

Pribilof Islands Blue King Crab

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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.

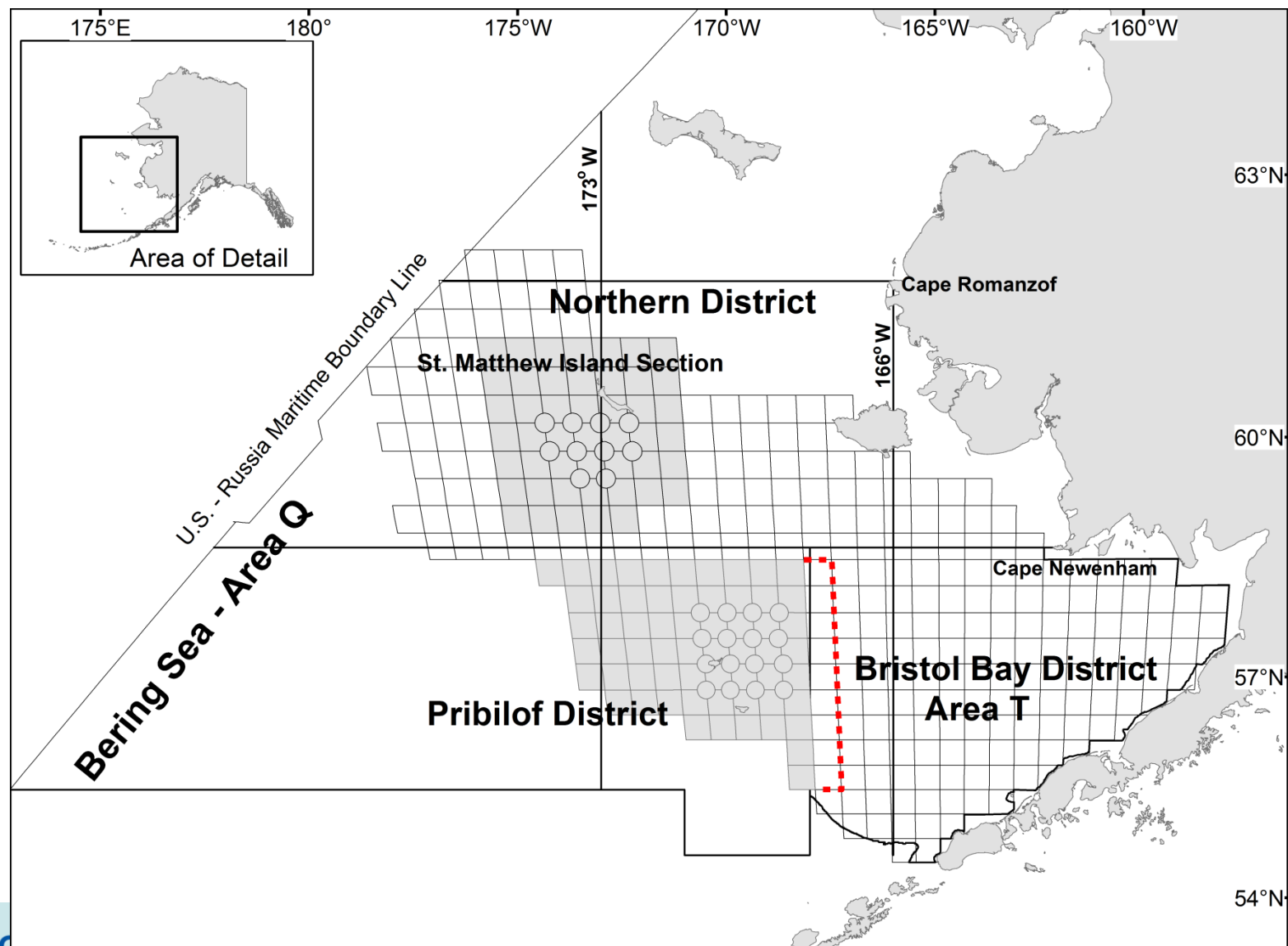
units in metric tons

| 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)

