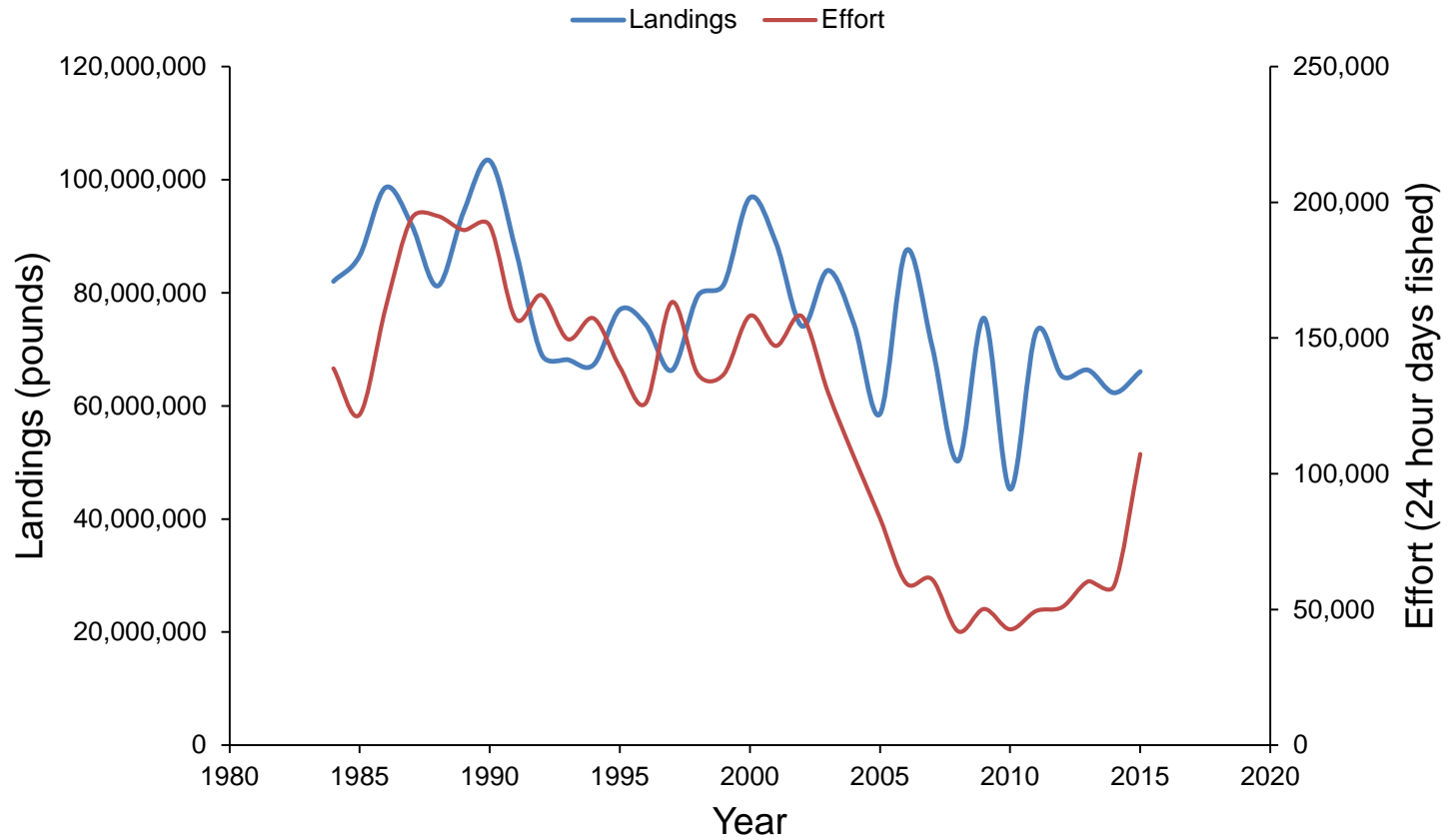
Brown Shrimp SSBmsy and Fmsy Estimates

SSBmsy - The brown shrimp stock assessment is parameterized as an annual model with seasons.

