
Pribilof Islands Blue King Crab

William Stockhausen
Alaska Fisheries Science Center

Changes From 2015 Assessment

- Same approach to OFL
 - Tier 4 status determination
 - Tier 5 OFL, ABC
- Random effects model smoothing survey MMB as part of estimating MMB-at-mating for B_{MSY} , current B
- New Fishery Data for 2015/16
 - directed fishery
 - no catch
 - crab fishery bycatch
 - updated
 - groundfish fisheries
 - 2014/15 updated
 - 2015/16 new
- New survey data
 - updated w/ 2016 EBS Trawl Survey
 - abundance, biomass
 - size compositions by sex, shell condition, maturity



Management Performance

Overfishing occurred in 2015/16.
Stock remains overfished.

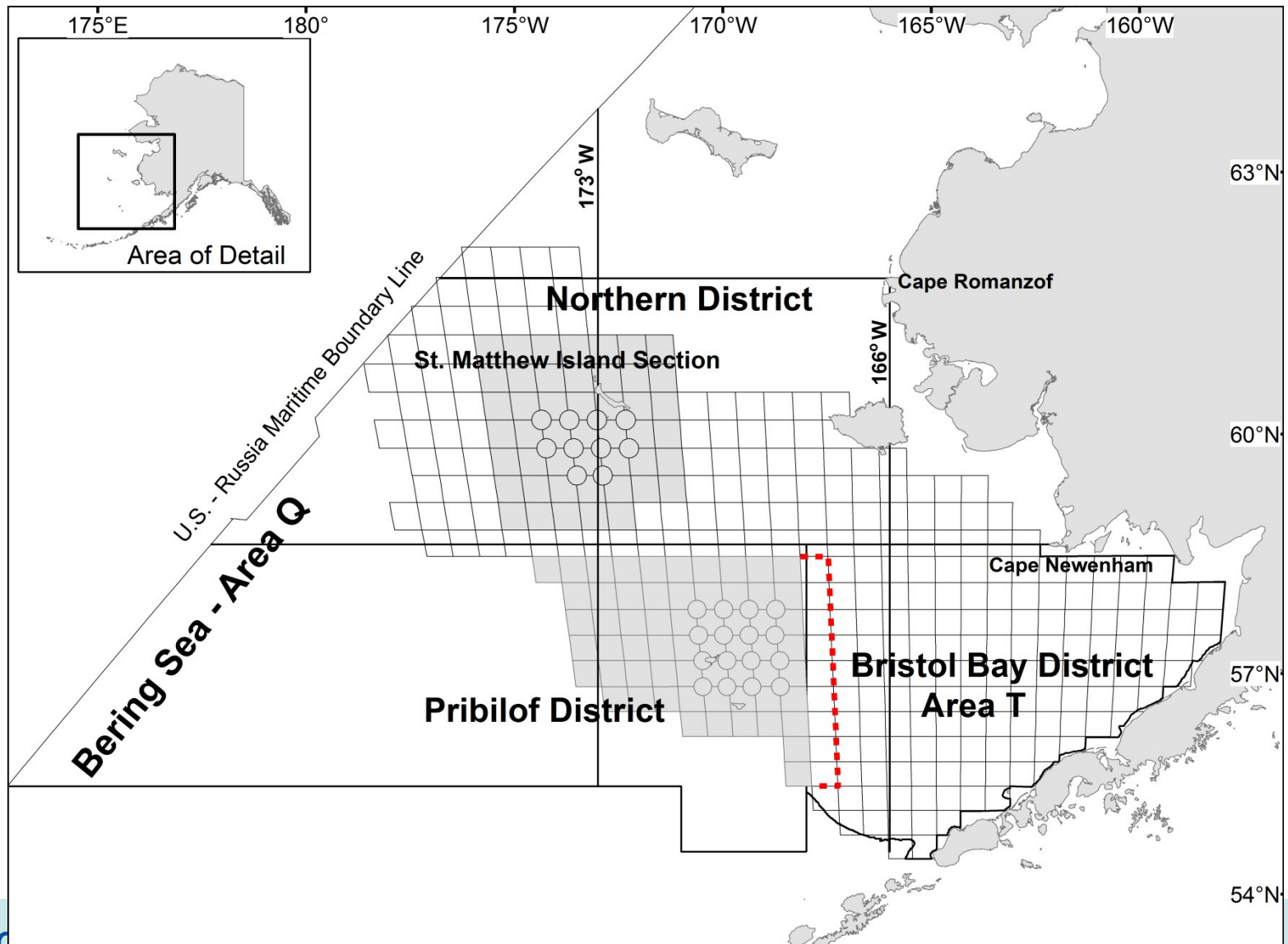
units in metric tons

Year	MSST	Biomass (MMB_{mating})	TAC	Retained Catch	Total Catch Mortality	OFL	ABC
2012/13	1,994 A	579 A	closed	0	0.61	1.16	1.04
2013/14	2,001 A	225 A	closed	0	0.03	1.16	1.04
2014/15	2,055 A	344 A	closed	0	0.07	1.16	0.87
2015/16	2,058 A	361 A	closed	0	1.18	1.16	0.87
2016/17	--	233 B	--	--	--	1.16	0.87

- OFL based on average catch (1999/2000-2005/06)
- ABC based on 25% buffer (CPT rec'd, SSC approved 2014)