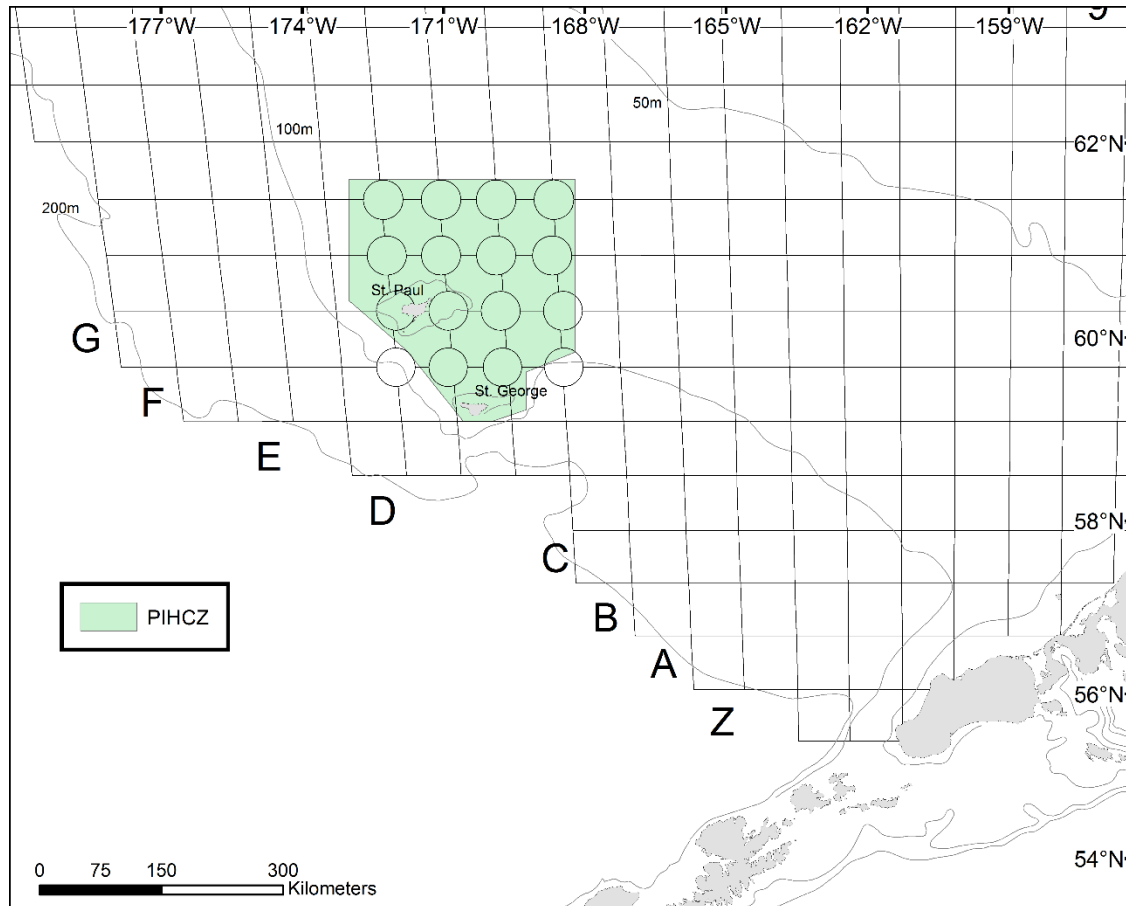


Management Area & Stock Definition



Spatial Closures in the Groundfish Fisheries

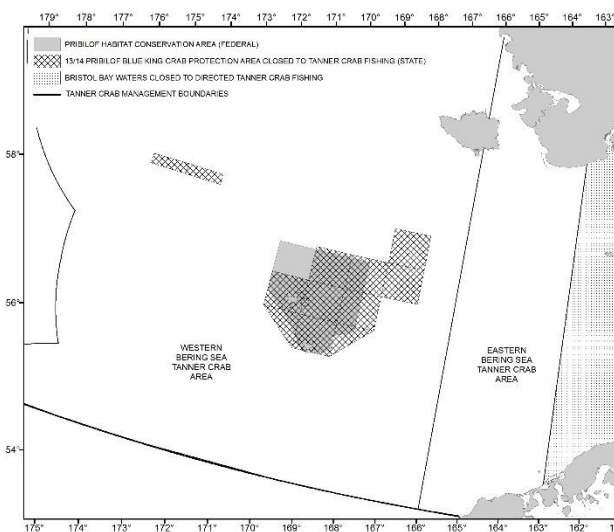
Pribilof Islands Habitat Conservation Zone



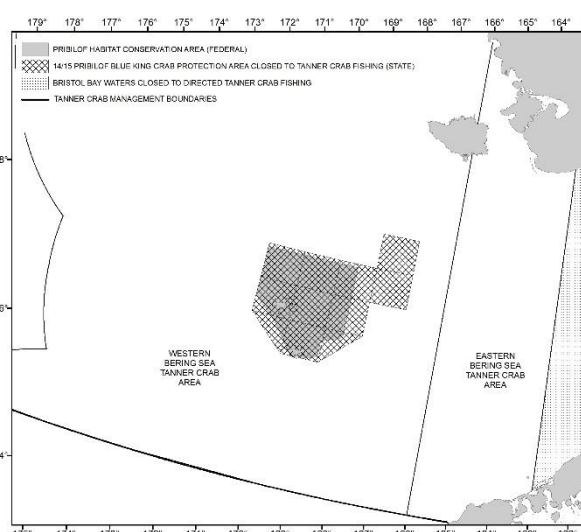
- Closed to non-pelagic trawl gear
- Closed to pot gear for Pacific cod

Closures in Western Tanner Crab Fishery

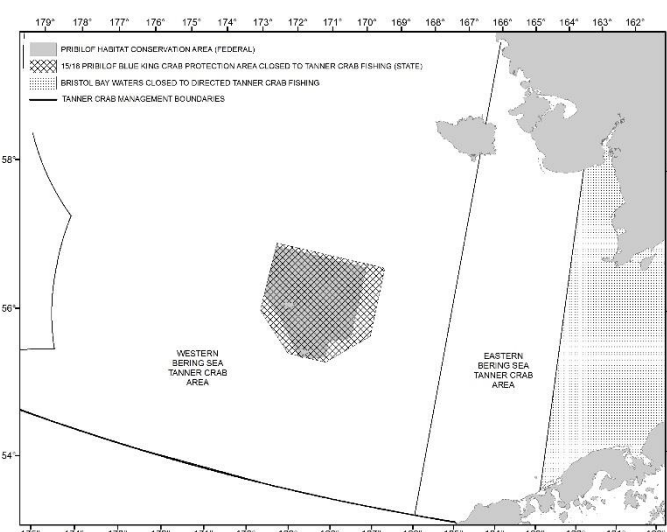
2013/14



2014/15

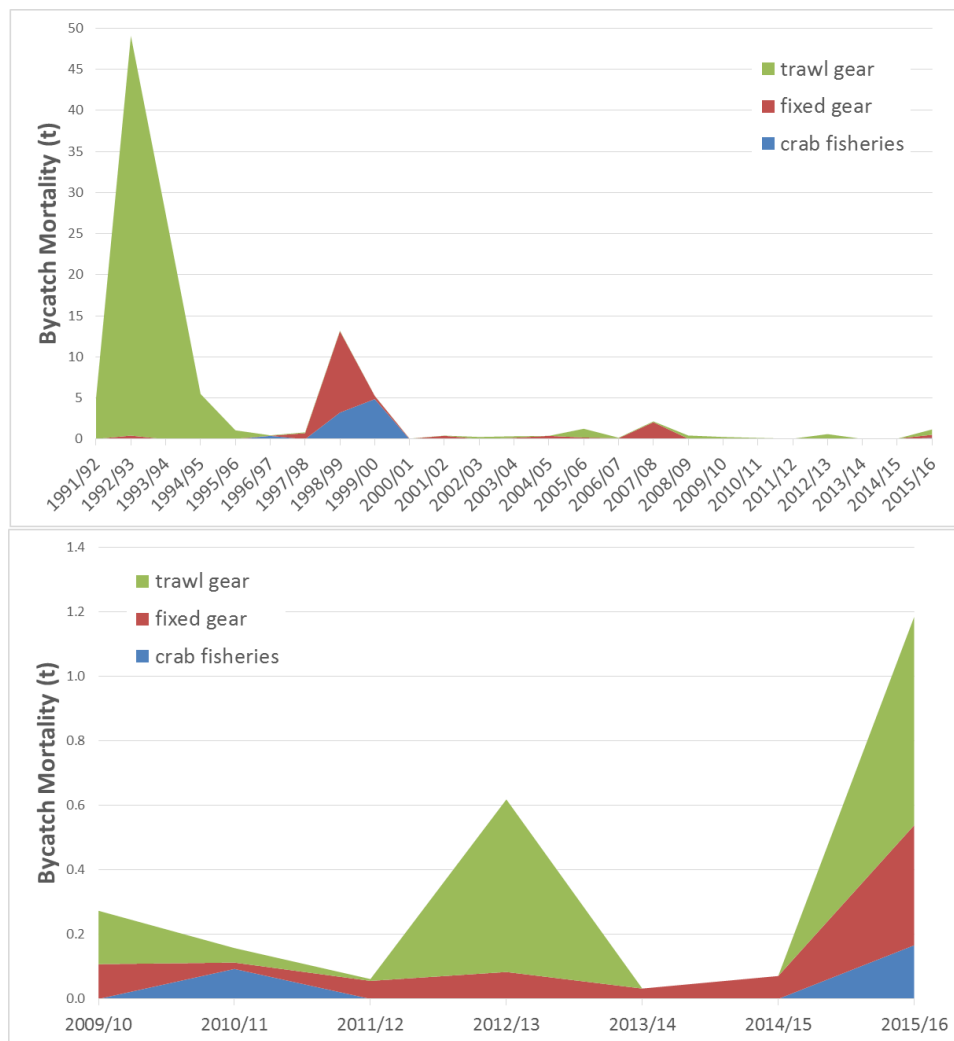
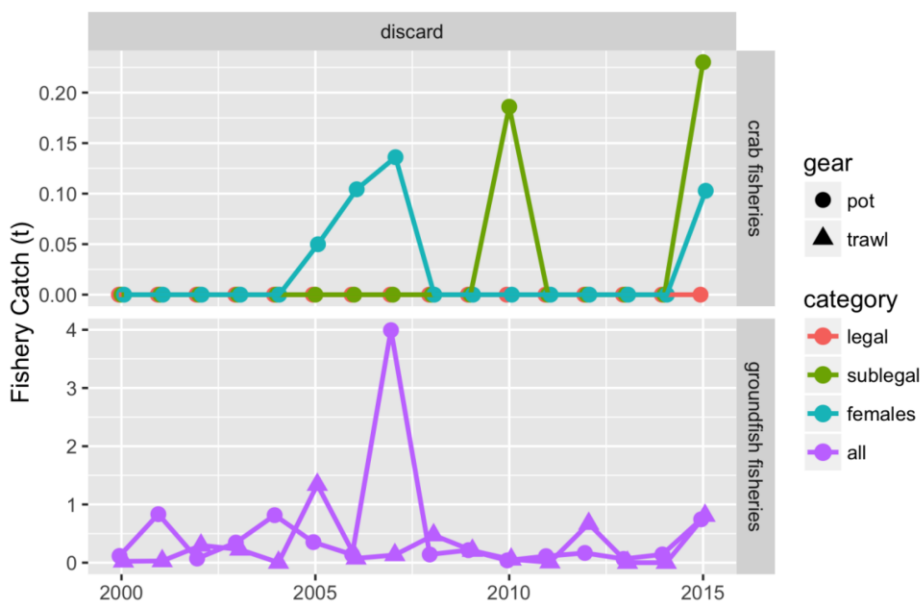


