

# Appendix B: NMFS Survey Data for the Tanner Crab Assessment

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## Introduction

This report calculates NMFS survey data time series (aggregate abundance, mature biomass and size compositions) for Tanner crab based on CRABHAUL files and a haul/station strata file downloaded from AKFIN.

The survey data were processed using the following parameters:

Table 1: Parameters used to process crab haul data.

	Quantity	Value
1	min size (mm CW)	25
2	max size (mm CW)	185
3	bin size (mm CW)	5
4	strata type	2015
5	haul types	all

## Annual survey abundance and biomass

Annual survey abundance and biomass for Tanner crab for the EBS and the areas east and west of 166°W longitude were calculated from the survey haul data as if the survey were conducted using a random-stratified sampling design (it uses a fixed grid), with survey strata defined for the Pribilof Islands high density sampling area, the St. Matthew Island high density sampling area, the standard-density sampling area west of 166°W longitude, and the standard-density area east of 166°W longitude. Abundance and biomass estimates from the four strata were then aggregated appropriately to the areas east and west of 166°W and to the entire EBS.

## By sex

The following plots illustrate time series trends in Tanner crab survey abundance and biomass by sex and area.

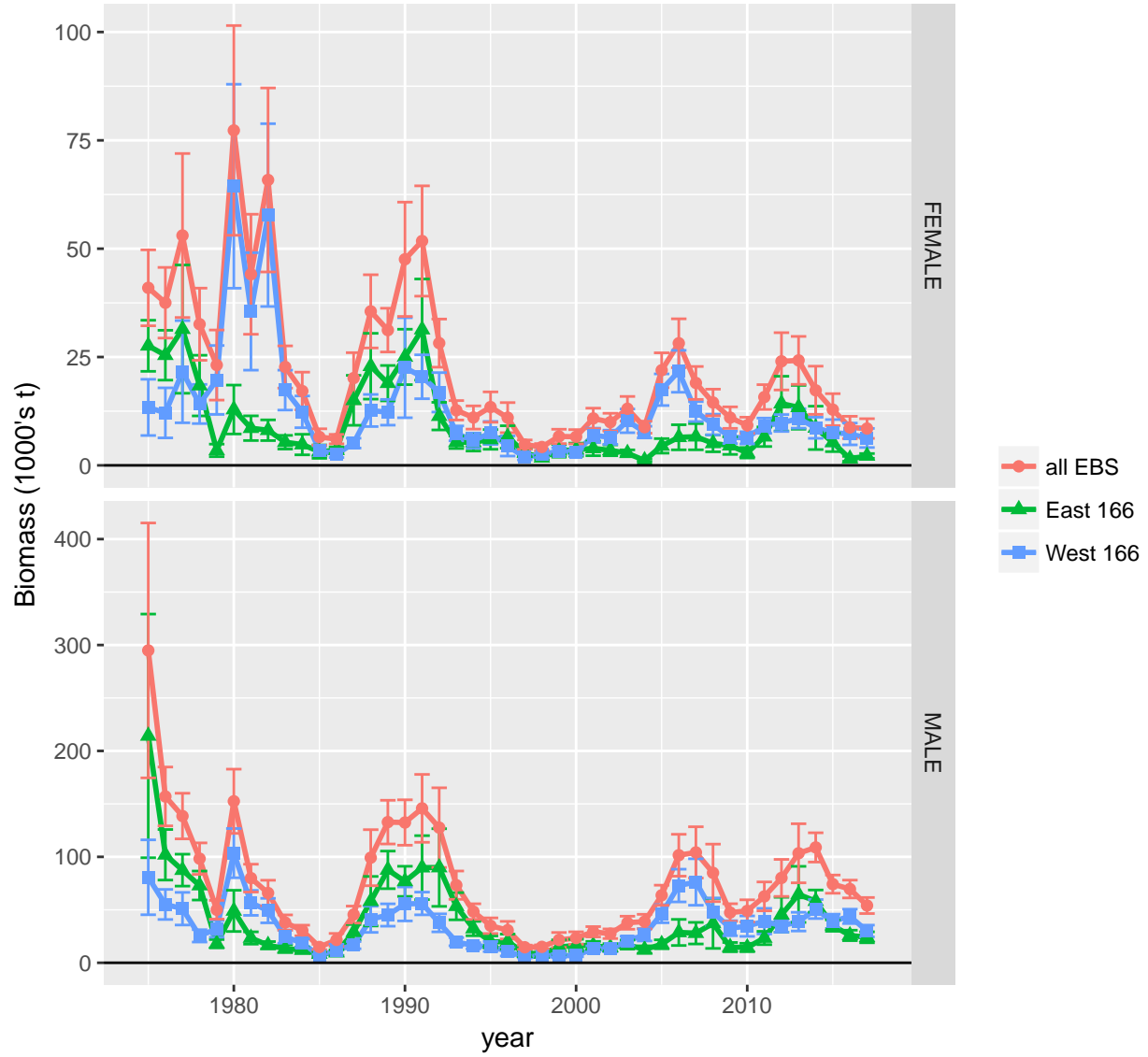


Figure 1: Tanner crab biomass in the NMFS EBS trawl survey, by sex and area.

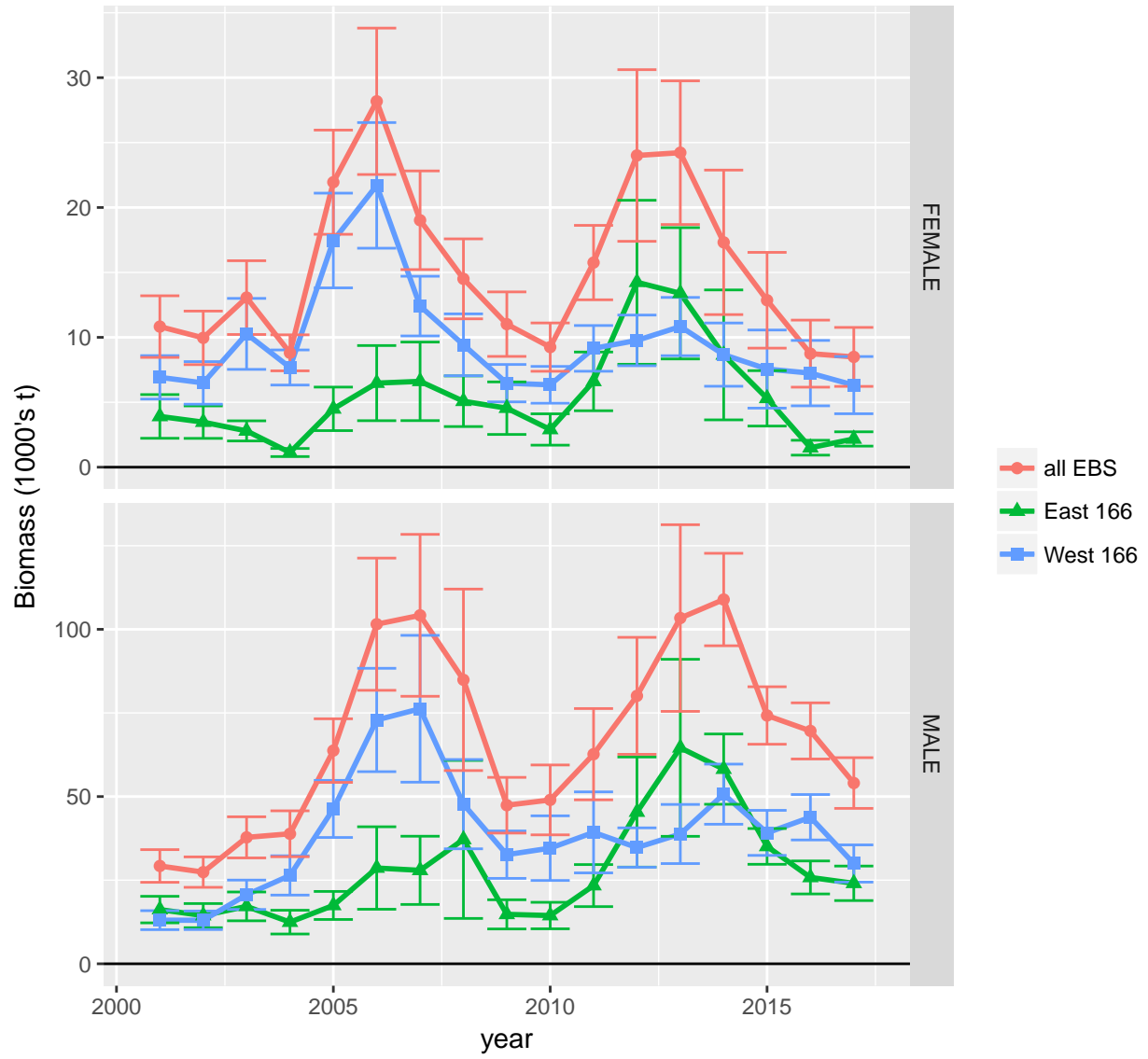


Figure 2: Tanner crab biomass in the NMFS EBS trawl survey, by sex and area, since 2001.