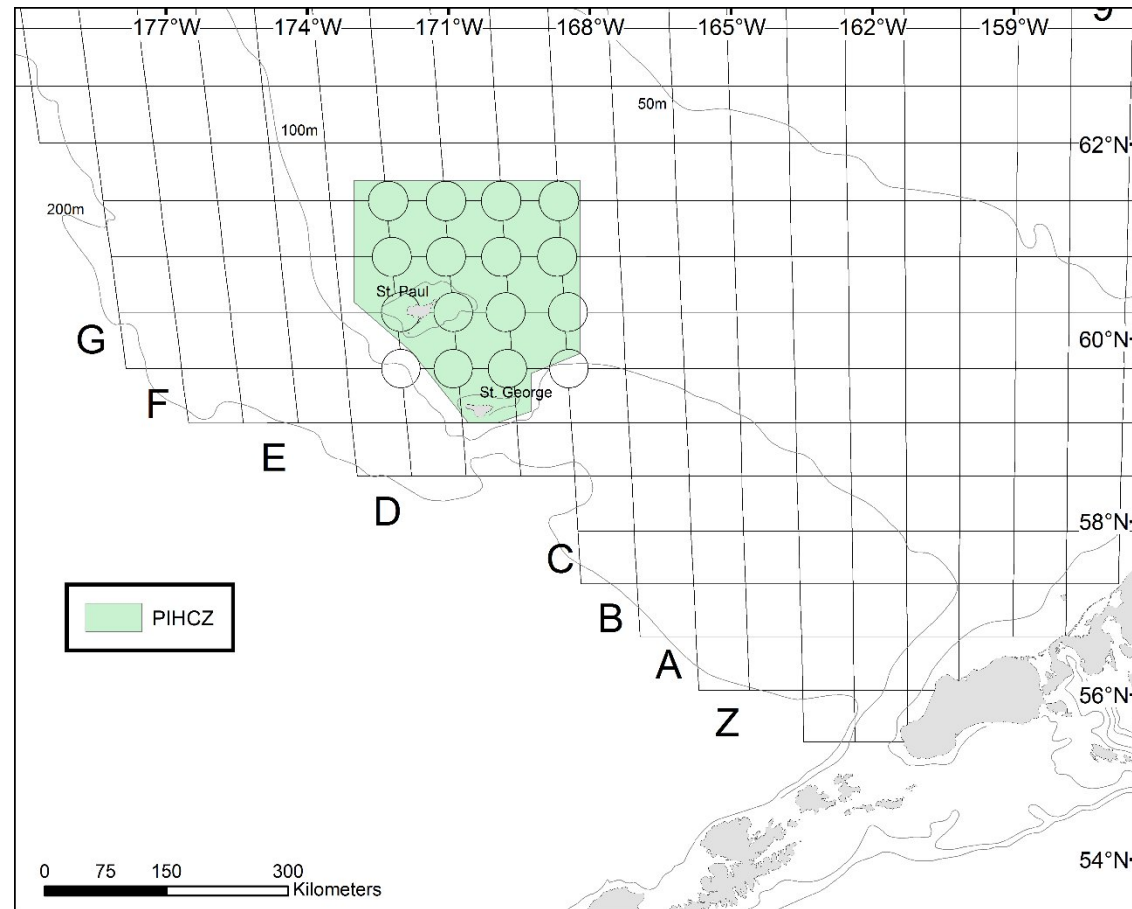


Management Area & Stock Definition



Spatial Closures in the Groundfish Fisheries

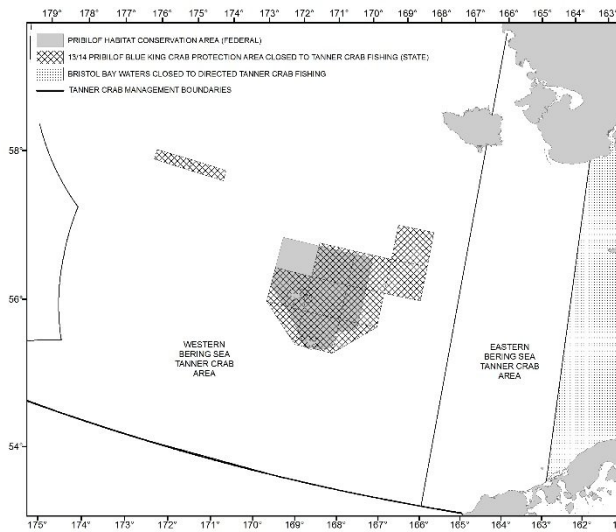
Pribilof Islands Habitat Conservation Zone



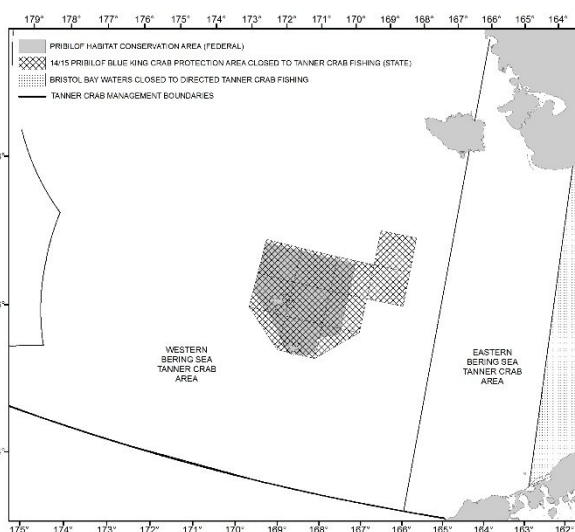
- Closed to non-pelagic trawl gear
- Closed to pot gear for Pacific cod

Closures in Western Tanner Crab Fishery

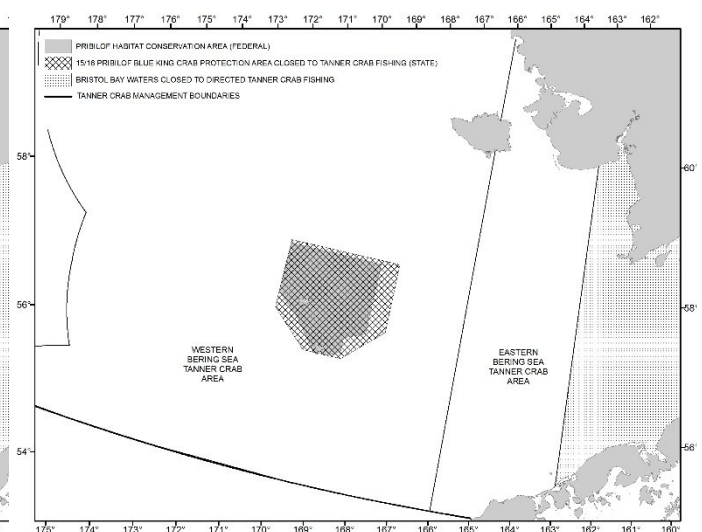
2013/14



2014/15



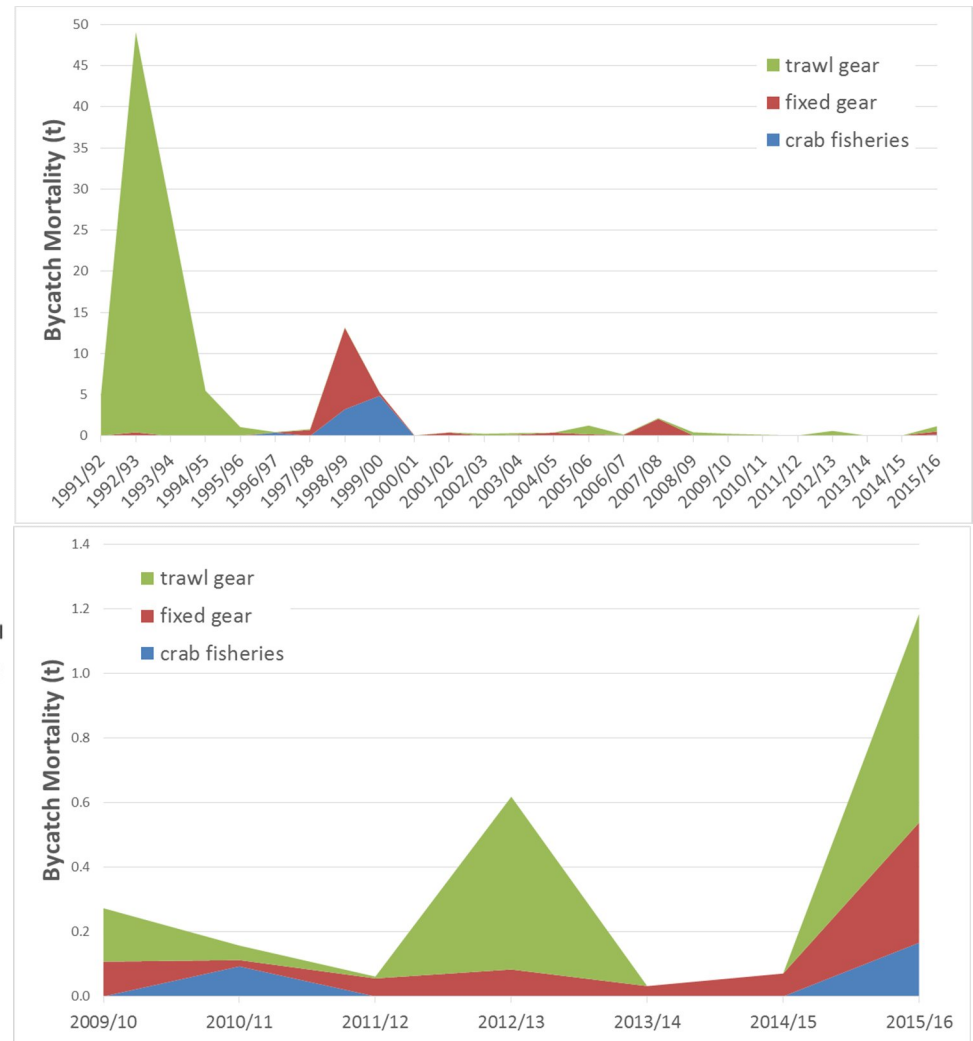
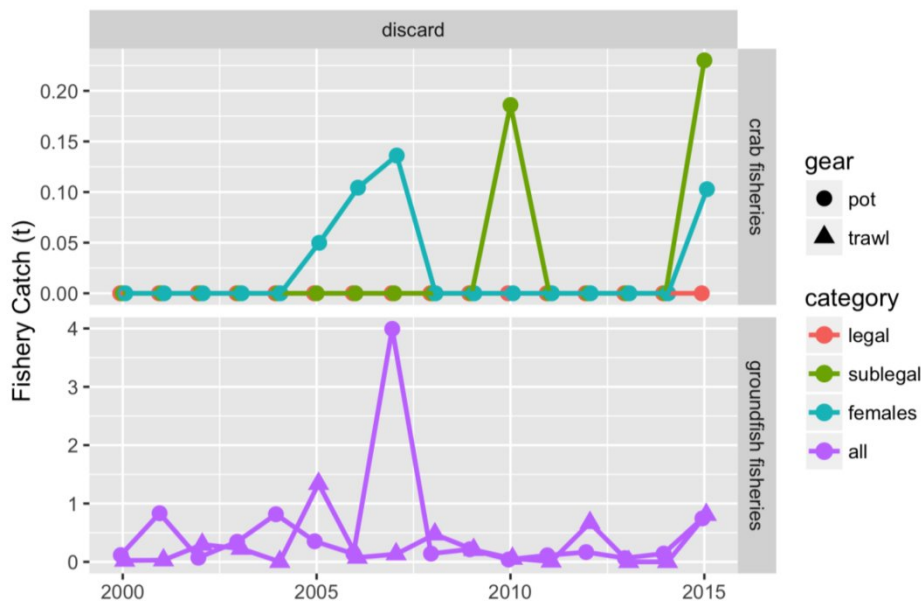
2015/16