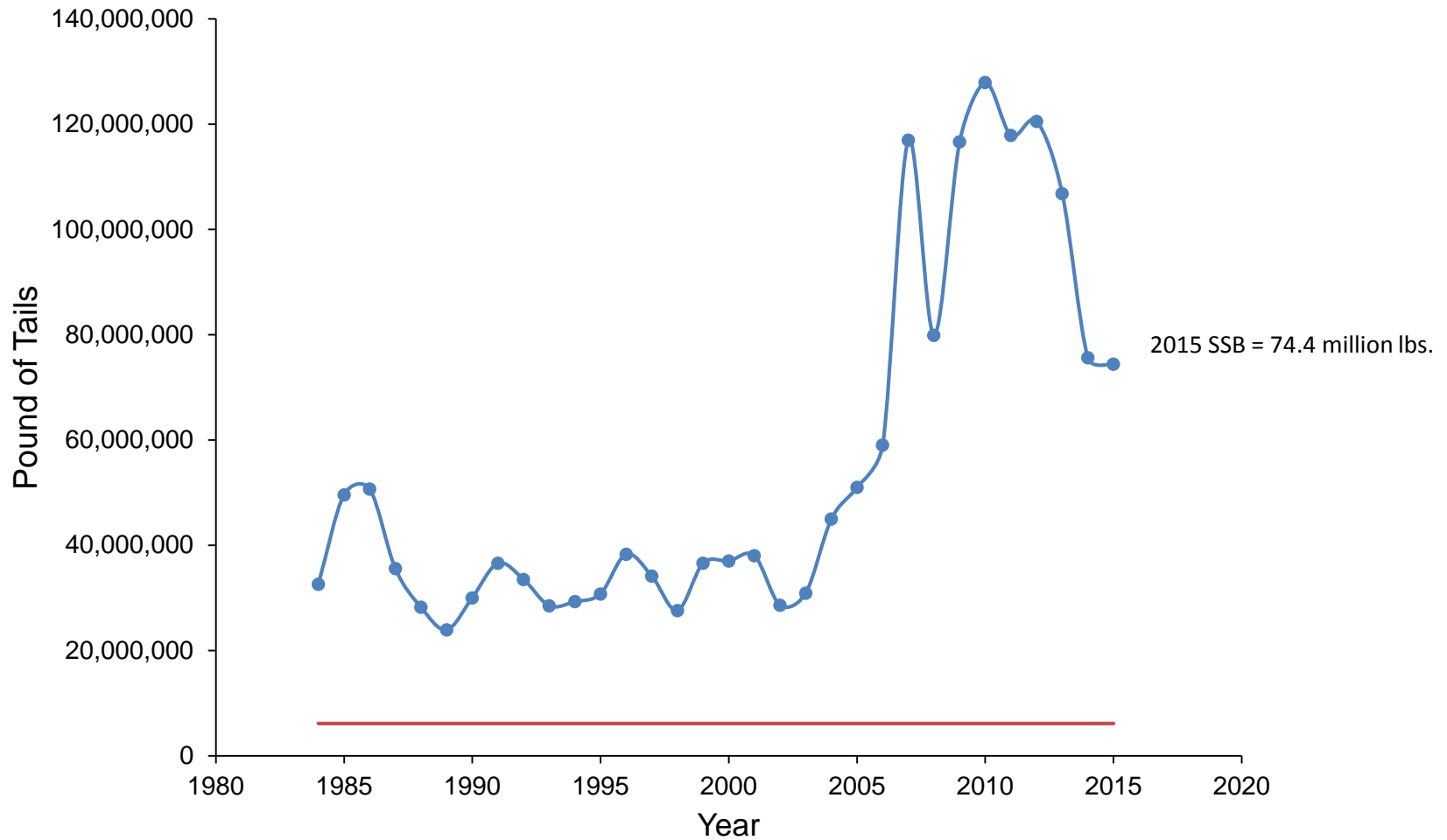
This results in an annual SSBmsy equal to 6,098,824 pounds of tails (2,766.4 metric tons).

Fmsy - SS calculates an annual Fmsy. This is compared to the annual Fstd estimated in the annual assessment run.