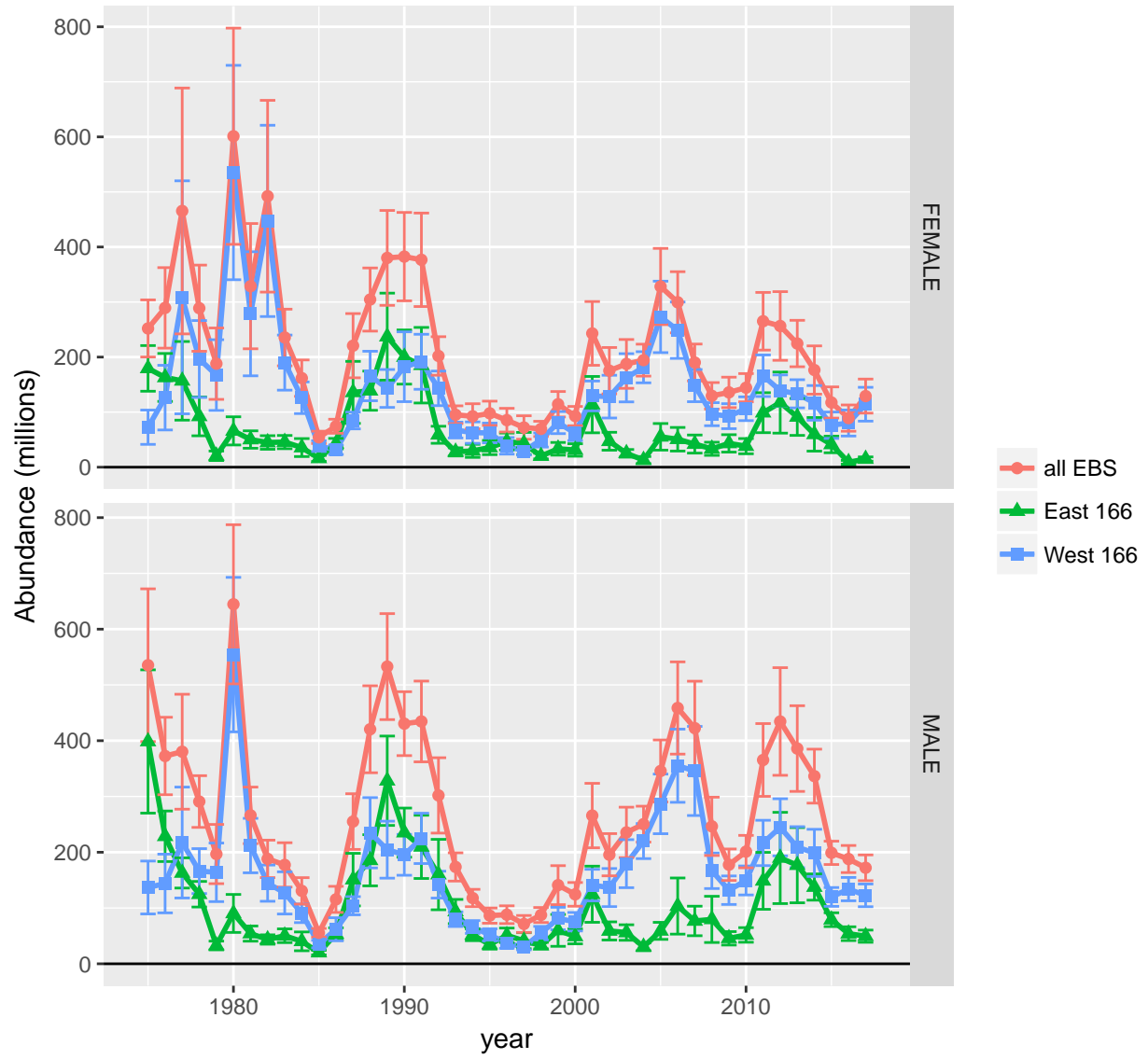


Figure 3: Tanner crab abundance in the NMFS EBS trawl survey, by sex and area.