Fishery	Sampled Pots	Total Effort (Pot lifts)	% Pots Observed	Expansion Factor
EBS snow	1,857	201,650	0.921	108.589
Tanner-West	898	85,244	1.053	94.927



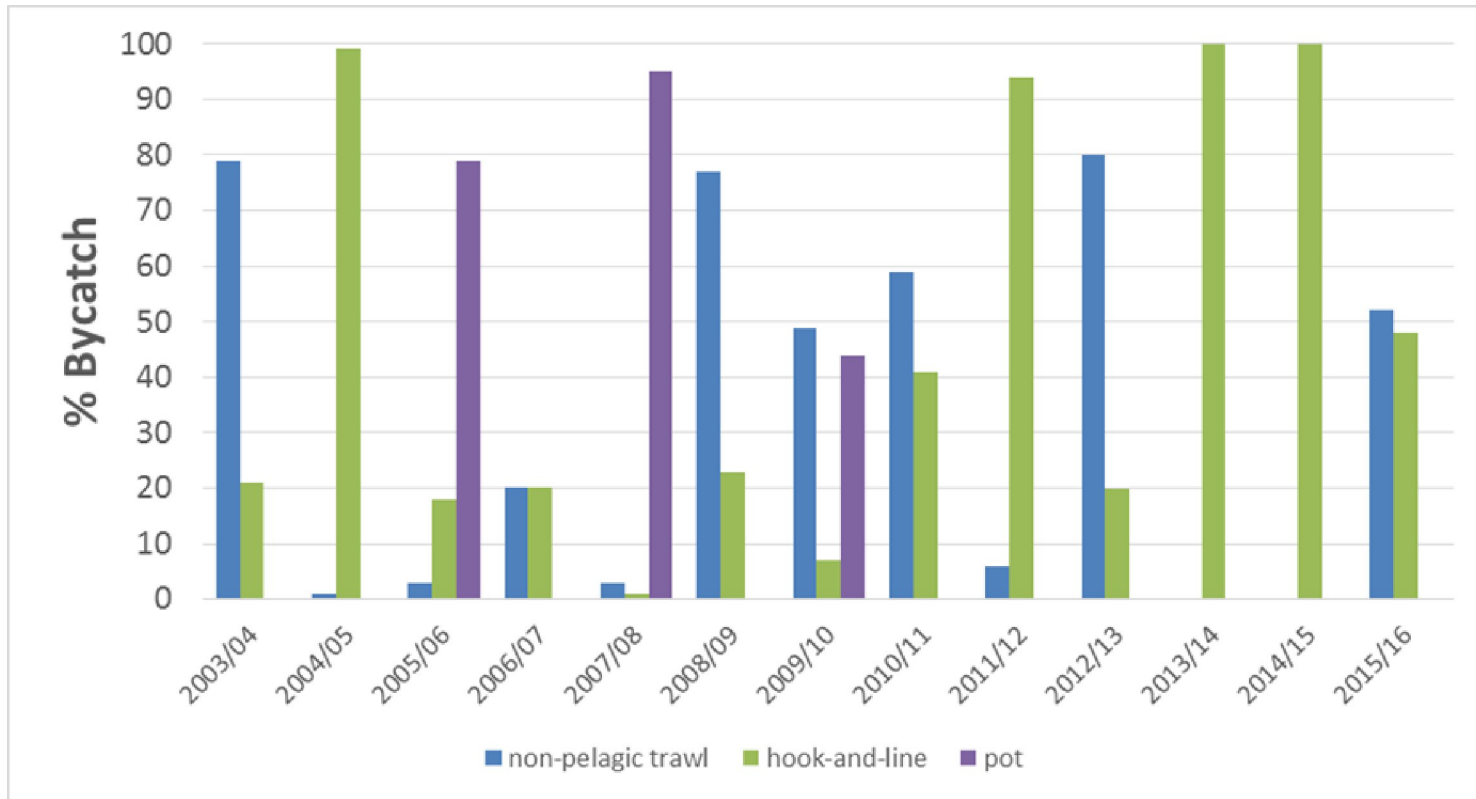
PIBKC Bycatch in Non-target Fisheries



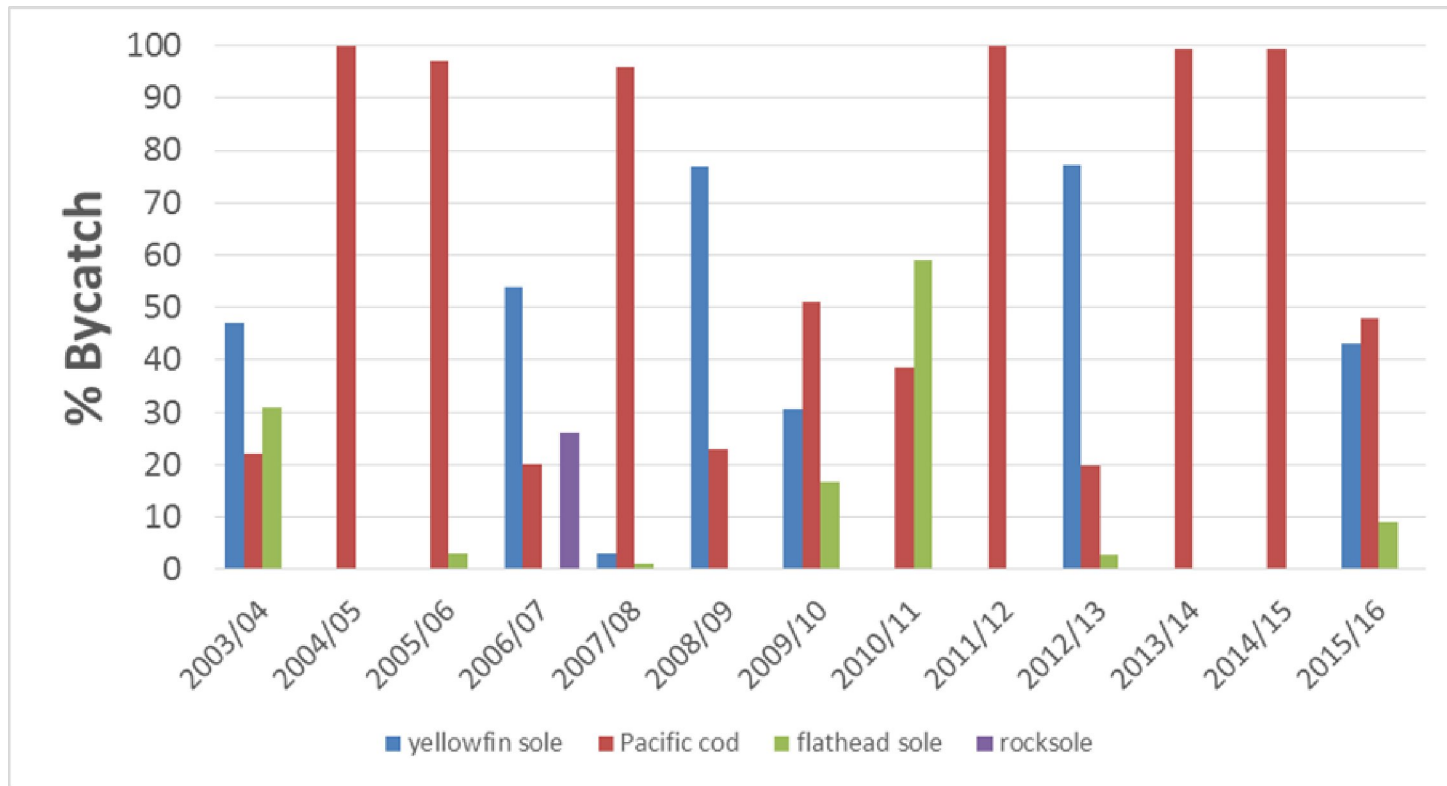
$$HM_{\text{fixed}} = 0.5$$

$$HM_{\text{trawl}} = 0.8$$

PIBKC Bycatch in the Groundfish Fisheries



PIBKC Bycatch in the Groundfish Fisheries



PIBKC Bycatch

Bycatch (t)