2015/16



| 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 |

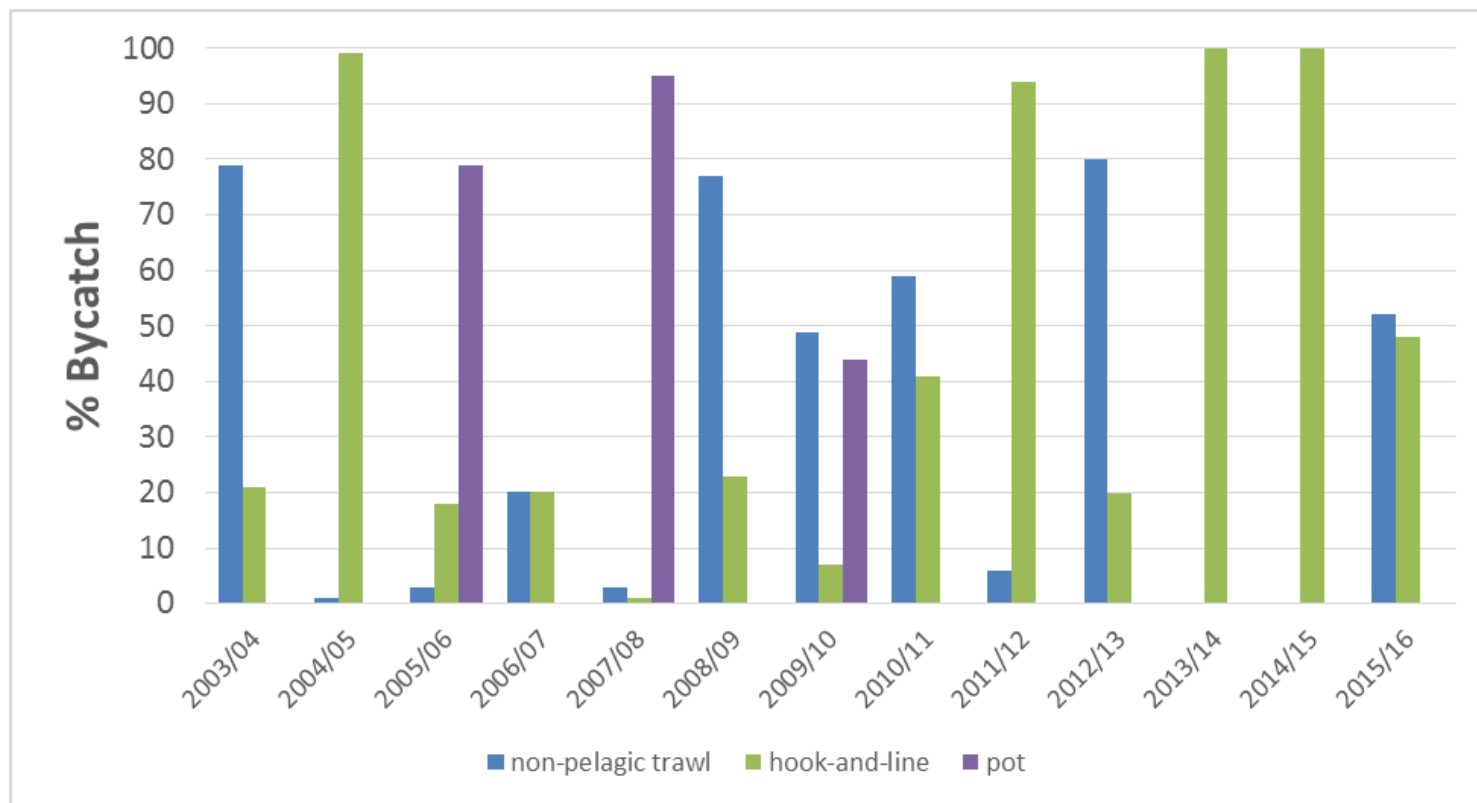
PIBKC Bycatch in Non-target Fisheries



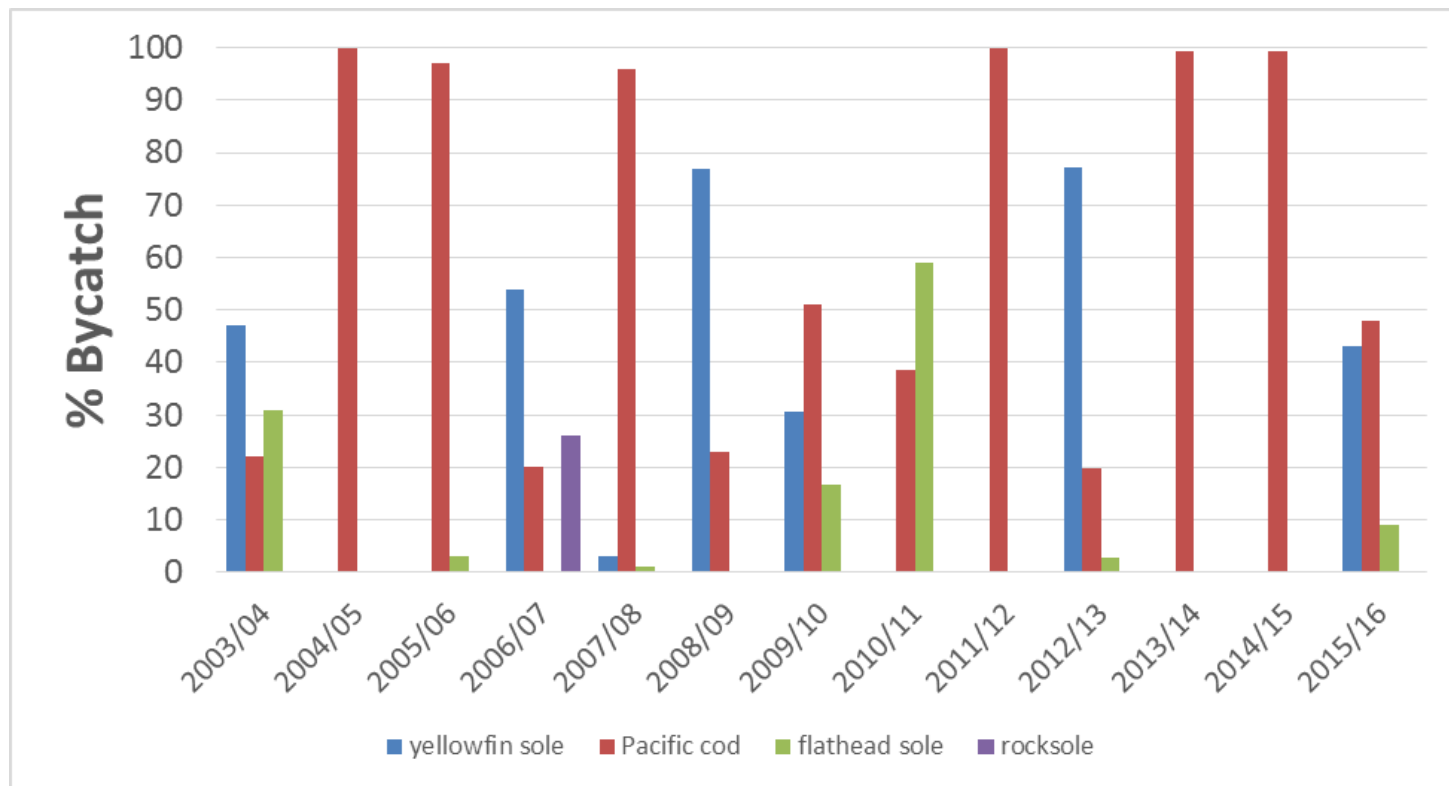
$$HM_{\text{fixed}} = 0.5$$

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

PIBKC Bycatch in the Groundfish Fisheries



PIBKC Bycatch in the Groundfish Fisheries



PIBKC Bycatch

Bycatch (t)

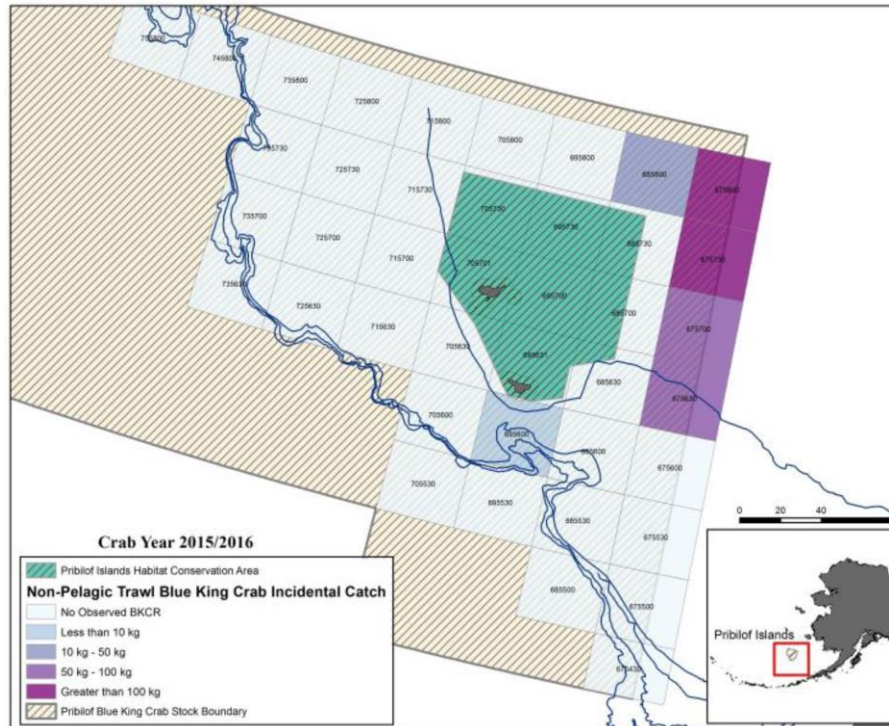
| fishery year | crab (pot) fisheries (t) | | | groundfish fisheries (t) | |
|--------------|--------------------------|-------------|----------------|--------------------------|------------|