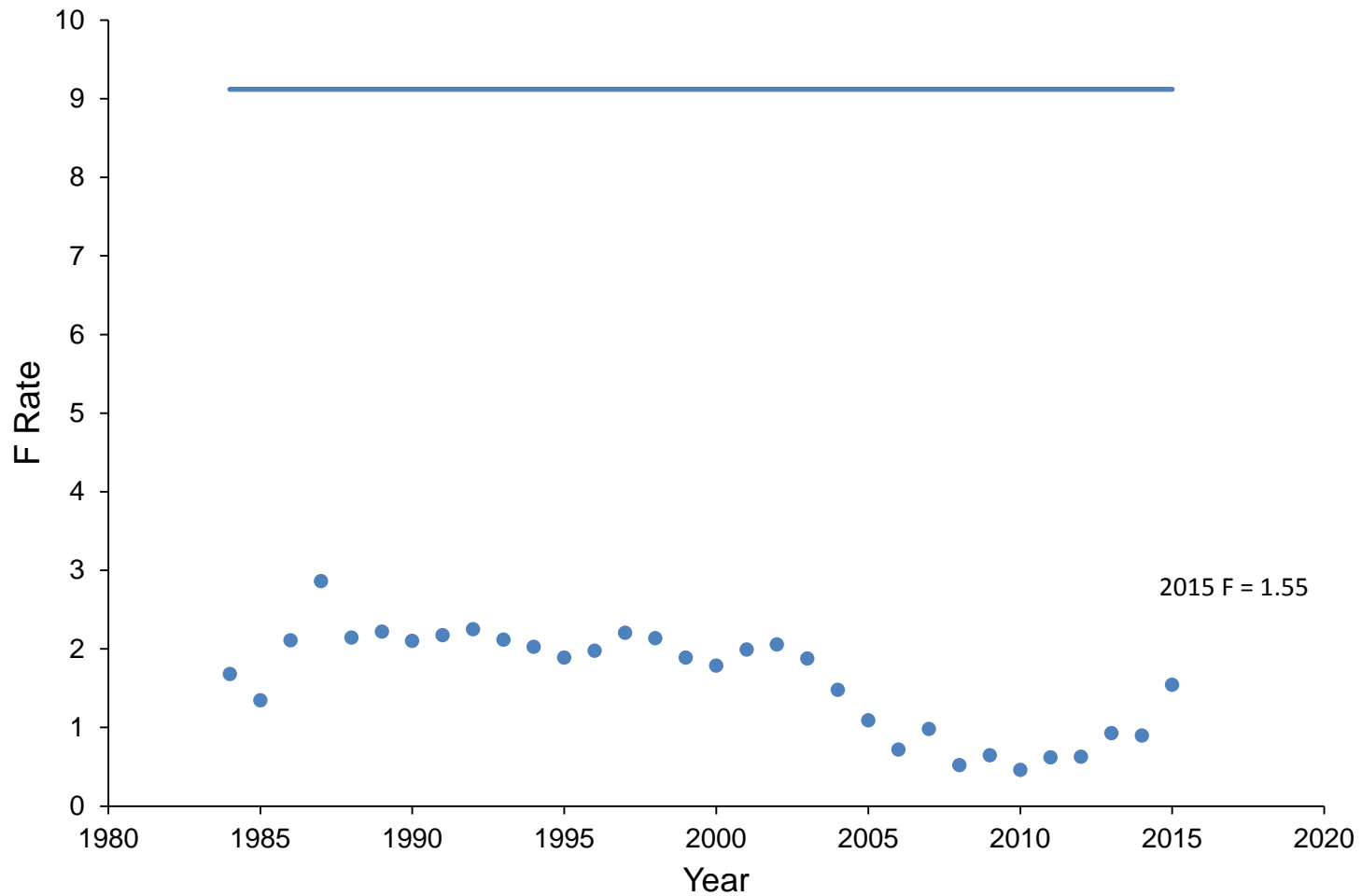
$$Fmsy_{(annual)} = 9.12$$



Brown shrimp landings and effort, 1984-2015.



Brown shrimp 2015 stock synthesis annual SSB and SSBmsy estimates.



Brown shrimp 2015 stock synthesis annual F estimates.

