

ADF&G Norton Sound Trawl Survey 1996-2023

Jenefer Bell
Alaska Department of Fish and Game
For January 2024 CPT meeting

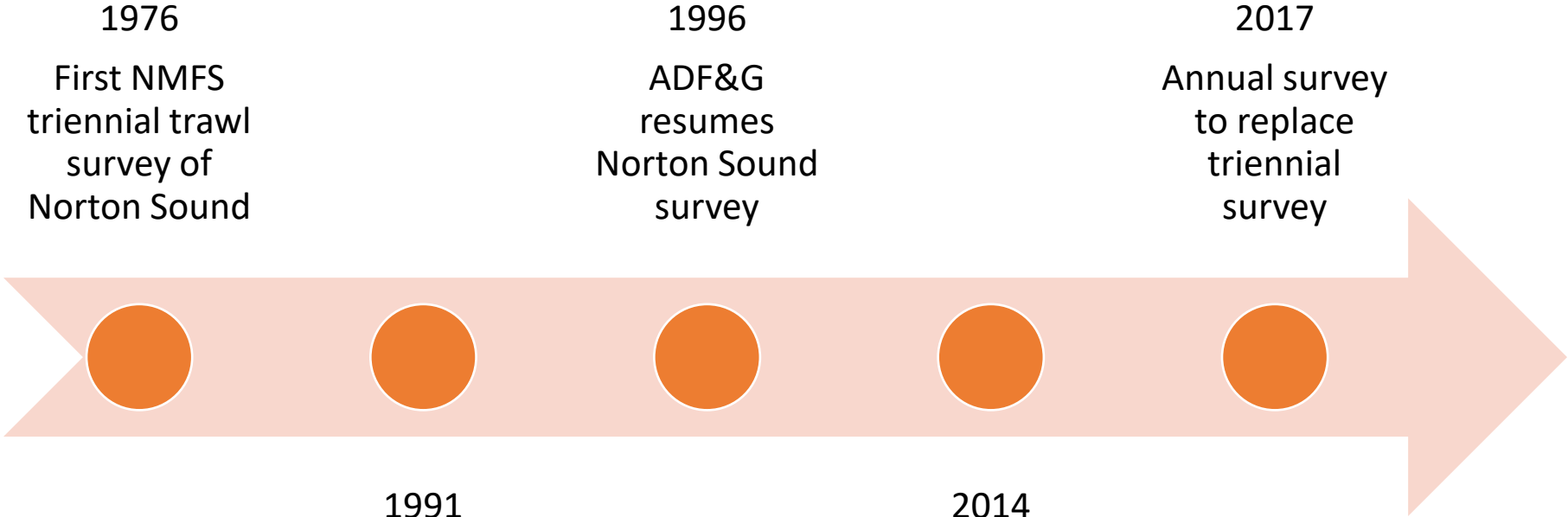


Overview

- Brief history of the bottom trawl survey
- Stations and standardizations
- Historical coverage and number of crab
- Comparison of index of abundance
- Summary



Brief history of the trawl survey

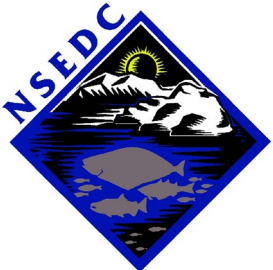


1991
NMFS Survey
of Norton
Sound
discontinued

1996
ADF&G
resumes
Norton Sound
survey

2014
Kodiak Test
Fishery funds
discontinued
for Norton
Sound Survey

2017
Annual survey
to replace
triennial
survey



Shout out to NSED
for providing support
for the trawl survey!