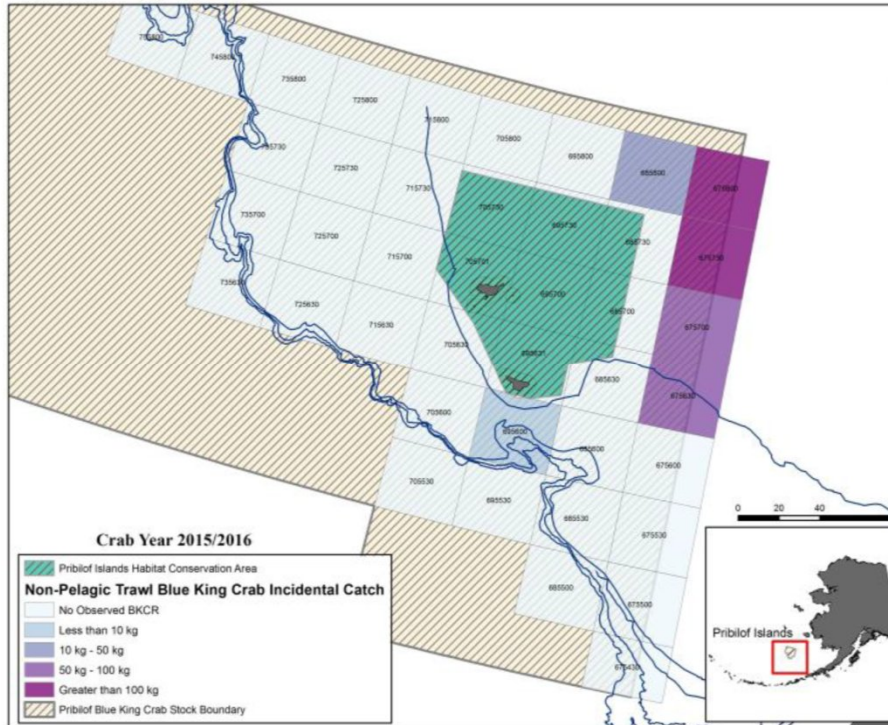
fishery year	crab (pot) fisheries (t)			groundfish fisheries (t)	
	females	legal males	sublegal males	fixed gear	trawl gear
1991/92	--	--	--	0.067	6.199
1992/93	--	--	--	0.879	60.791
1993/94	--	--	--	0.000	34.232
1994/95	--	--	--	0.035	6.856
1995/96	--	--	--	0.108	1.284
1996/97	0.000	0.000	0.807	0.031	0.067
1997/98	0.000	0.000	0.000	1.462	0.130
1998/99	3.715	2.295	0.467	19.800	0.079
1999/00	1.969	3.493	4.291	0.795	0.020
2000/01	0.000	0.000	0.000	0.116	0.023
2001/02	0.000	0.000	0.000	0.833	0.029
2002/03	0.000	0.000	0.000	0.071	0.297
2003/04	0.000	0.000	0.000	0.345	0.227
2004/05	0.000	0.000	0.000	0.816	0.002
2005/06	0.050	0.000	0.000	0.353	1.339
2006/07	0.104	0.000	0.000	0.138	0.074
2007/08	0.136	0.000	0.000	3.993	0.132
2008/09	0.000	0.000	0.000	0.141	0.473
2009/10	0.000	0.000	0.000	0.216	0.207
2010/11	0.000	0.000	0.186	0.039	0.056
2011/12	0.000	0.000	0.000	0.112	0.007
2012/13	0.000	0.000	0.000	0.167	0.669
2013/14	0.000	0.000	0.000	0.064	0.000
2014/15	0.000	0.000	0.000	0.142	0.000
2015/16	0.103	0.000	0.230	0.745	0.808

Bycatch mortality (t)

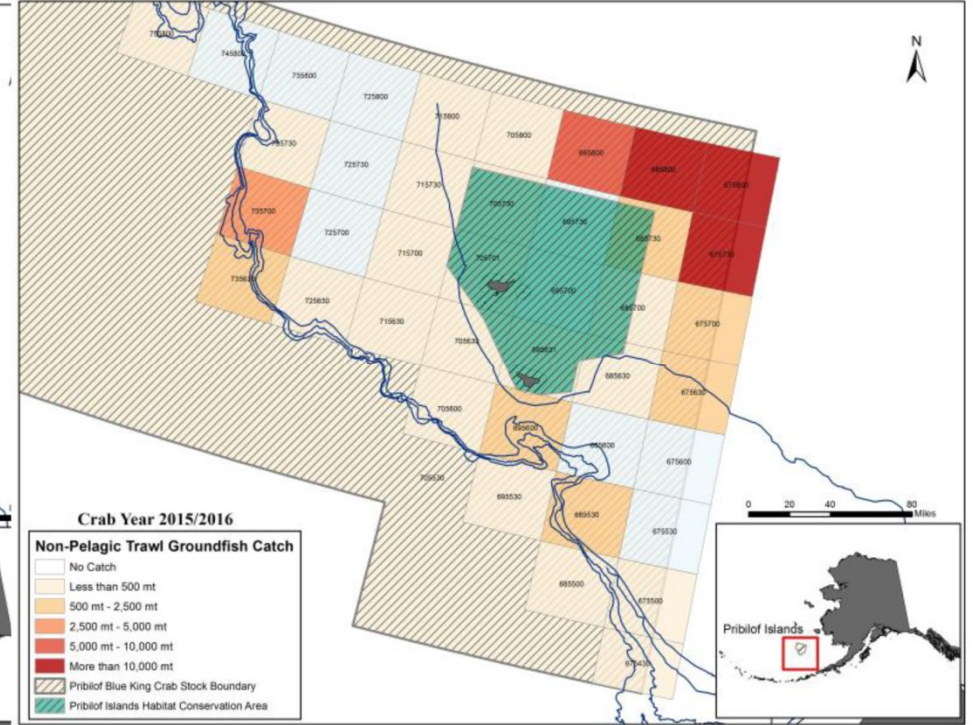
fishery year	crab (pot) fisheries (t)			groundfish fisheries (t)		total bycatch mortality (t)
	females	legal males	sublegal males	fixed gear	trawl gear	
1991/92	--	--	--	0.034	4.959	4.993
1992/93	--	--	--	0.440	48.633	49.072
1993/94	--	--	--	0.000	27.386	27.386
1994/95	--	--	--	0.018	5.485	5.502
1995/96	--	--	--	0.054	1.027	1.081
1996/97	0.000	0.000	0.404	0.016	0.054	0.473
1997/98	0.000	0.000	0.000	0.731	0.104	0.835
1998/99	1.857	1.148	0.234	9.900	0.063	13.202
1999/00	0.984	1.746	2.145	0.398	0.016	5.290
2000/01	0.000	0.000	0.000	0.058	0.018	0.076
2001/02	0.000	0.000	0.000	0.417	0.023	0.440
2002/03	0.000	0.000	0.000	0.036	0.238	0.273
2003/04	0.000	0.000	0.000	0.173	0.182	0.354
2004/05	0.000	0.000	0.000	0.408	0.002	0.410
2005/06	0.025	0.000	0.000	0.177	1.071	1.273
2006/07	0.052	0.000	0.000	0.069	0.059	0.180
2007/08	0.068	0.000	0.000	1.997	0.106	2.170
2008/09	0.000	0.000	0.000	0.071	0.378	0.449
2009/10	0.000	0.000	0.000	0.108	0.165	0.273
2010/11	0.000	0.000	0.093	0.020	0.045	0.158
2011/12	0.000	0.000	0.000	0.056	0.006	0.062
2012/13	0.000	0.000	0.000	0.084	0.535	0.619
2013/14	0.000	0.000	0.000	0.032	0.000	0.032
2014/15	0.000	0.000	0.000	0.071	0.000	0.071
2015/16	0.051	0.000	0.115	0.372	0.646	1.185