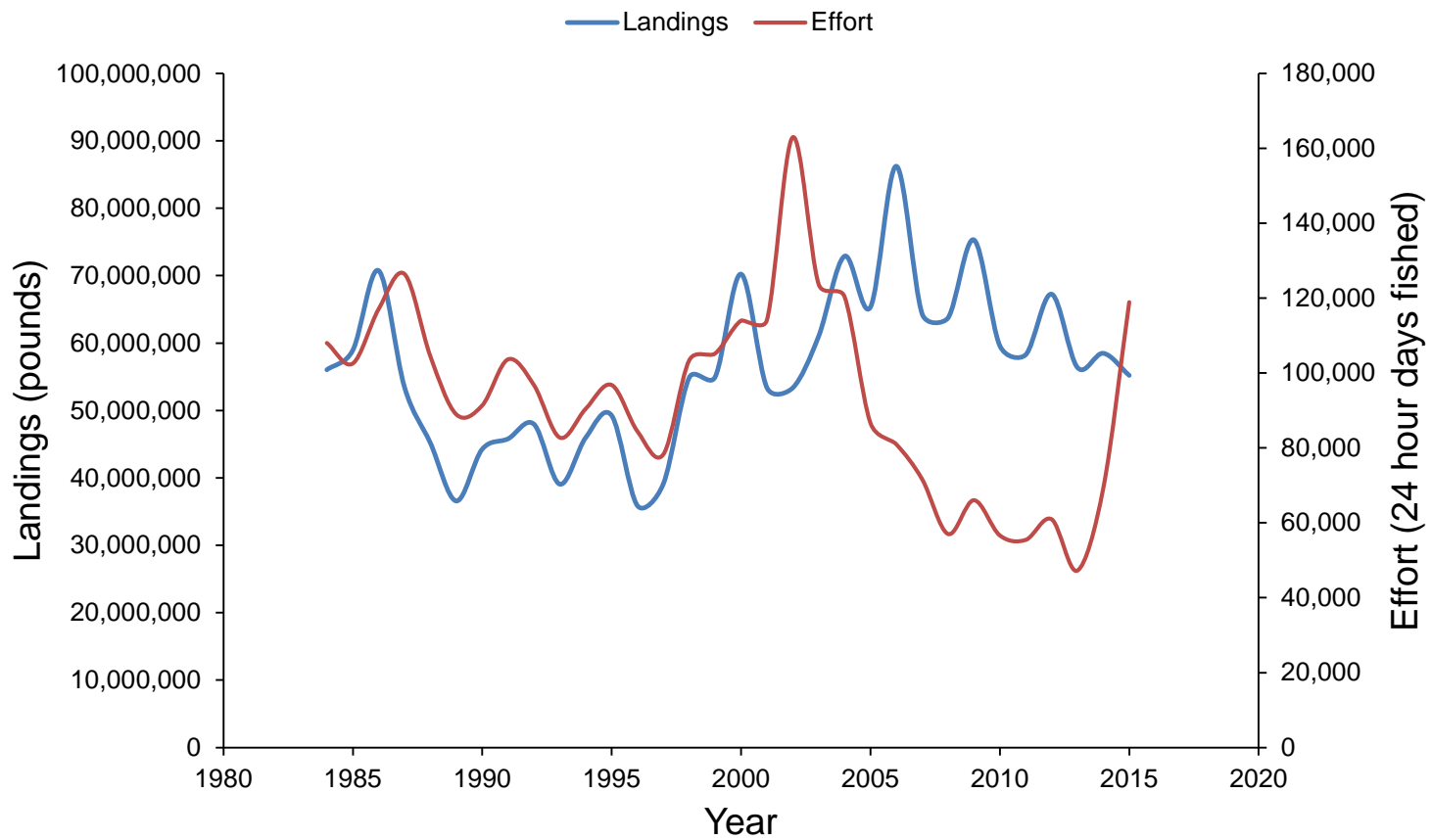
White Shrimp SSBmsy and Fmsy Estimates

SSBmsy - White shrimp spawn and recruit in cycles in throughout the year and similar to the pink shrimp model, this models these parameters on a continuous basis. An annual SSBmsy is estimated by multiplying the terminal benchmark "year" SSBmsy estimate by 12.