Stations and standardizations- 1996

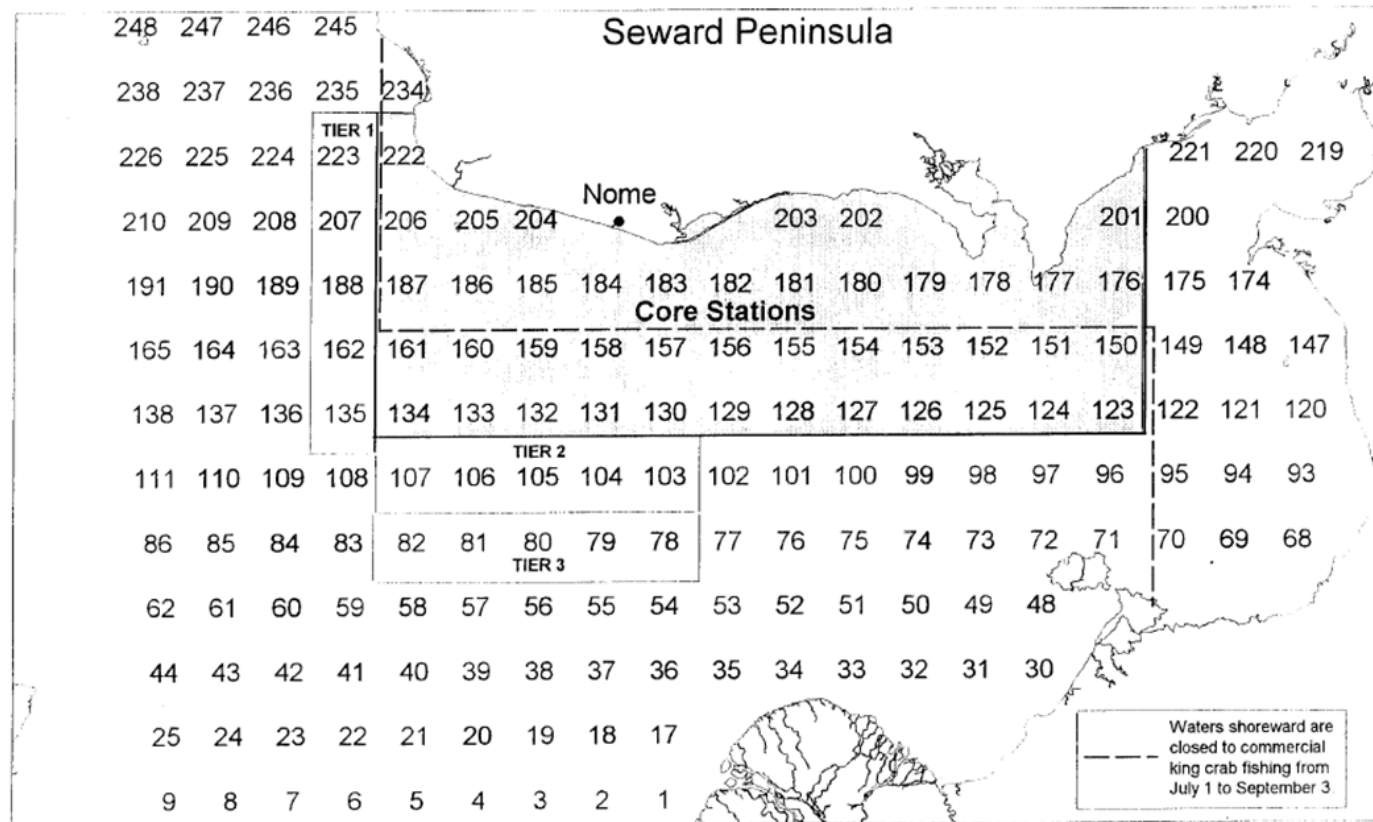
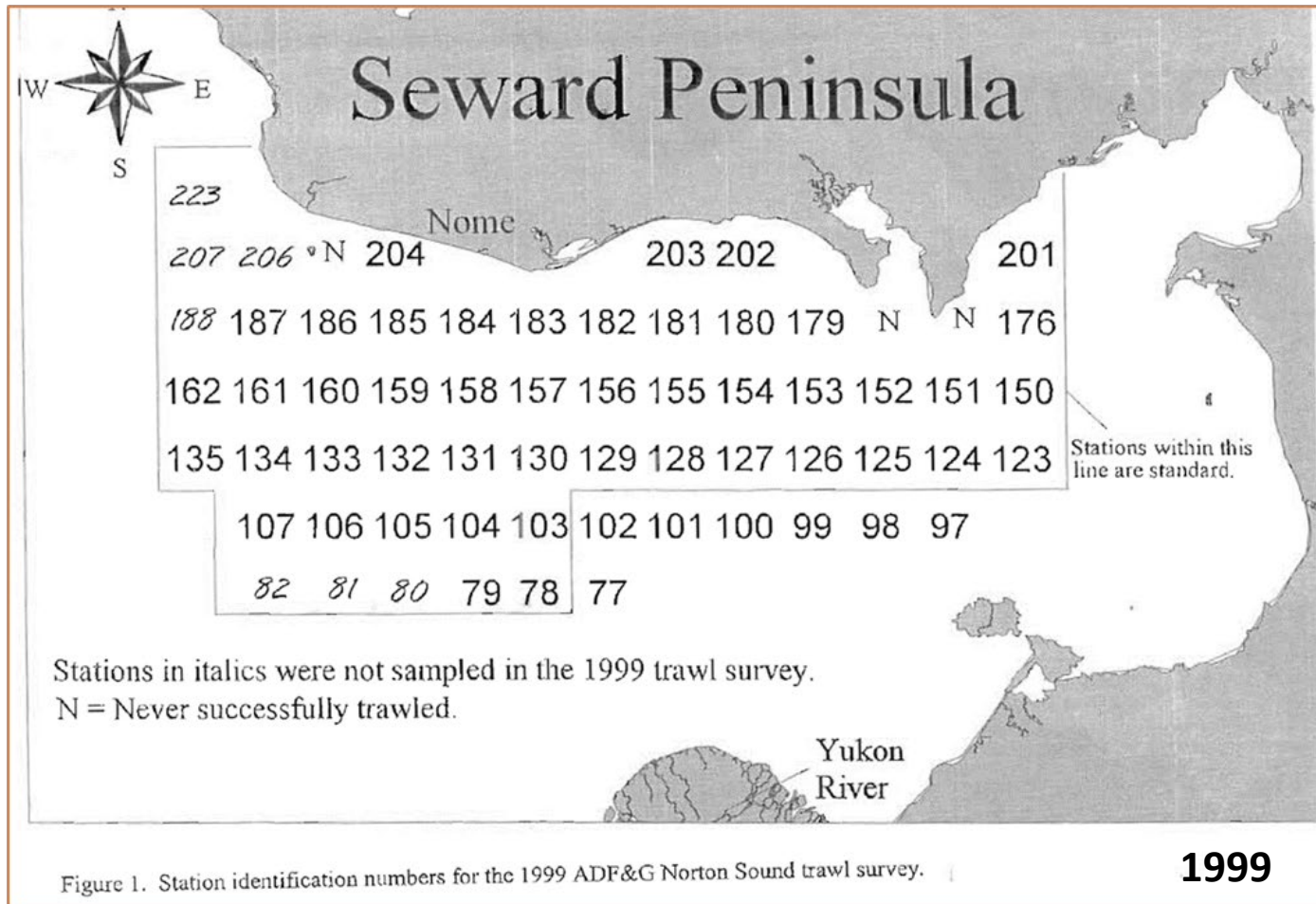


Figure 2. Layout of core and tier stations 1, 2, and 3 for the Norton Sound red king crab trawl survey conducted by the Alaska Department of Fish and Game, August 1996.

1996

- Followed the grid established by NMFS (10 x 10 nmi)
- Maintained historical trawl area broken out into tiers to define priorities
- 'Core' stations were trawled first and as time allowed stations in tiers 1, 2, and 3 were trawled

Stations and standardizations-1999



- Red king crab abundance was standardized for reporting in 1998 (Fair 1998)*
- Area was standardized but not all stations targeted to be trawled
- Survey coverage was restricted by budget and time and hindered by boat availability and weather (and in early years, site suitability)

From: Fair, L.F. and E. L. Brennan. 2001. Analysis of red king crab data from the 1999 ADF&G trawl survey of Norton Sound. Alaska Department of Fish and Game, Regional Information Report No. 3A00-26, Anchorage.

*Fair, L.F. 1998. Standardization of Norton Sound trawl survey red king crab abundance estimates. Alaska Department of Fish and Game, Regional Information Report No. 3A98-36, Anchorage.