| | females | legal males | sublegal males | fixed gear | trawl gear |
| 1991/92 | -- | -- | -- | 0.067 | 6.199 |
| 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)

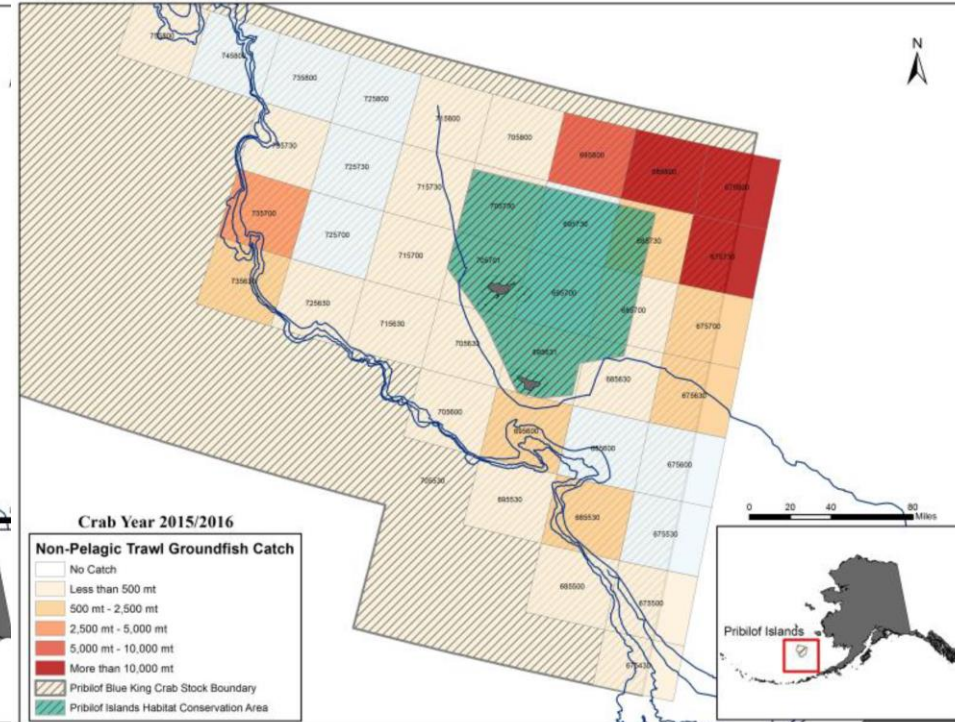
| fishery year | crab (pot) fisheries (t) | | | groundfish fisheries (t) | | total bycatch mortality (t) |
|--------------|--------------------------|-------------|----------------|--------------------------|------------|-----------------------------|
| | females | legal males | sublegal males | fixed 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)