PIBKC Bycatch in Non-Pelagic Trawl Fisheries

PIBKC Bycatch (kg)



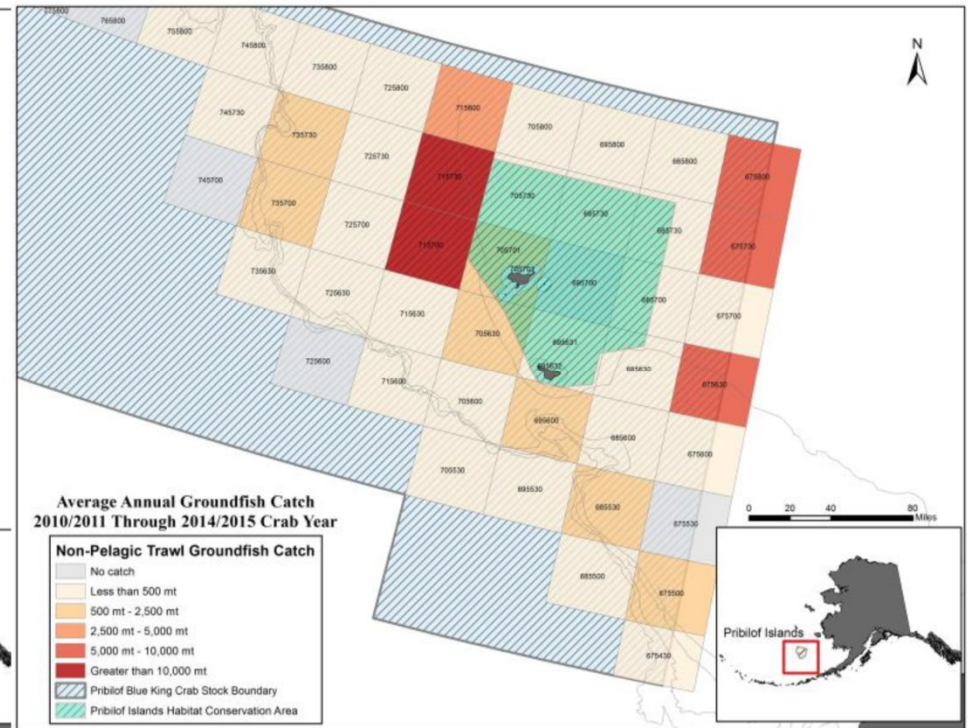
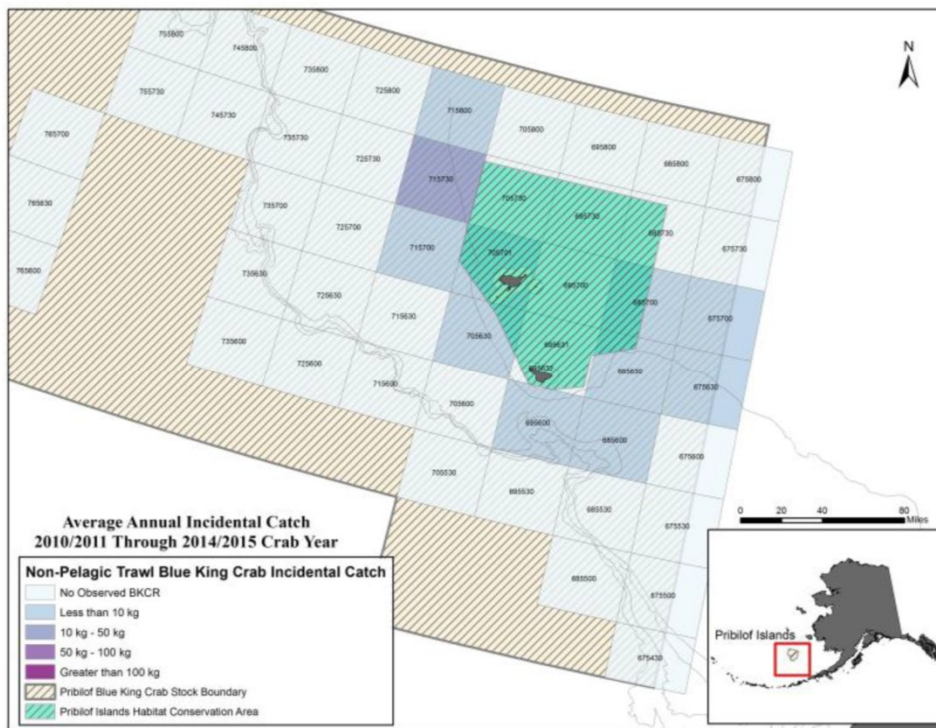
Groundfish catch (t)



PIBKC Bycatch in Non-Pelagic Trawl Fisheries

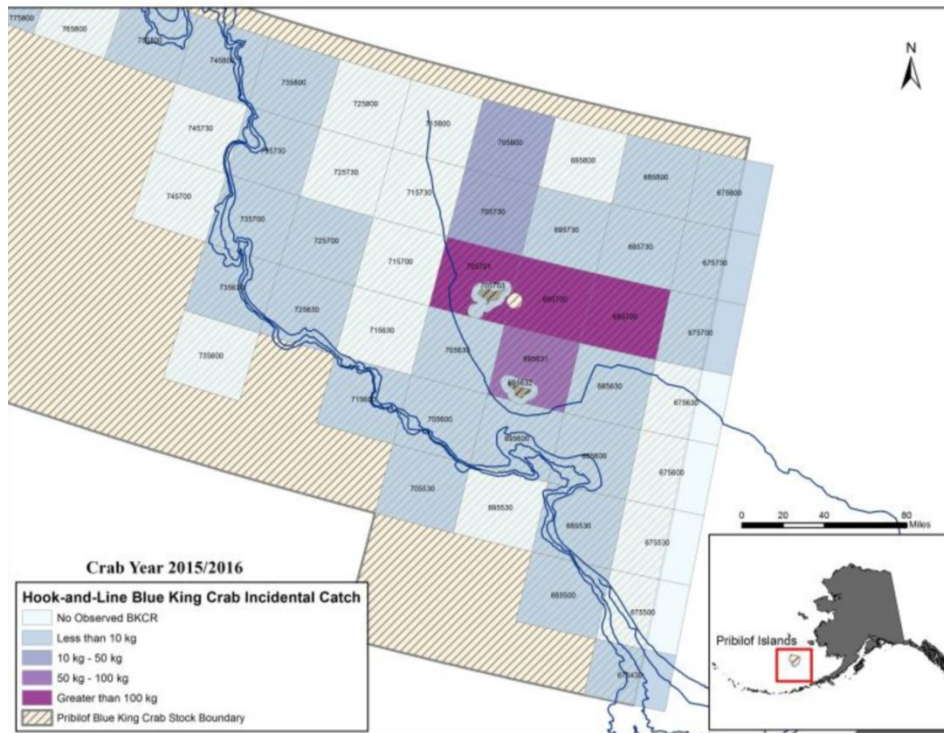
5-year Average PIBKC Bycatch (kg)

5-Year Average Groundfish catch (t)