Stations and standardizations 2002-2017

- Standardized area remained the same but changed tier locations and stations to outside standardized area
- For reporting and ADF&G management, RKC abundance was from trawled stations within the standardized area and did not include tiers 2 and 3
- Incorporated ADF&G trawl survey abundance estimate into model in 2004-05

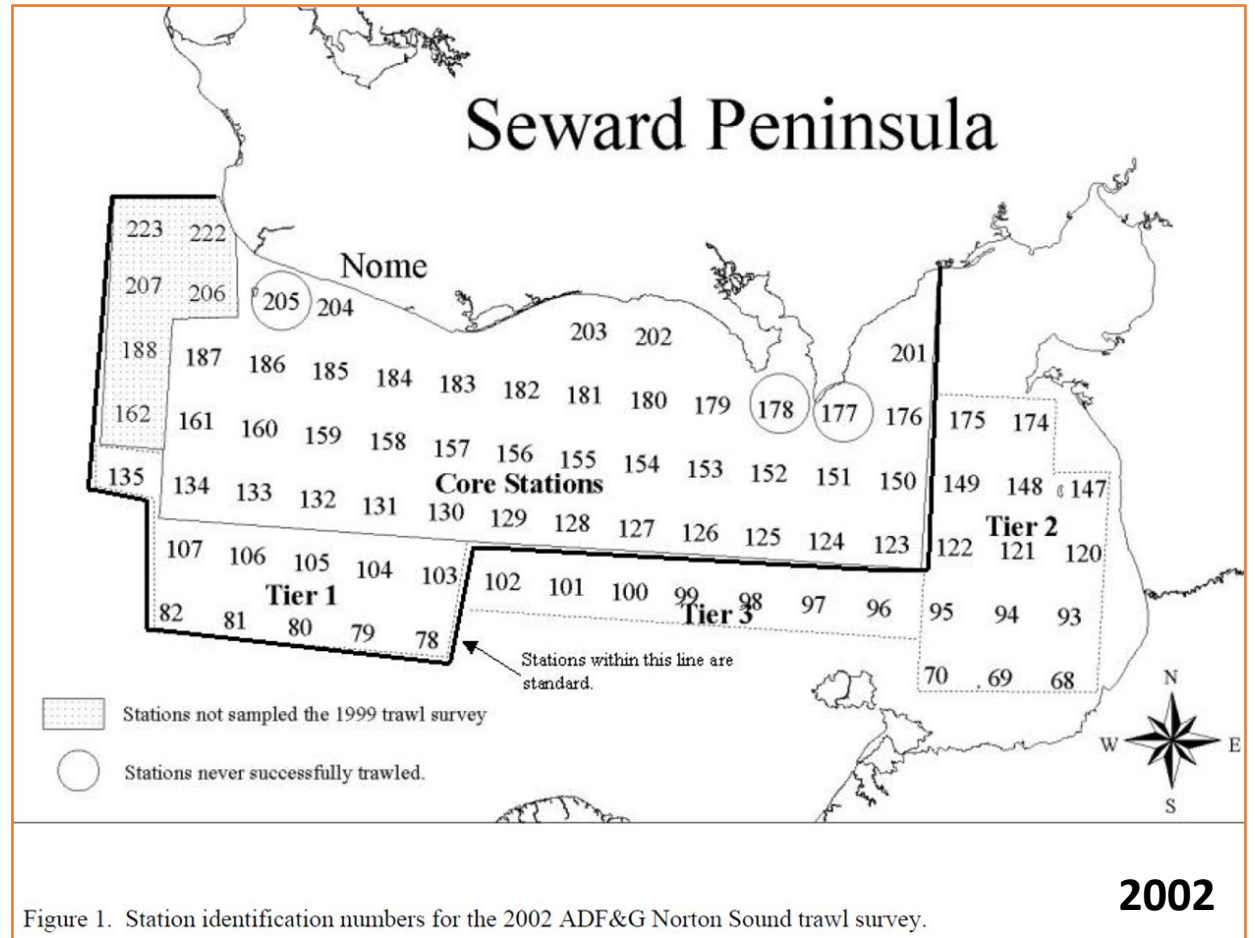


Figure 1. Station identification numbers for the 2002 ADF&G Norton Sound trawl survey.

From: Brennan, E.L. 2003. Analysis of red king crab data from the 2002 ADF&G trawl survey of Norton Sound. Alaska Department of Fish and Game, Regional Information Report No. 3A02-52, Anchorage.

Stations and standardizations 2018-2023

- Annual trawl survey
- Trimmed to 60 stations contained within the core and tier areas
- All have same priority but fall back to tiers if time is running short
- Reporting for ADF&G uses all trawled stations within this area and model still uses all core and tier stations trawled
- At this time, small amount of funds dedicated to charter vessel but currently no dedicated vessel