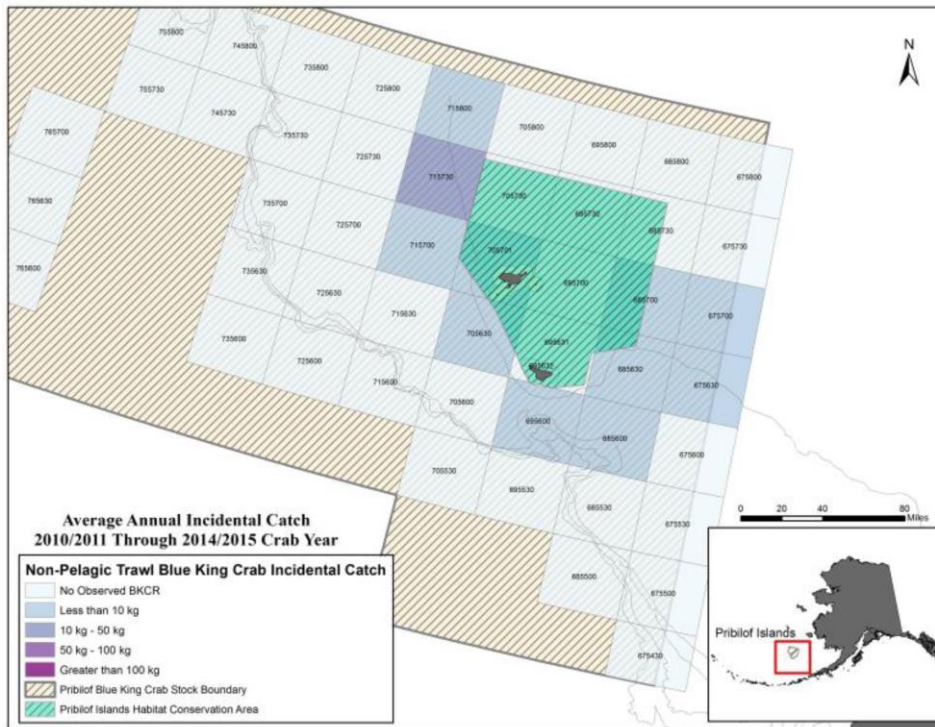


Groundfish catch (t)

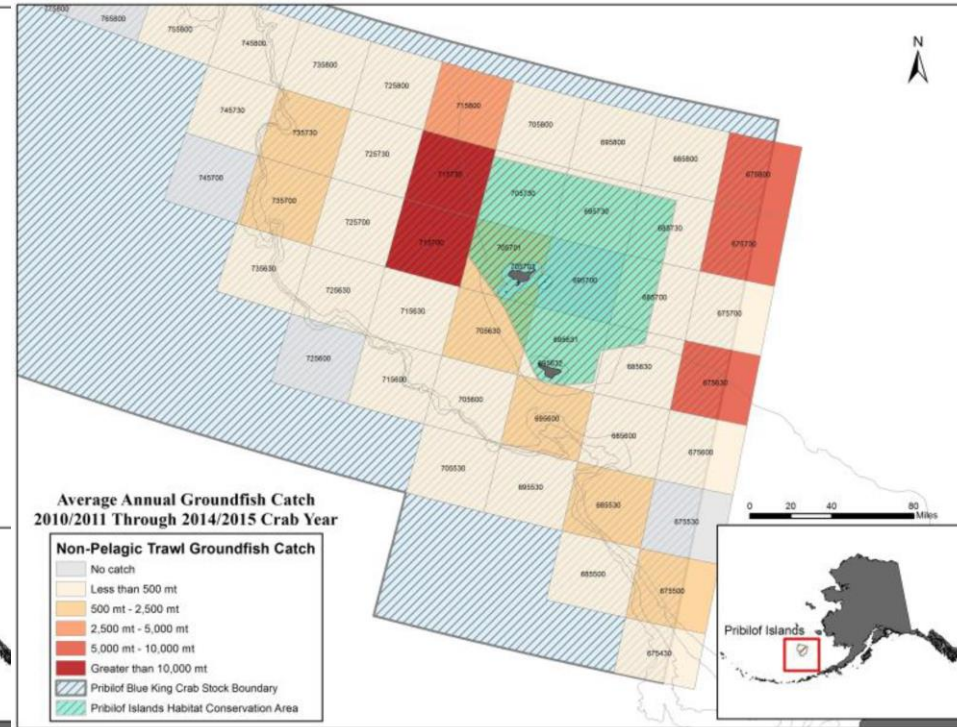


PIBKC Bycatch in Non-Pelagic Trawl Fisheries

5-year Average PIBKC Bycatch (kg)

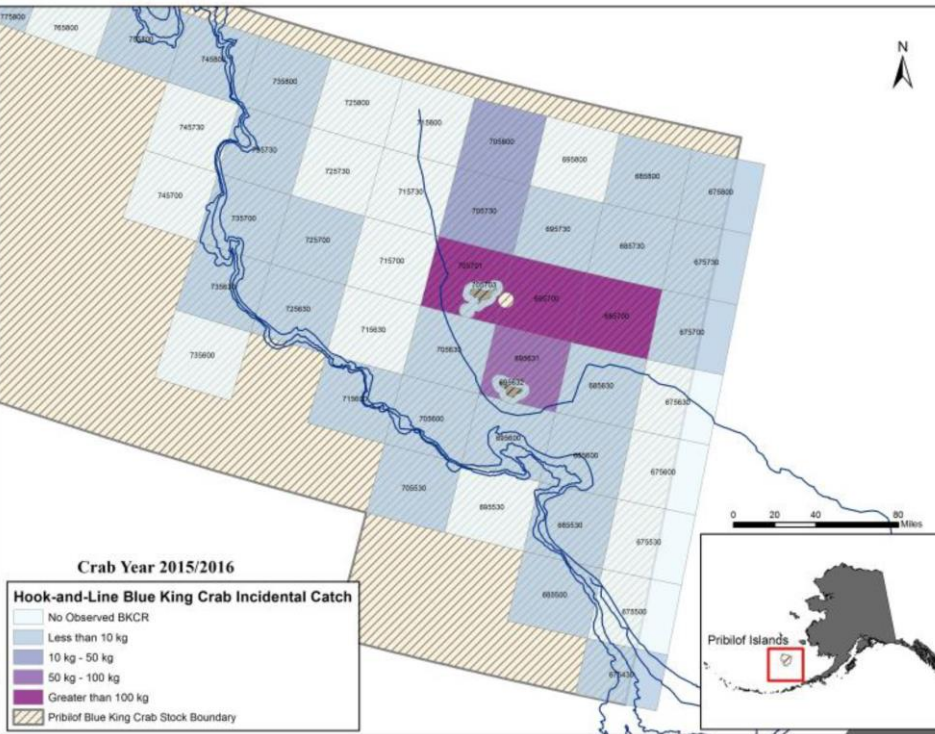


5-Year Average Groundfish catch (t)