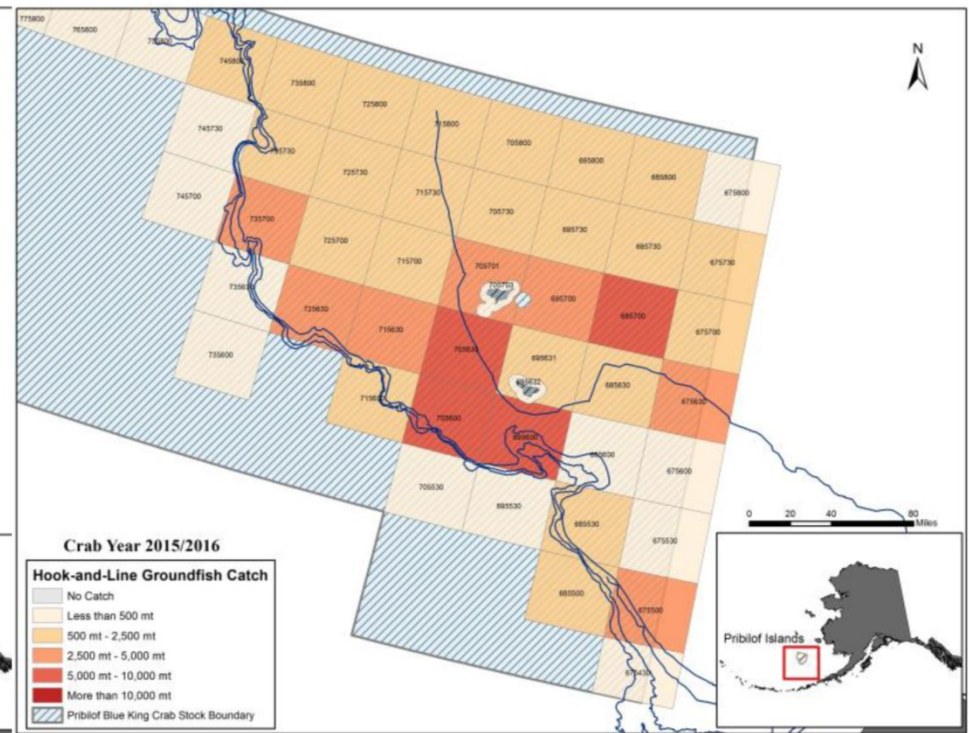


PIBKC Bycatch in Hook-and-Line Fisheries

PIBKC Bycatch (kg)



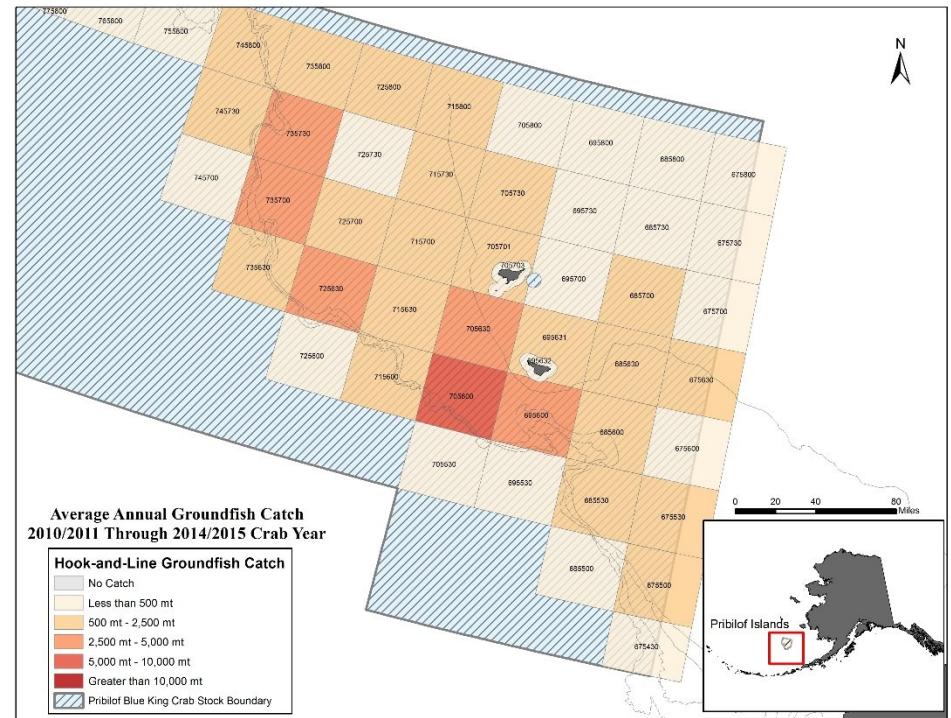
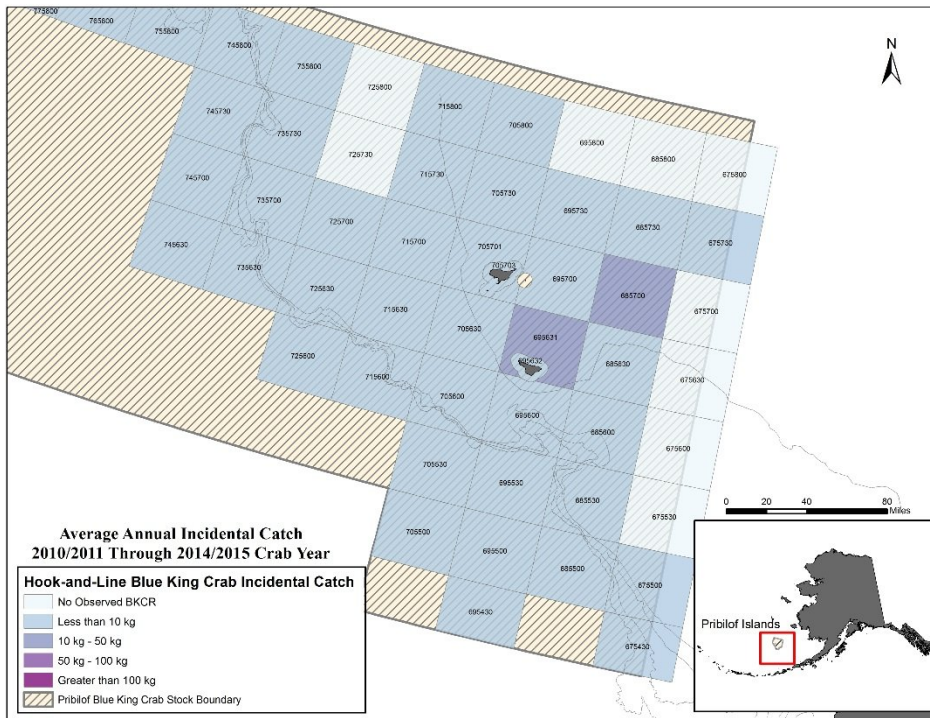
Groundfish catch (t)