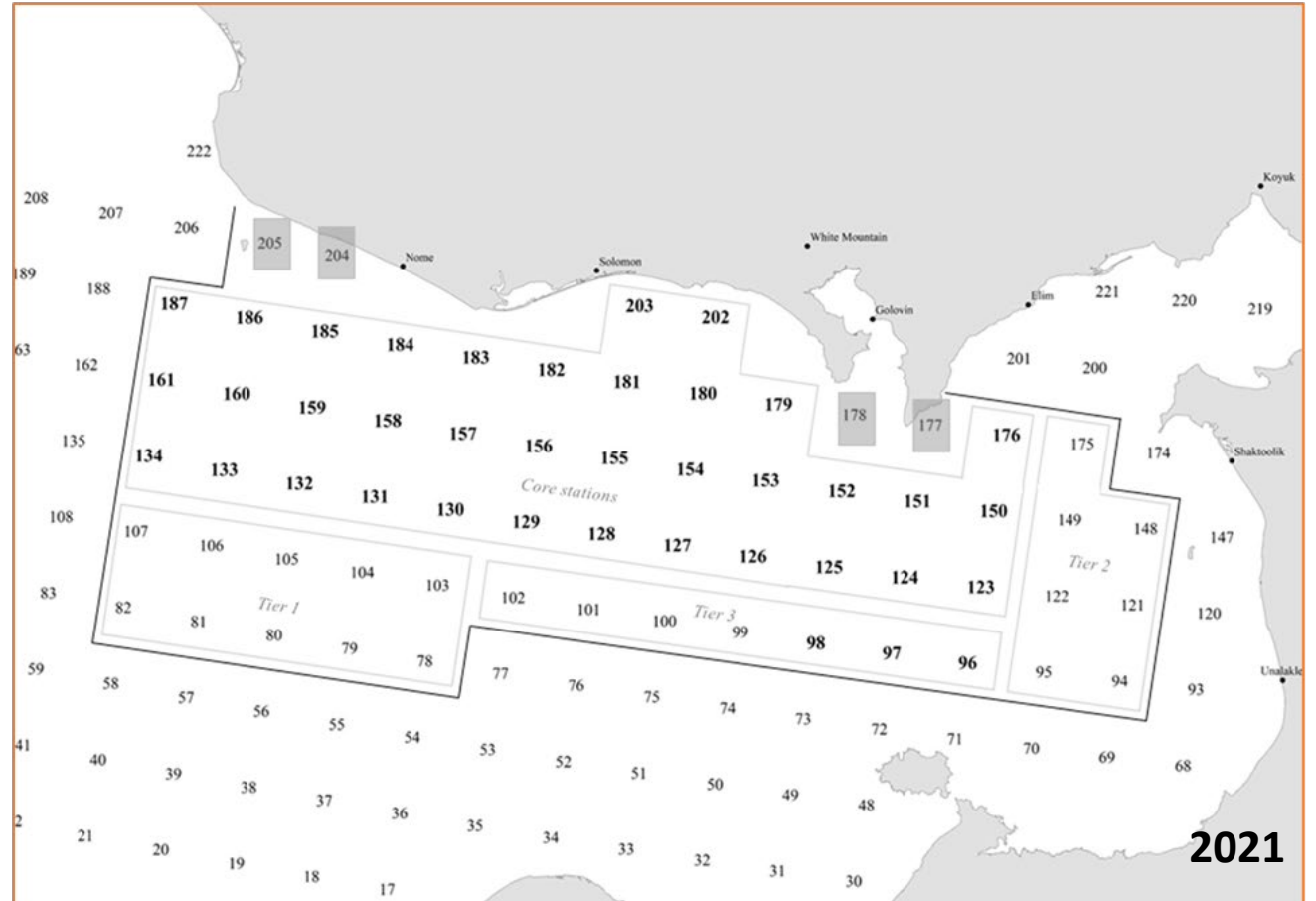
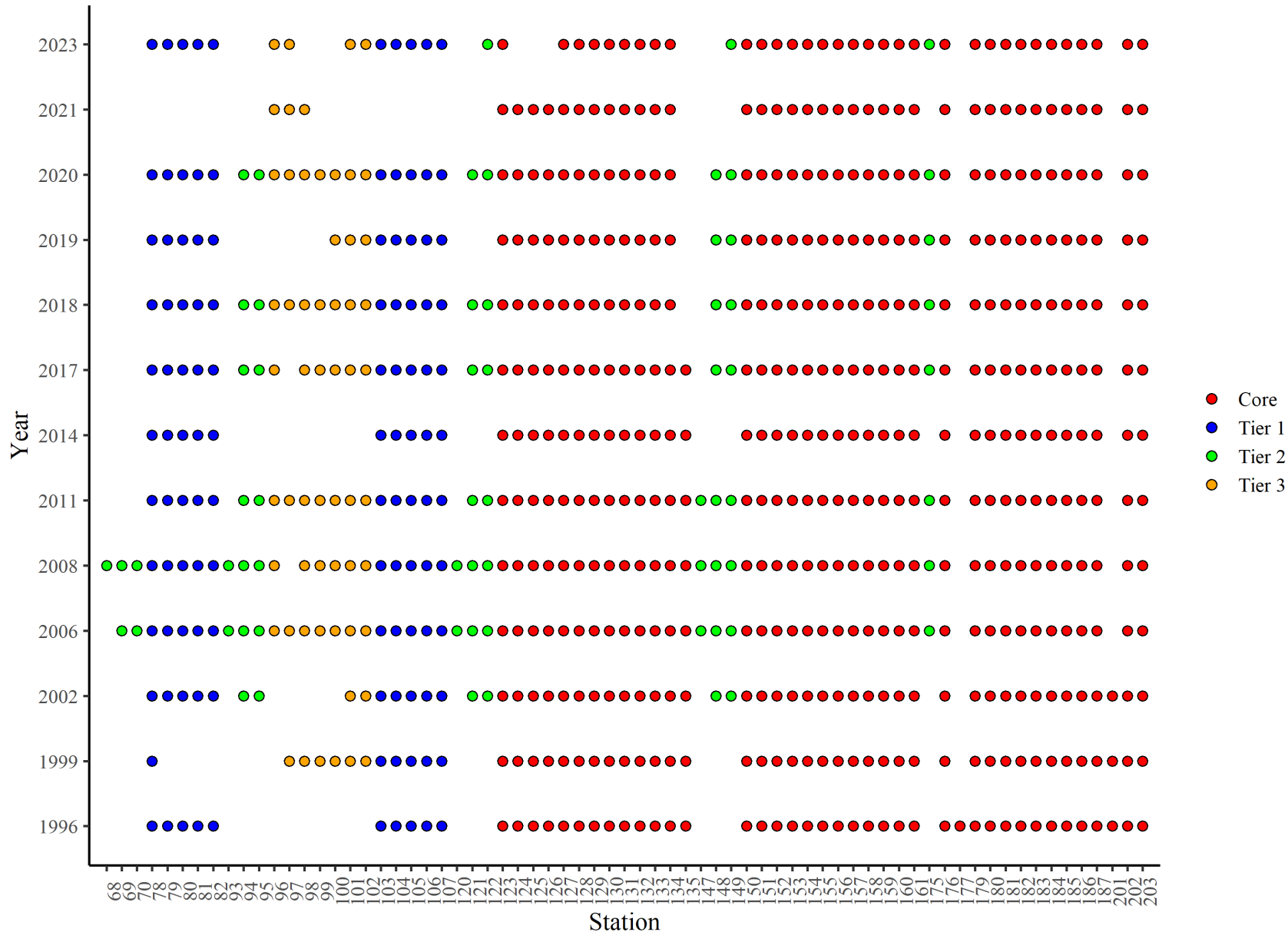