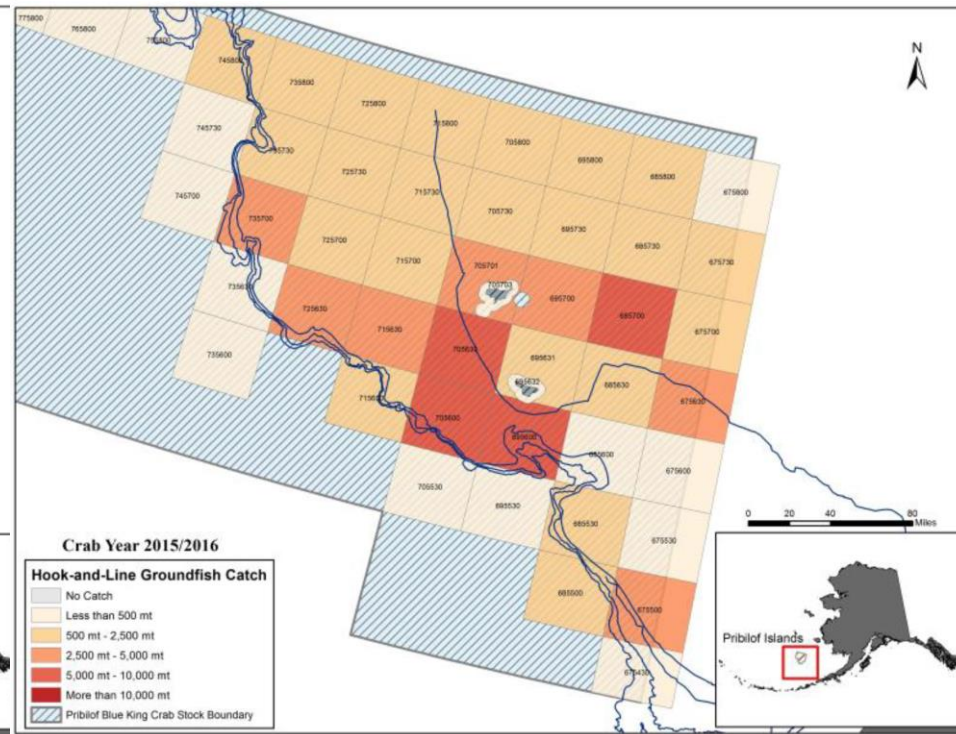


PIBKC Bycatch in Hook-and-Line Fisheries

PIBKC Bycatch (kg)

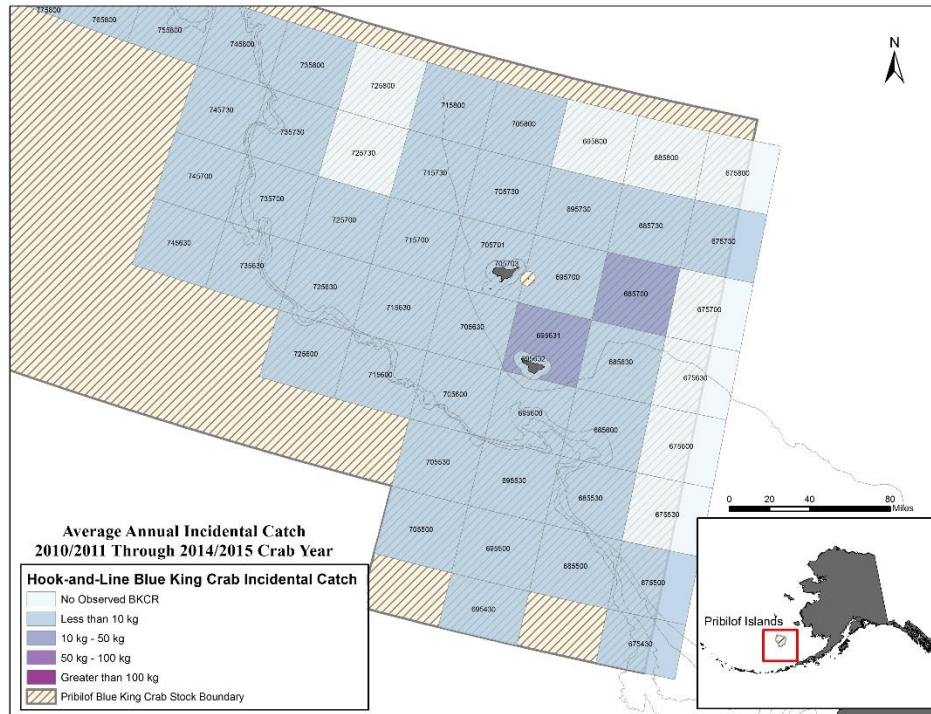


Groundfish catch (t)