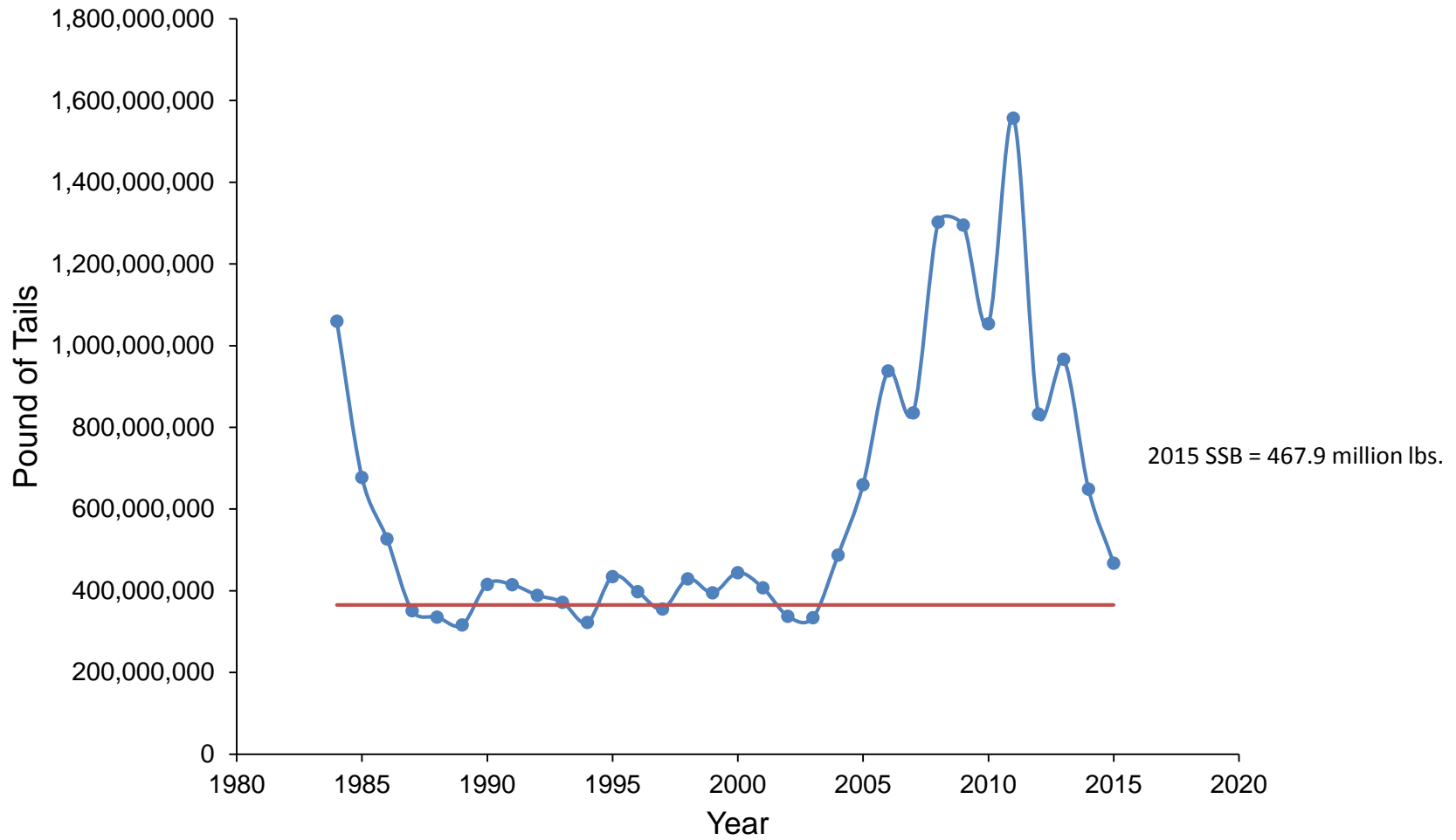
We derive an annual adjusted SSBmsy of 365,611,862 pounds of tails (165,885 metric tons).

Fmsy - the SS model estimates an Fmsy value. This value is multiplied by 12 to estimate an annual Fmsy. The sum of the mean monthly Fstd estimates is compared to this Fmsy estimate.