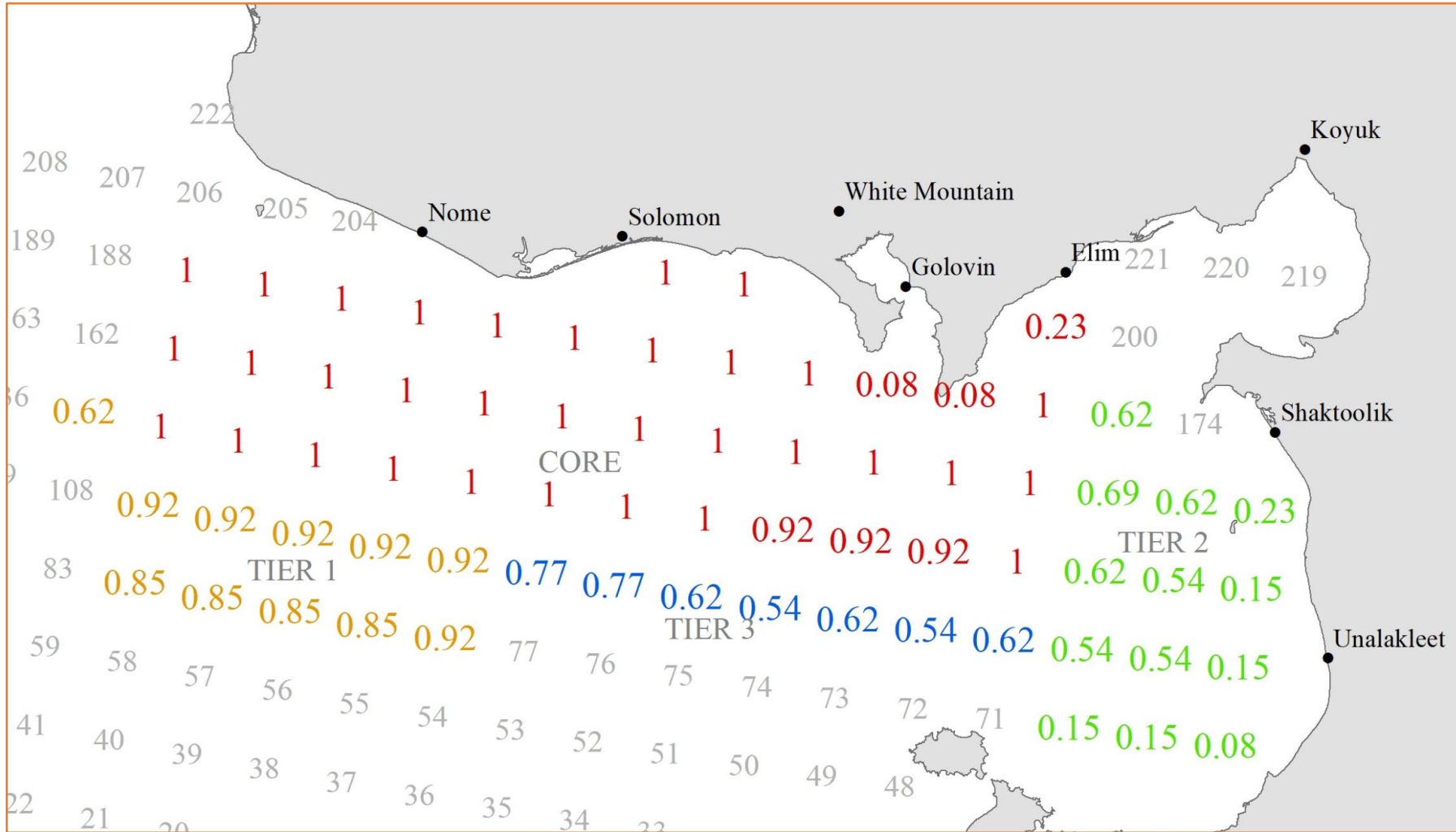
Figure 2.-Stations successfully trawled in 2021 (bold) out of the target goal of 60 stations (within the border lines).

Historical coverage and number of crab



- 68 possible stations
- Ranged from 67 stations completed in 2006 to 39 stations completed in 2021
- Overall, 33 ('consistent') stations have been towed in all 13 years
- All 'consistent' stations were part of the core