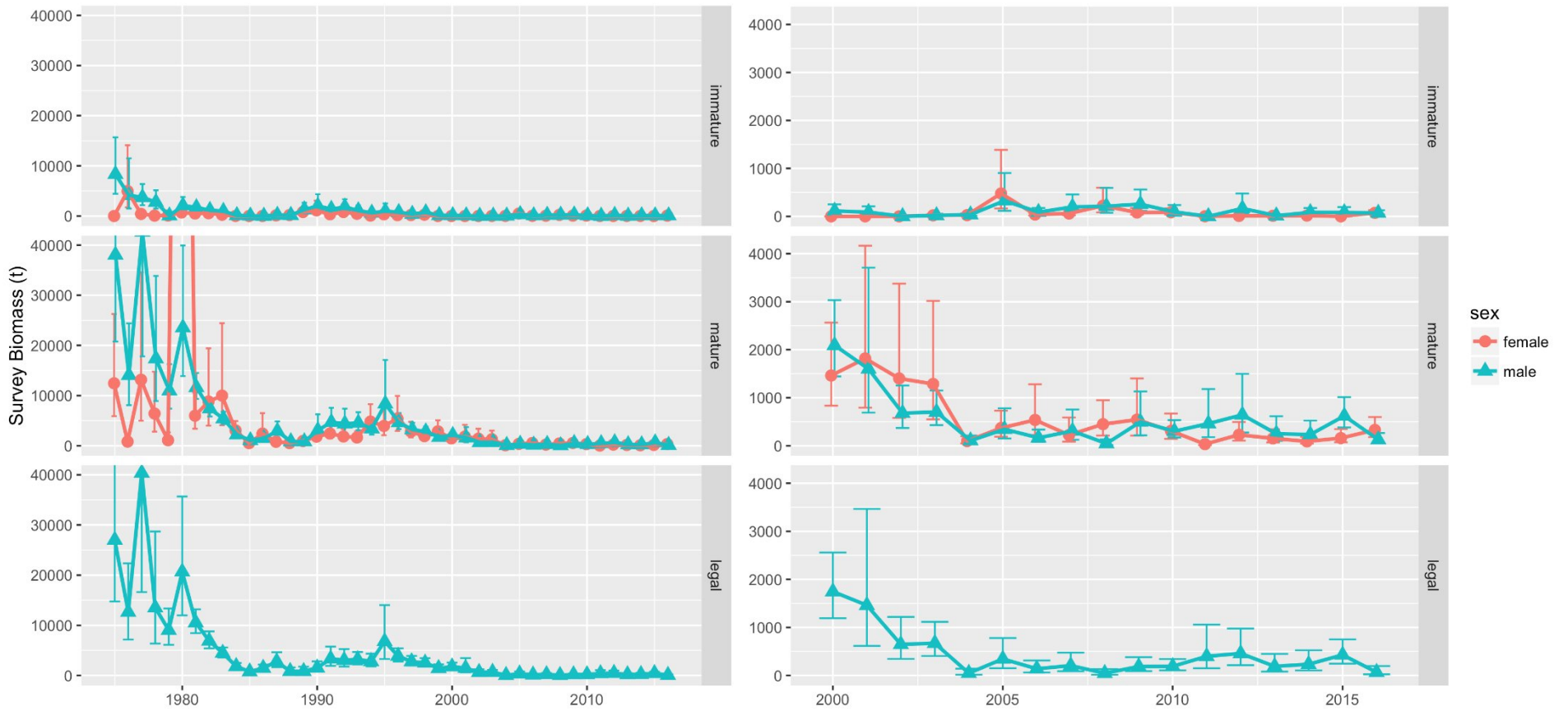
PIBKC Bycatch in Hook-and-Line Fisheries

5-year Average PIBKC Bycatch (kg)

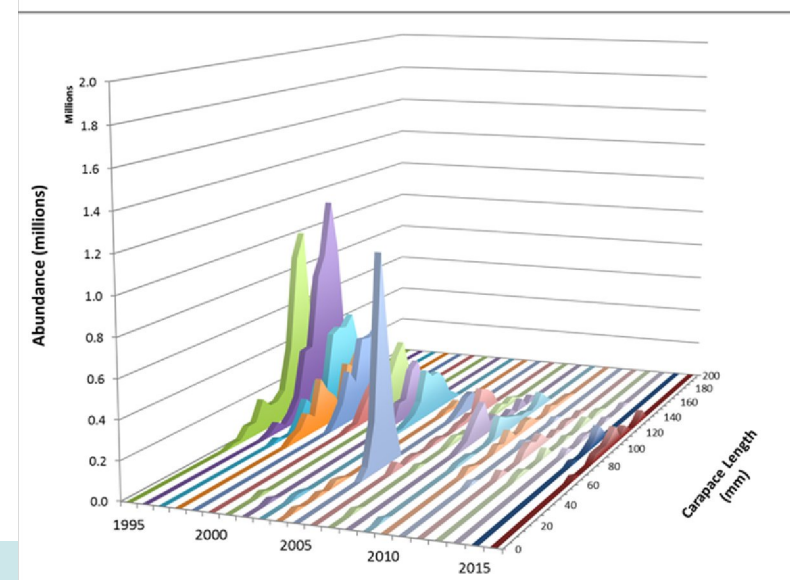
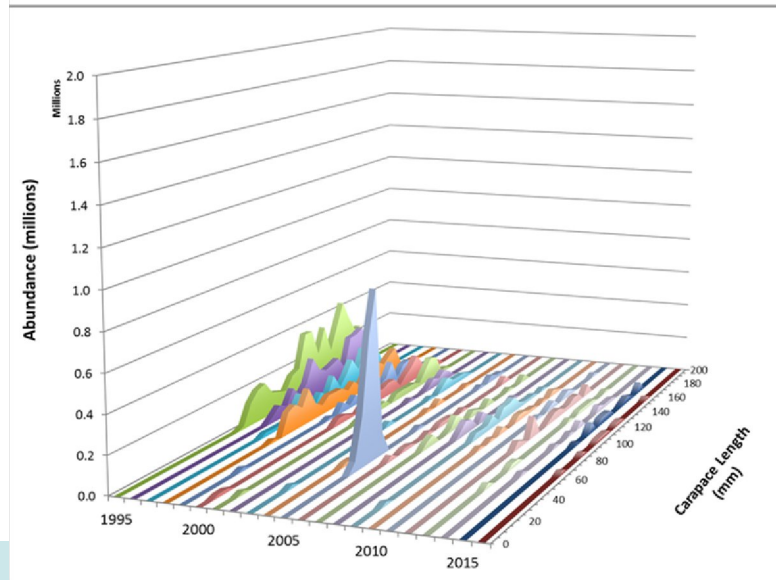
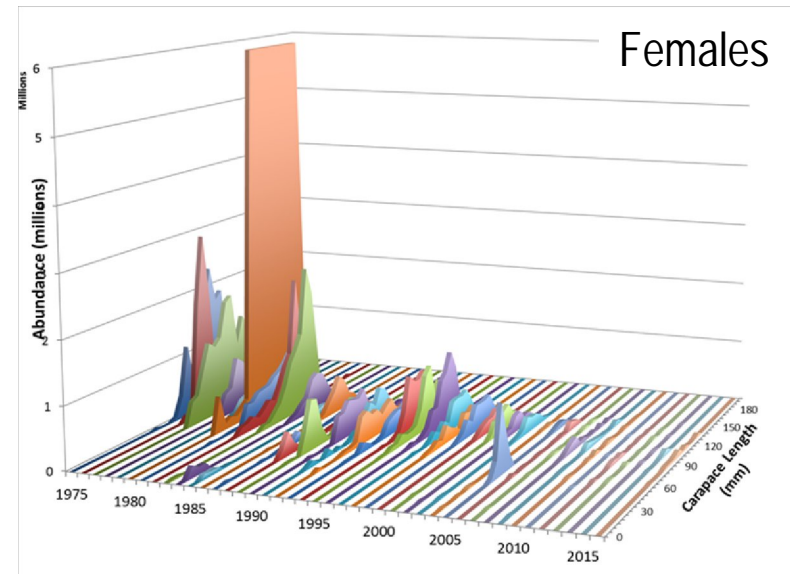
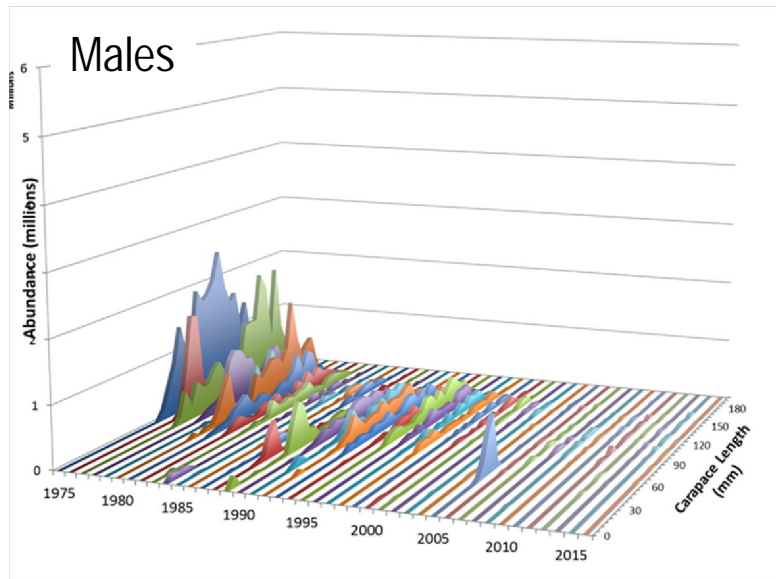
5-Year Average Groundfish catch (t)