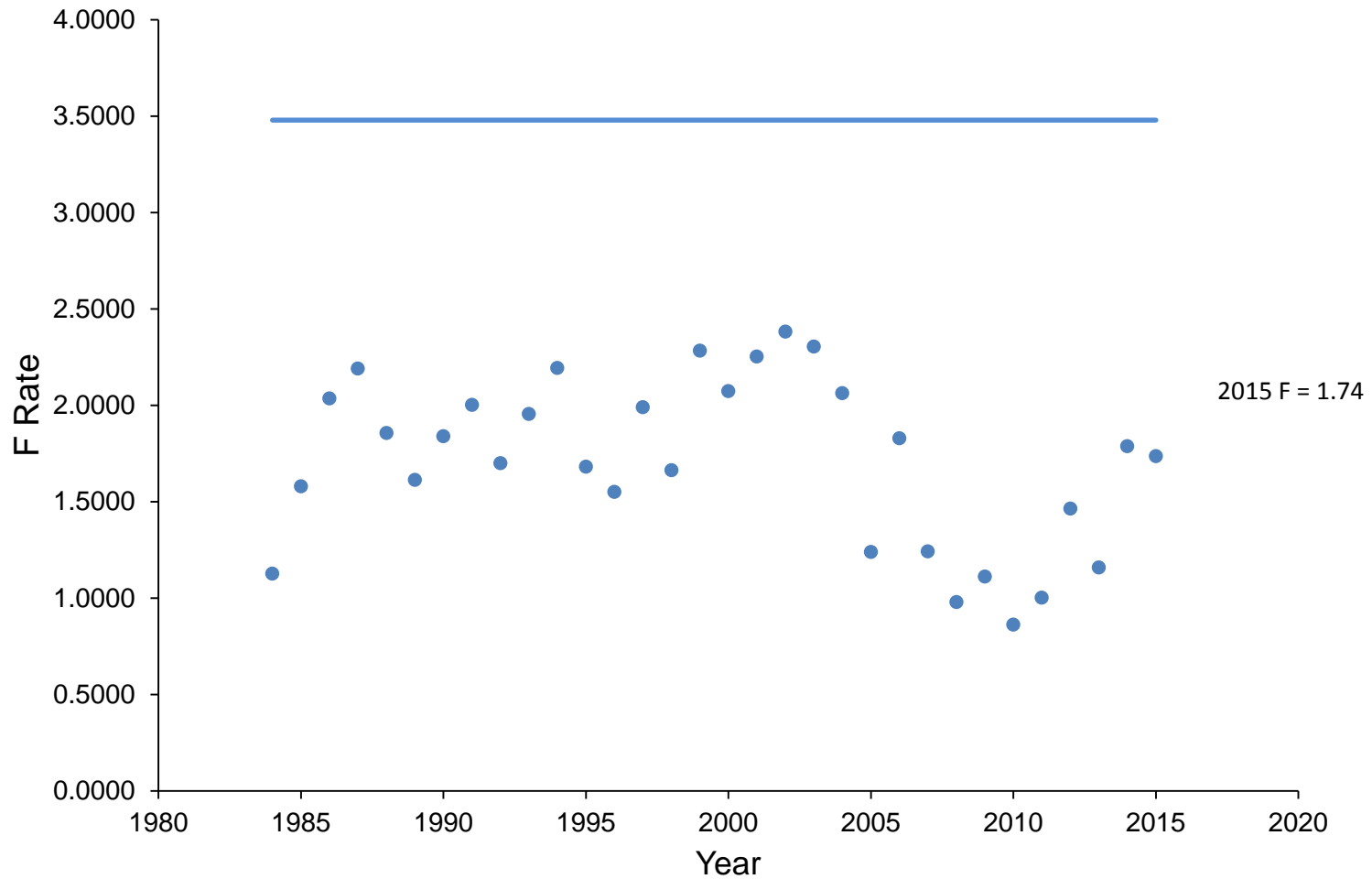
$$Fmsy_{(annual)} = 3.48$$



White shrimp landings and effort, 1984-2015.



White shrimp 2015 stock synthesis annual SSB and SSBmsy estimates.



White shrimp 2015 stock synthesis annual F estimates.