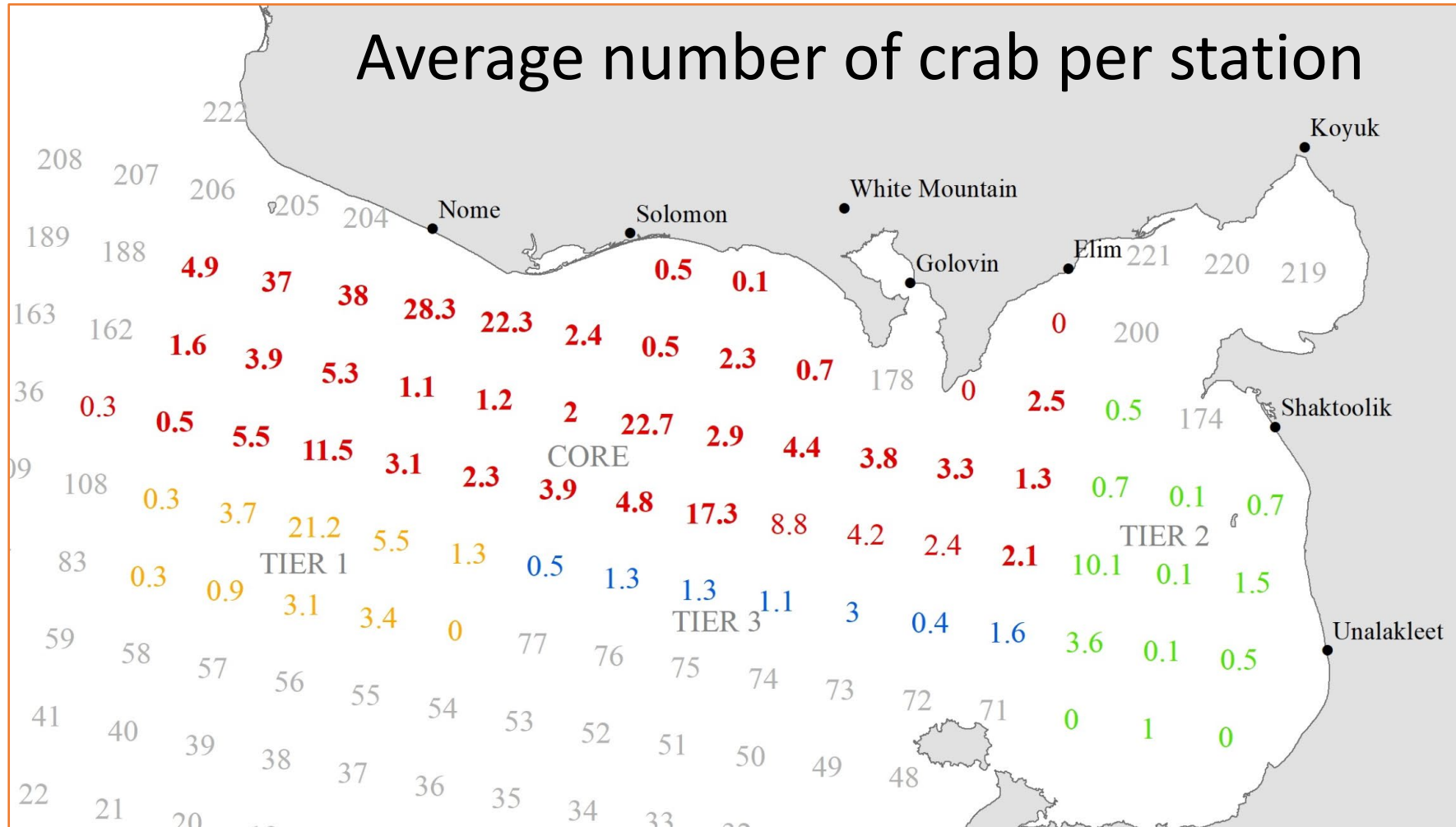
Historical coverage and number of crab



Proportion of years each station was towed

**1 is a 'consistent' station
 Gray numbers are unsurveyed stations

Historical coverage and number of crab

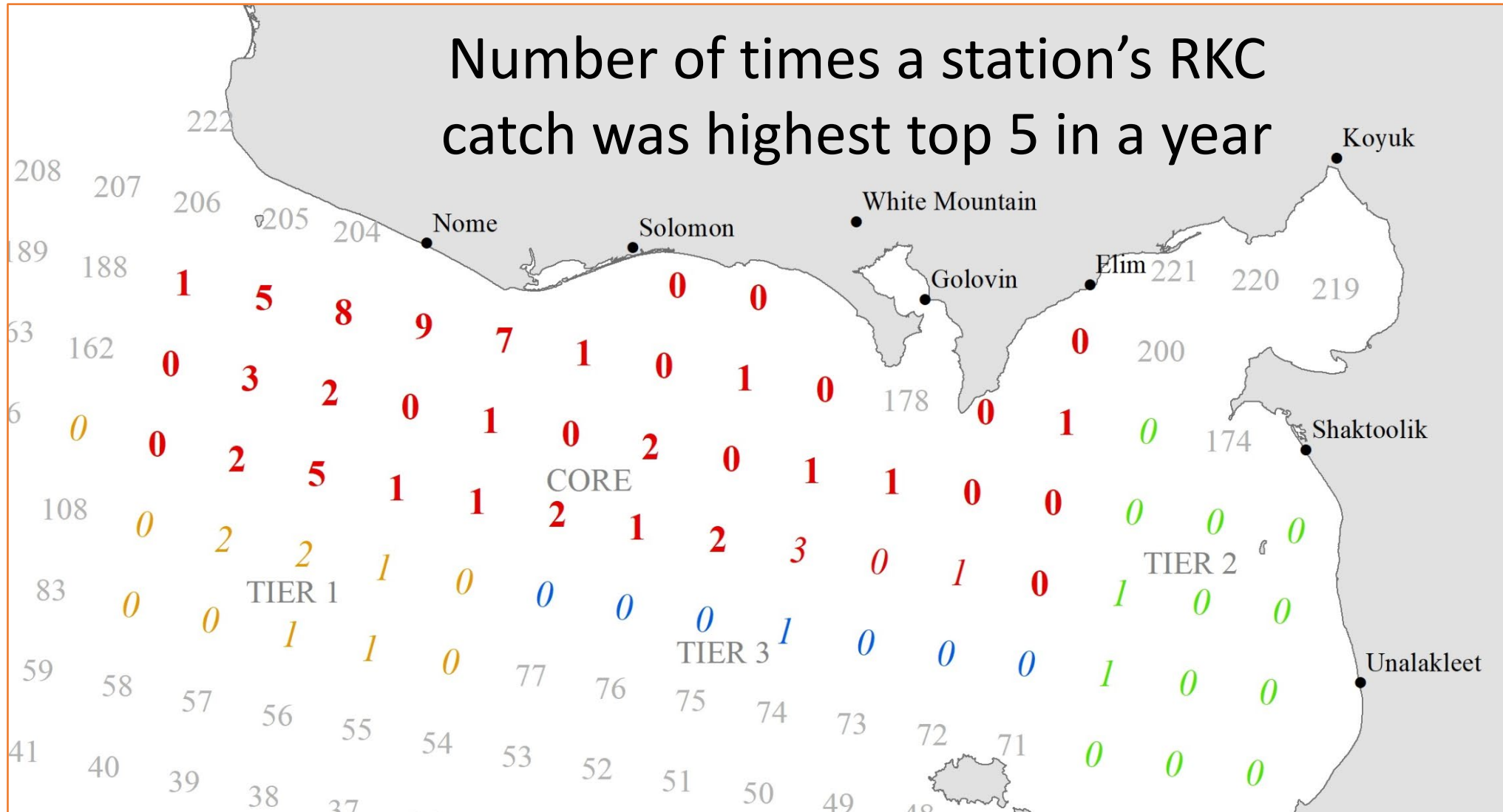


Most of the highest catches are found in the core area and specifically within the 'consistent' stations