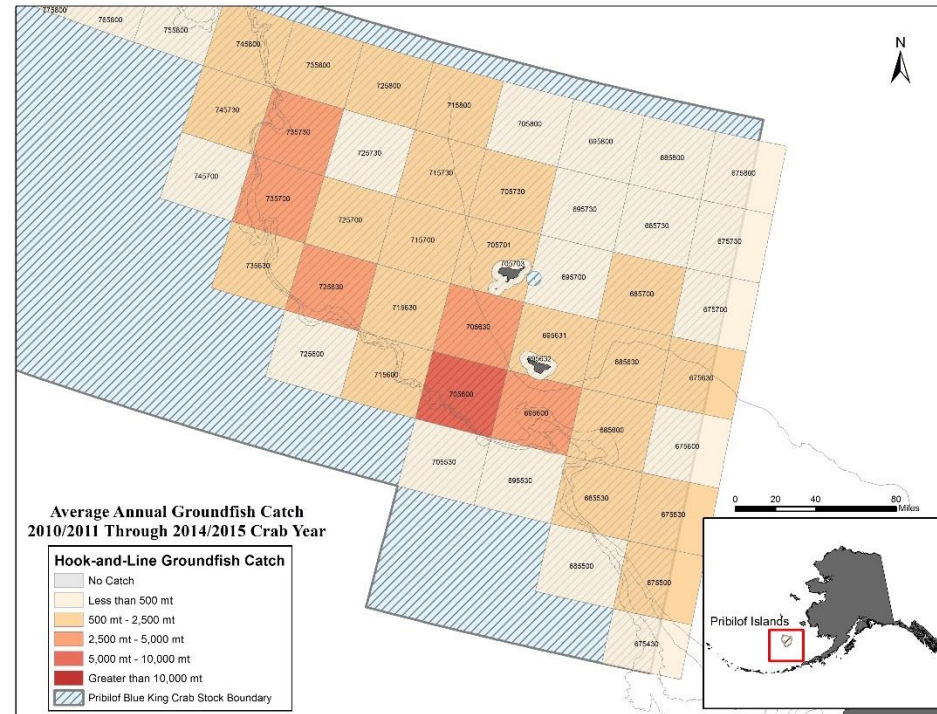


PIBKC Bycatch in Hook-and-Line Fisheries

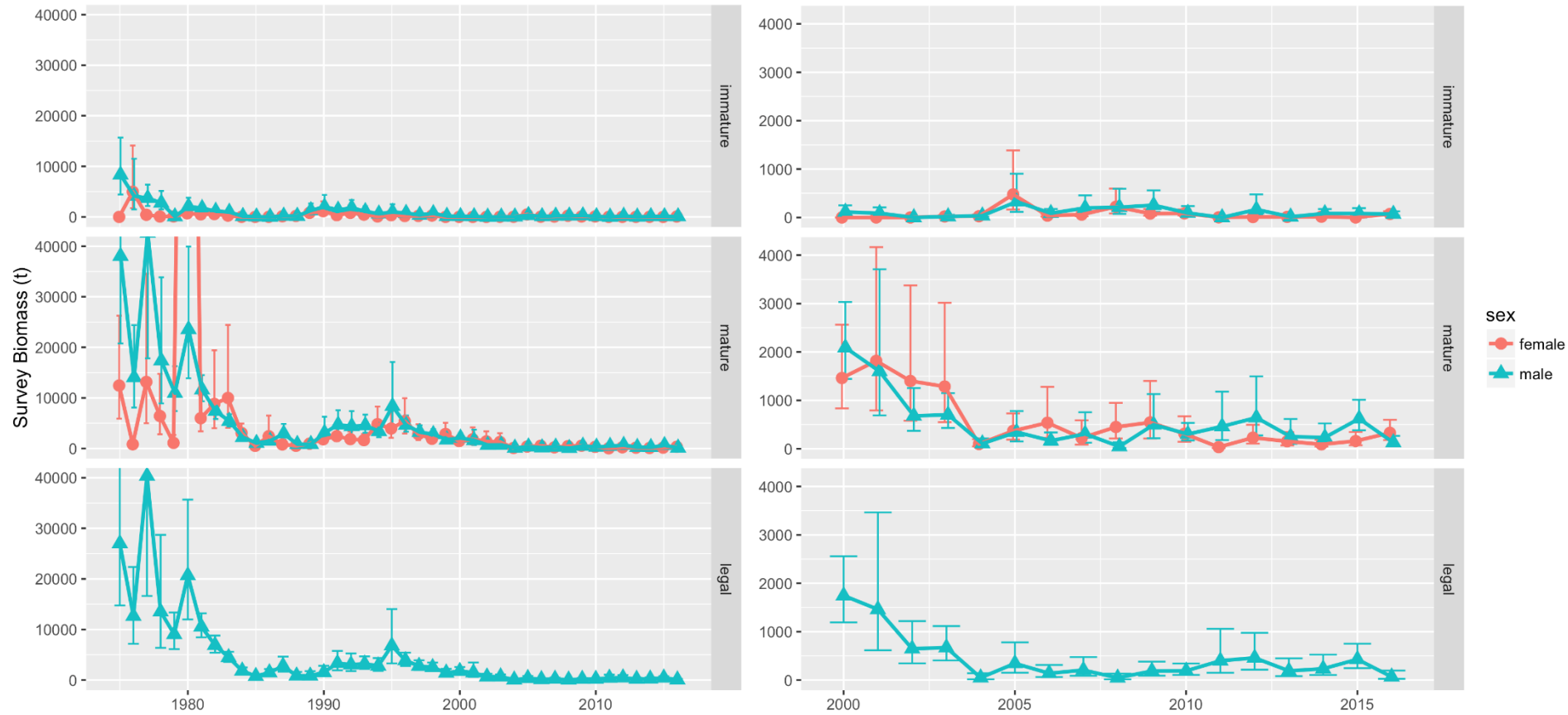
5-year Average PIBKC Bycatch (kg)



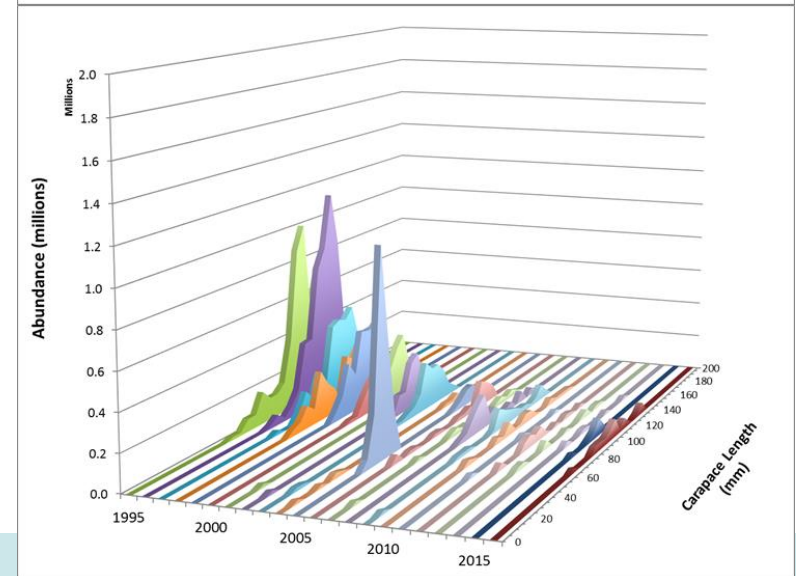
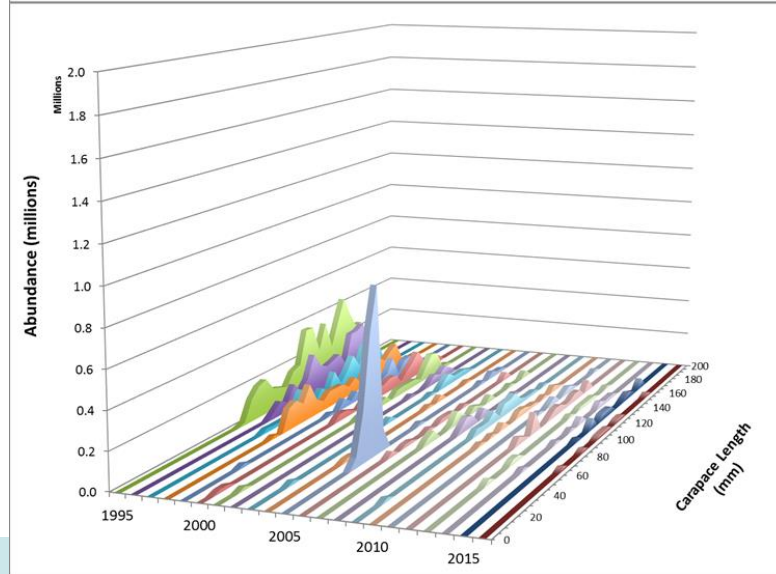
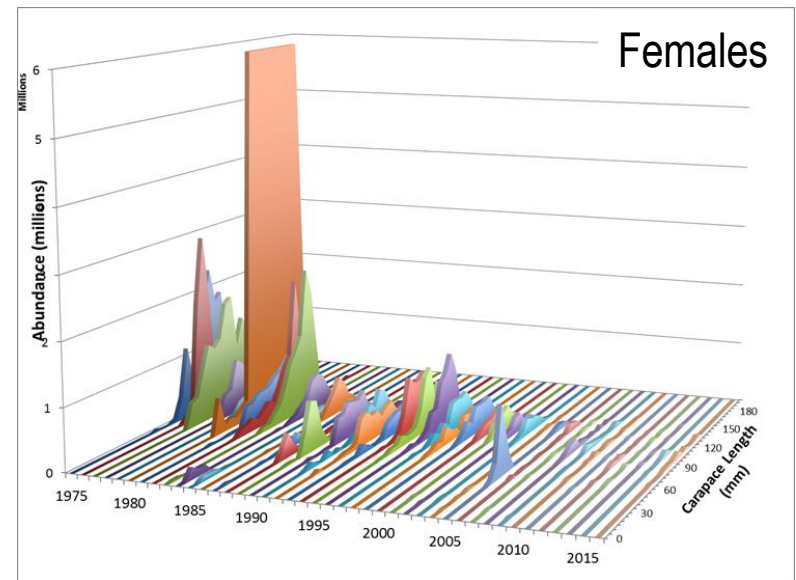
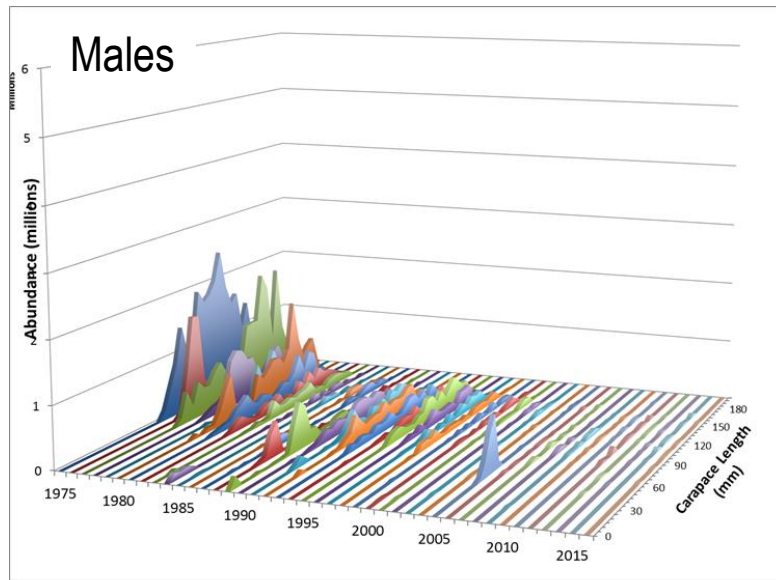
5-Year Average Groundfish catch (t)