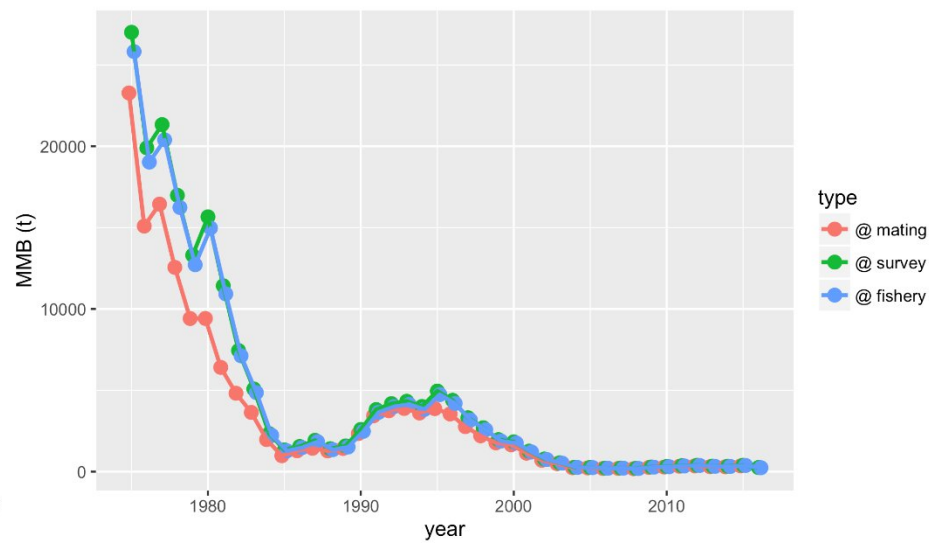
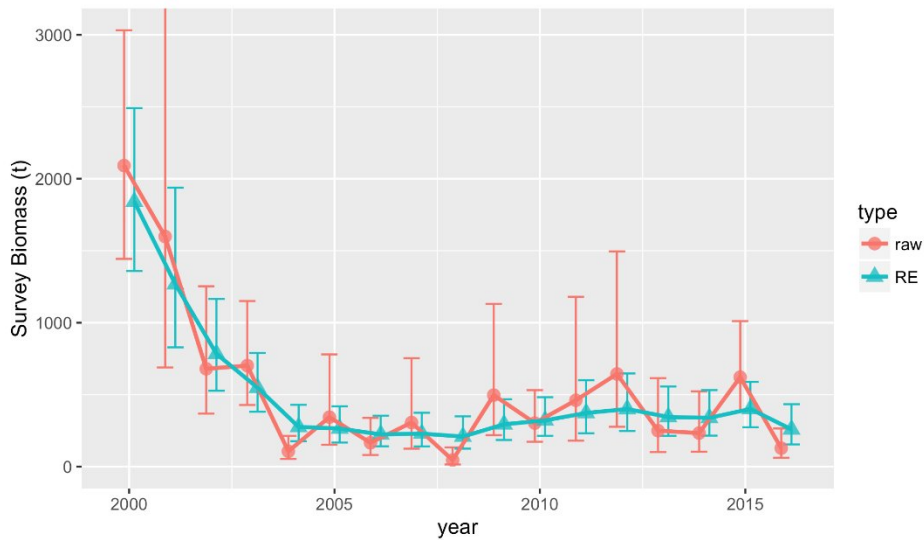
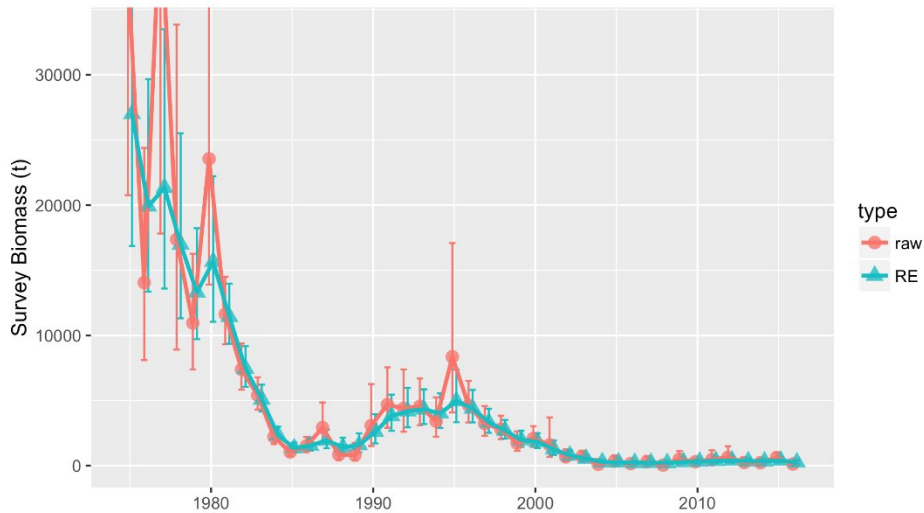
NMFS EBS Trawl Survey: Survey Trends



NMFS EBS Trawl Survey: Survey Trends



MMB-at-mating



B_{MSY} and “Current” MMB-at-mating

- B_{MSY} = mean(MMB-at-mating) over 1980-1984, 1990-1997
- “Current” B is projected MMB-at-mating for 2016/17 assuming OFL is taken

Year	Tier	B_{MSY}	Current MMB _{mating}	B/B_{MSY} (MMB _{mating})	g	Years to define B_{MSY}	Natural Mortality	P*
2012/13	4c	4,494	496	0.11	1	1980/81-1984/85 &1990/91-1997/98	0.18	10% buffer
2013/14	4c	3,988	278	0.07	1	1980/81-1984/85 &1990/91-1997/98	0.18	10% buffer
2014/15	4c	4,002	218	0.05	1	1980/81-1984/85 &1990/91-1997/98	0.18	25% buffer
2015/16	4c	4,109	361	0.09	1	1980/81-1984/85 &1990/91-1997/98	0.18	25% buffer
2016/17	4c	4,116	233	0.06	1	1980/81-1984/85 &1990/91-1997/98	0.18	25% buffer



Management Performance

Overfishing occurred in 2015/16.
Stock remains overfished.

units in metric tons

Year	MSST	Biomass (MMB_{mating})	TAC	Retained Catch	Total Catch Mortality	OFL	ABC
2012/13	1,994 A	579 A	closed	0	0.61	1.16	1.04
2013/14	2,001 A	225 A	closed	0	0.03	1.16	1.04
2014/15	2,055 A	344 A	closed	0	0.07	1.16	0.87
2015/16	2,058 A	361 A	closed	0	1.18	1.16	0.87
2016/17	--	233 B	--	--	--	1.16	0.87

A: as updated in subsequent assessment

B: as calculated in the 2016 assessment

- OFL based on average catch (1999/2000-2005/06)
- ABC based on 25% buffer (CPT rec'd, SSC approved 2014)
- OFL, ABC for 2016/17 unchanged from 2015/16





NOAA FISHERIES

PIBKC Bycatch in Groundfish Fisheries

Crab Fishery Year	% bycatch (biomass) by trip target				total bycatch (# crabs)
	yellowfin sole %	Pacific cod %	flathead sole %	rocksole %	
2003/04	47	22	31	< 1	252
2004/05	< 1	100	< 1	< 1	259
2005/06	< 1	97	3	< 1	757
2006/07	54	20	< 1	26	96
2007/08	3	96	1	< 1	2,950
2008/09	77	23	< 1	< 1	295
2009/10	31	51	17	< 1	281
2010/11	< 1	39	59	< 1	48
2011/12	< 1	100	< 1	< 1	62
2012/13	77	20	3	< 1	410
2013/14	< 1	99	< 1	< 1	39
2014/15	< 1	99	< 1	< 1	64
2015/16	43	48	9	< 1	609