**Bold numbers are 'consistent' stations

Gray numbers are unsurveyed stations

Historical coverage and number of crab



**Bold numbers are 'consistent' stations

Gray numbers are unsurveyed stations

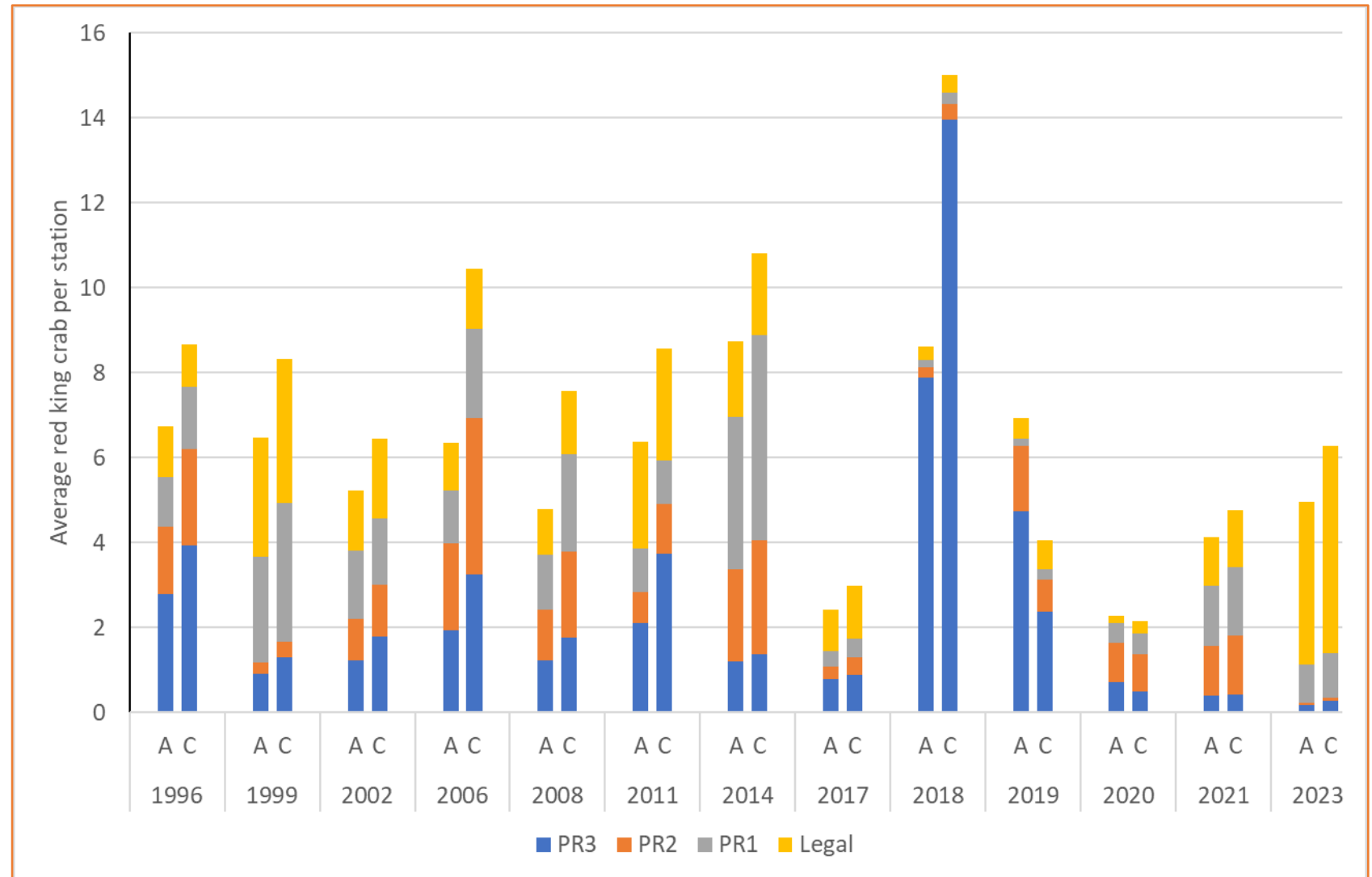
Historical coverage and number of crab

Average crab per station by size by year

A = all stations
C = consistent stations

Crab length categories

PR3= ≤ 75 mm CL
PR2= 76 – 89 mm CL
PR1= 90 – 104 mm CL
Legal= ≥ 105 mm CL



Comparison of index of abundance

Number of male crab each year

Year	All Stations					Consistent Stations					Prop
	PR3	PR2	PR1	Legal	Total	PR3	PR2	PR1	Legal	Total	
1996	131	75	55	56	317	130	75	48	33	286	0.90
1999	44	13	123	137	317	43	12	108	112	275	0.87
2002	67	54	89	77	287	59	40	52	62	213	0.74
2006	130	136	84	75	425	107	122	69	47	345	0.81
2008	80	79	86	71	316	58	67	76	49	250	0.79
2011	131	45	64	155	395	123	39	34	87	283	0.72
2014	56	102	169	84	411	45	89	159	64	357	0.87
2017	47	17	22	59	145	29	14	14	41	98	0.68
2018	473	14	11	19	517	461	12	9	13	495	0.96
2019	246	80	9	25	360	78	25	8	23	134	0.37
2020	42	56	28	10	136	16	29	16	10	71	0.52
2021	15	46	55	45	161	14	46	53	44	157	0.98
2023	9	2	45	192	248	9	2	35	161	207	0.83