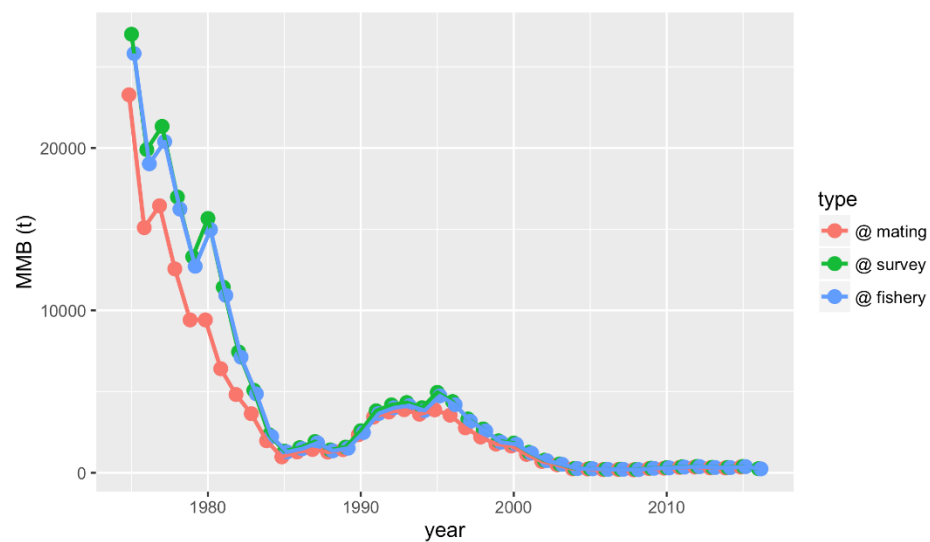
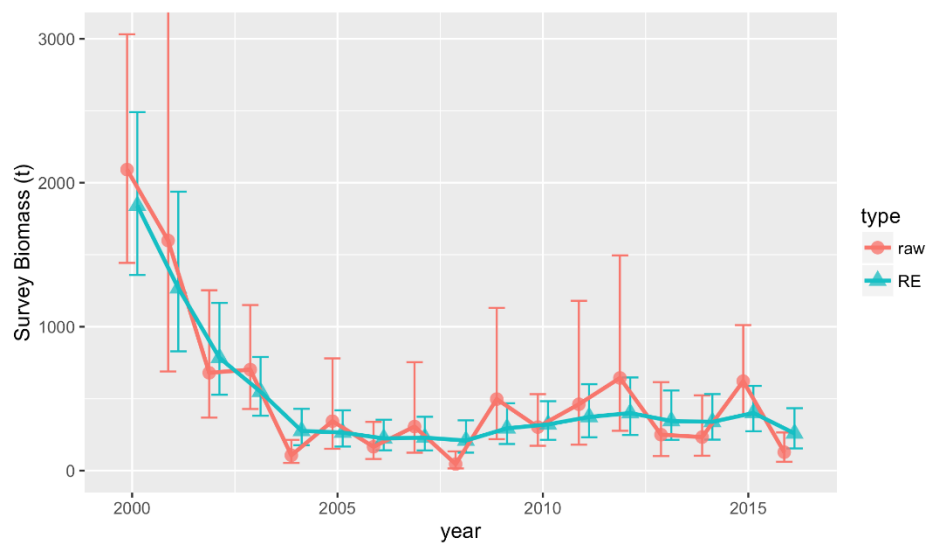
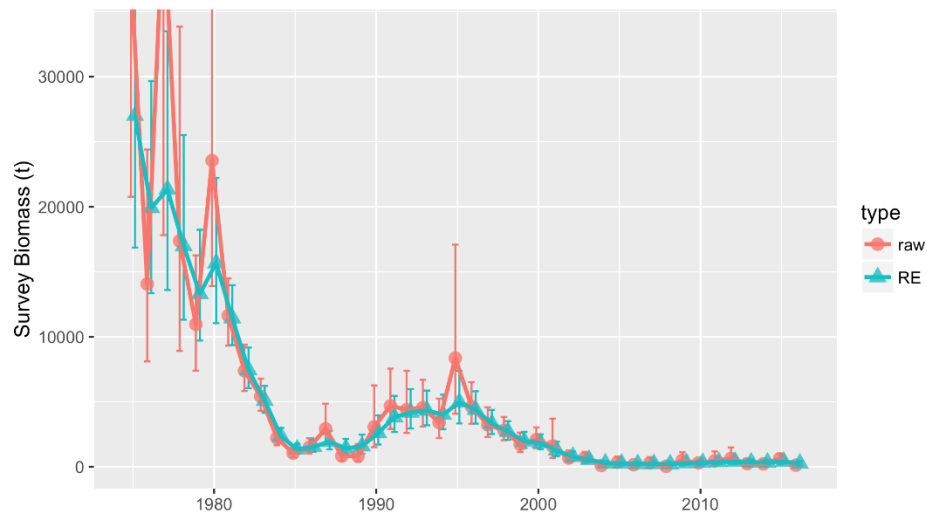
NMFS EBS Trawl Survey: Survey Trends



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}) | γ | 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 |
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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 |