Figure 4: Tanner crab abundance in the NMFS EBS trawl survey, by sex and area, since 2001.

## By sex and maturity state

The following plots illustrate the time series trends for Tanner crab survey abundance and biomass by sex, maturity state, and area.

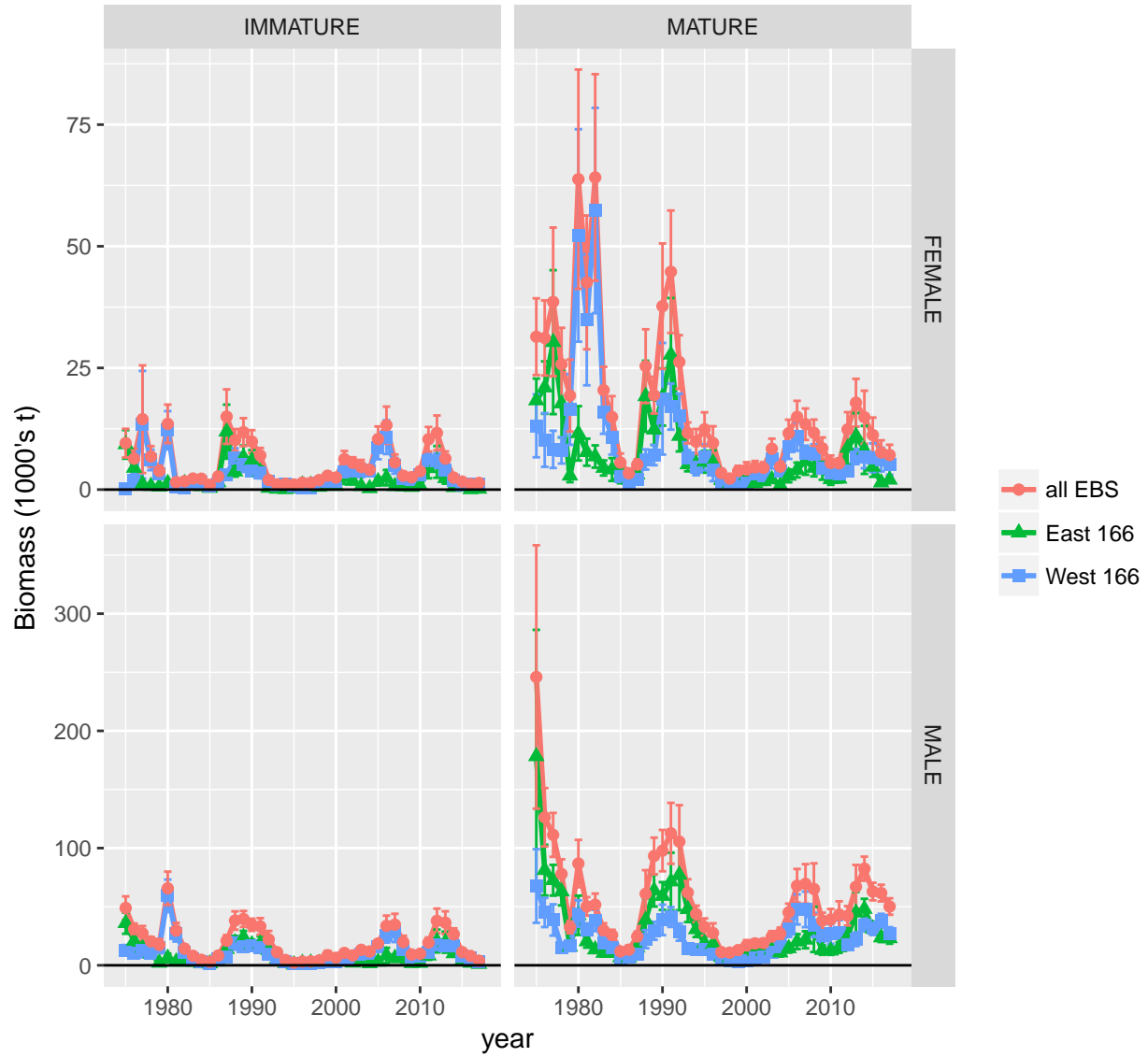


Figure 5: Tanner crab biomass in the NMFS EBS trawl survey, by sex, maturity state and area.