‘Consistent’ stations account for 37% to 98% of crab each year

Comparison of index of abundance

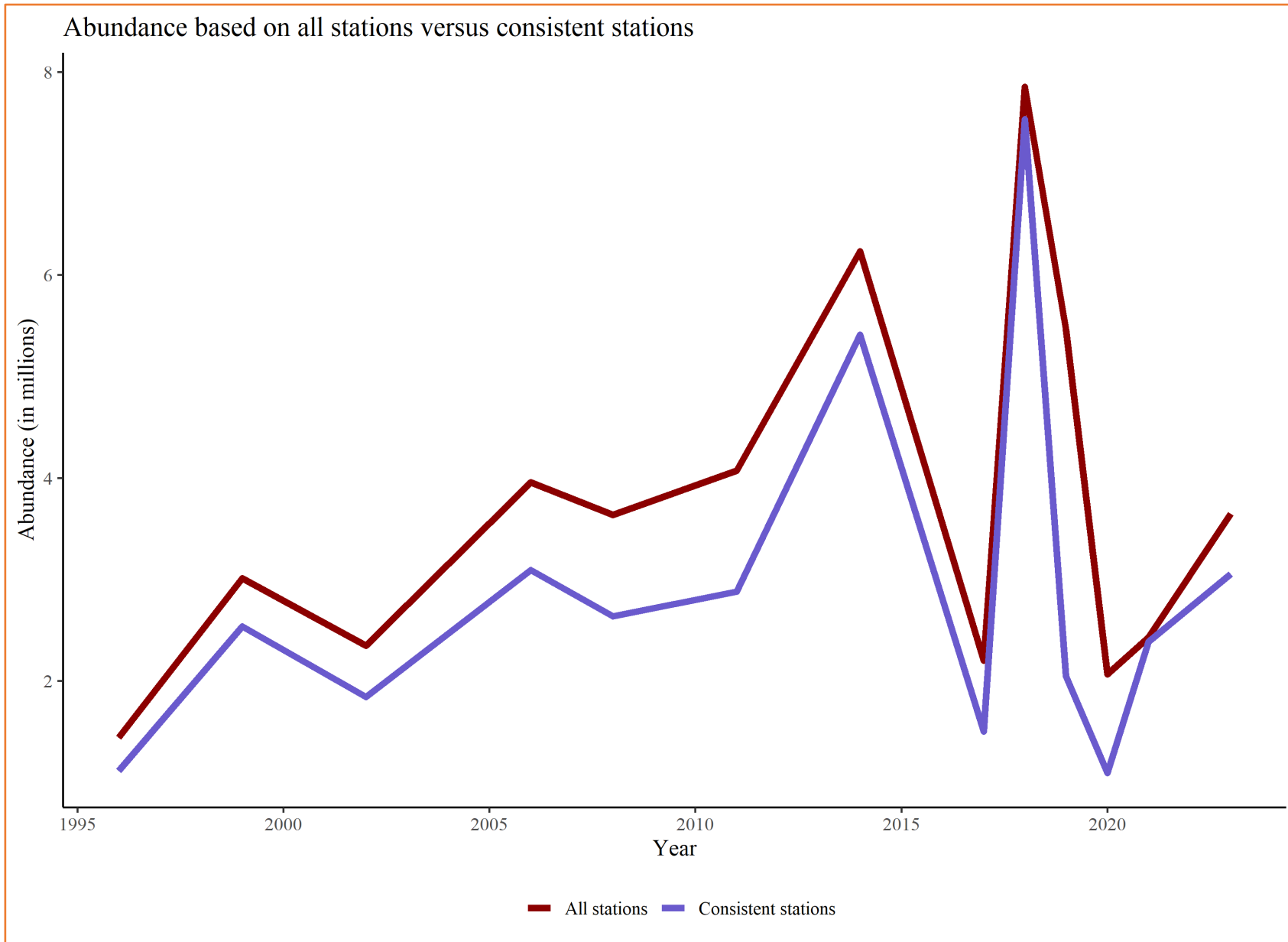
Abundance each year

Year	All Stations					Consistent stations					Prop
	PR3	PR2	Pr1	Legal	Total	PR3	PR2	Pr1	Legal	Total	
1996	0.47	0.16	0.25	0.57	1.44	0.48	0.16	0.17	0.30	1.11	0.77
1999	0.45	0.16	0.68	1.72	3.01	0.59	0.14	0.38	1.42	2.54	0.84
2002	0.64	0.41	0.51	0.79	2.35	0.66	0.35	0.24	0.59	1.84	0.78
2006	1.47	1.09	0.53	0.86	3.96	1.26	0.94	0.36	0.53	3.09	0.78
2008	1.04	0.85	0.73	1.02	3.64	0.86	0.67	0.44	0.67	2.64	0.73
2011	1.38	0.45	0.46	1.79	4.07	1.31	0.39	0.21	0.97	2.88	0.71
2014	0.83	1.55	2.11	1.75	6.23	0.91	1.35	1.74	1.41	5.41	0.87
2017	0.71	0.26	0.29	0.94	2.20	0.44	0.21	0.18	0.67	1.50	0.68
2018	7.18	0.21	0.15	0.30	7.85	7.02	0.18	0.12	0.21	7.53	0.96
2019	3.74	1.22	0.11	0.41	5.47	1.22	0.38	0.08	0.38	2.05	0.37
2020	0.64	0.85	0.35	0.23	2.07	0.24	0.44	0.20	0.21	1.09	0.53
2021	0.23	0.68	0.79	0.73	2.43	0.41	0.70	0.56	0.71	2.38	0.98
2023	0.11	0.03	0.62	2.89	3.65	0.45	0.03	0.18	2.40	3.05	0.84

‘Consistent’ stations account for 37% to 98% of crab each year

Abundance = sum of [station area (usually 100 nm²)*CPUE(per station)] For trawled stations only!

Comparison of index of abundance



Summary

- Trawl area, which includes current core and tier 1, has been consistent since 1996, with tiers 2 and 3 added after 1999.
- Trawl area included up to 68 stations from 1996 to 2017 but currently 60 stations are targeted for annual surveys
- All stations within the standardized trawl area (core, tiers 1-3) are used for abundance estimates for trawl reporting and ADF&G management
- Trawl abundance estimates incorporated into model in 2005
- A total of 33 stations have been trawled in all 13 years
- Majority of male crab captured by the trawl occur within these 33 stations
- Deviations of abundance patterns between 'all stations' and 'consistent stations' can be attributed to one-off capture events for stations outside the core