Conclusions

- All three stocks are healthy and are not Overfished nor undergoing Overfishing
- Spawning stock biomass for all three stocks is greater than overfished reference points
- Fishing mortality rates are less than the F-rate overfishing reference points

Acknowledgements

Drs. Richard Methot and James M. Nance
National Marine Fisheries Service
Assistance with Stock Synthesis modeling and SSBmsy and
Fmsy estimation

James Primrose and Jo Williams
National Marine Fisheries Service
Assistance with data compilation and maps

Louisiana Wildlife and Fisheries – Joe West

GOM Commercial Shrimp Fishermen

Gulf of Mexico Pink Shrimp Stock Assessment Forecast Output File					
Model Run, Rick A. Hart, NMFS SEFSC Galveston Laboratory					
#V3.24a					
SS-V3.24a-safe;_02/24/2012;_Stock_Synthesis_by_Richard_Methot_(NOAA)_using_ADMB_10					
Thu	Aug	14	14:43:10	2014	
Calculate_FMSY	Value			Annual Calculations	
SPR	0.23598				
Fmult	0.60304				
F_std	0.112206			1.346472	
Exploit(Y/Bsmry)	0.319483				
Recruits@MSY	382004	--	--	382004	0.874834
SPBio	895.35	0.002344	--		10744.2
SPBmsy/SPBzero(using_SPB_virgin)	0.206443	--	--		
SPBmsy/SPBzero(using_BenchmarkYr_biology)	0.206443	--	--		
MSY_for_optimize	655.635	0.001716	--		
MSY_encountered	655.635	0.001716	--		
MSY_dead	655.635	0.001716	--	77634.7	
MSY_retain	655.635	0.001716	--		
Biomass_Smry	2052.17	0.005372	--		

Pink shrimp stock synthesis annual SSBmsy and Fmsy estimates.

Gulf of Mexico Brown Shrimp Stock Assessment Forecast Output File					
Model Run, Rick A. Hart, NMFS SEFSC Galveston Laboratory					
#V3.24a					
SS-V3.24a-safe;_02/24/2012;_Stock_Synthesis_by_Richard_Methot_(NOAA)_using_ADMB_10					
Mon	Aug	25	11:17:07	2014	
calculate_FMSY	Value				
SPR	0.0565764				
Fmult	109.395				
F_std	9.11625				
Exploit(Y/Bsmry)	13.8838				
Recruits@MSY	3.98E+07	--	--	3.98E+07	0.999852
SPBio	2766.38	6.95E-05	--	Spawning biomass at MSY	
SPBmsy/SPBzero(using_SPB_virgin)	0.0618594	--	--		
SPBmsy/SPBzero(using_BenchmarkYr_biology)	0.056568	--	--		
MSY_for_optimize	66643.2	0.00167366	--		
MSY_encountered	0	0	--		
MSY_dead	66643.2	0.00167366	--	1.58E+07	
MSY_retain	66643.2	0.00167366	--		
Biomass_Smry	4800.07	0.000120548	--		

Brown shrimp stock synthesis annual SSBmsy calculations.

#V3.24a								
SS-V3.24a-safe;_02/24/2012;_Stock_Synthesis_by_Richard_Methot_(NOAA)_using_ADMB_10								
Wed	Sep	17	11:15:17	2014				
Calculated_Max_Allowable_F	3.25438							
calculate_FMSY	Value			Annual Value				
SPR	0.169578							
Fmult	0.535717							
F_std	0.290407			3.484884				
Exploit(Y/Bsmry)	0.188141							
Recruits@MSY	2.22E+06	--	--	This would be annualized spawning biomass at MSY				
SPBio	13823.8	0.006224	--	165885.6				
SPBmsy/SPBzero(using_SPB_virgin)	0.167476	--	--					
SPBmsy/SPBzero(using_BenchmarkYr_biology)	0.167475	--	--					
MSY_for_optimize	3380.67	0.001522	--					
MSY_encountered	0	0	--					
MSY_dead	3380.67	0.001522	--	879826				
MSY_retain	3380.67	0.001522	--					
Biomass_Smry	17968.8	0.008091	--					

White shrimp Stock Synthesis SSBmsy and Fmsy calculations.