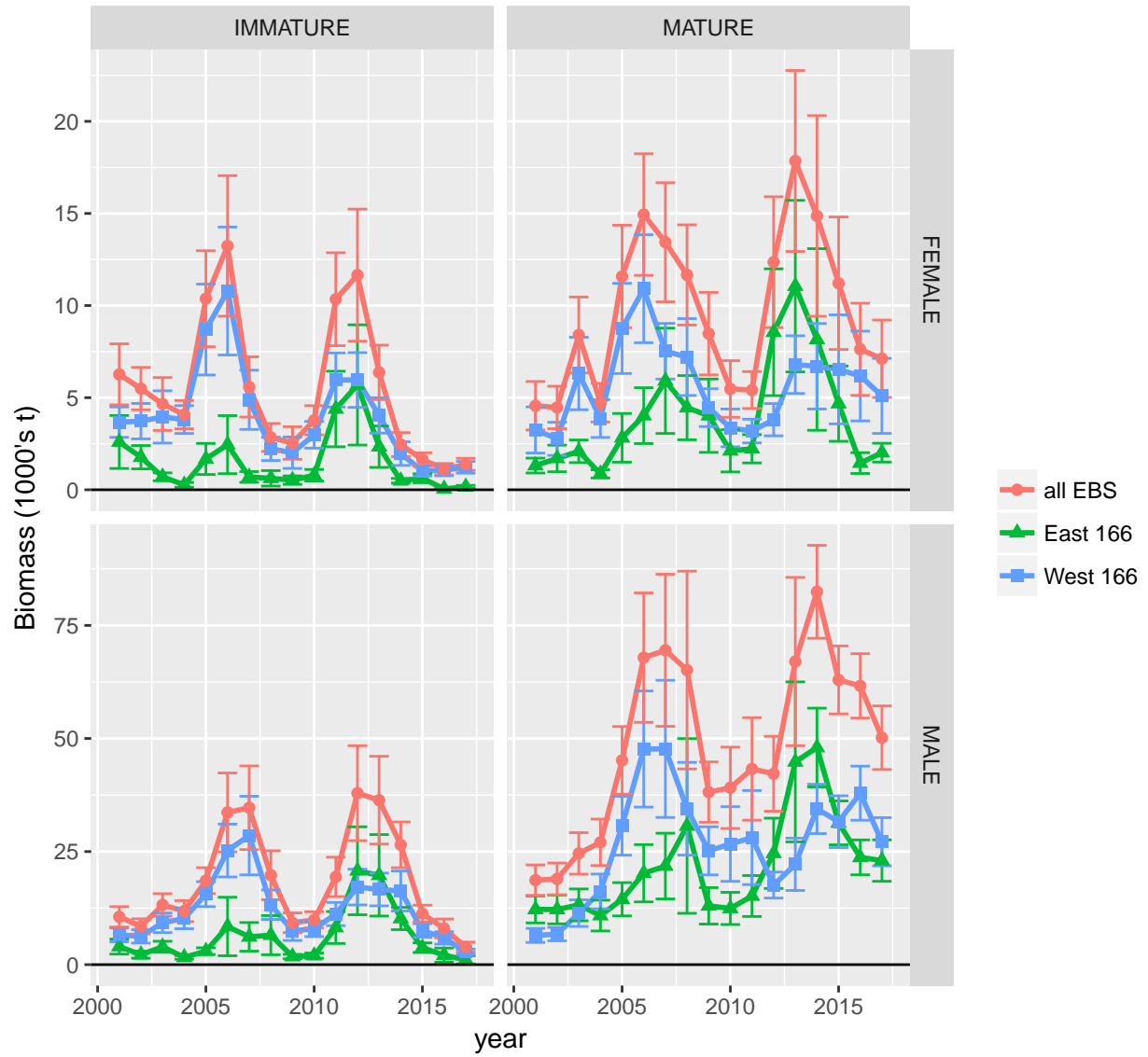


Figure 6: Tanner crab biomass in the NMFS EBS trawl survey, by sex, maturity state and area, since 2001.

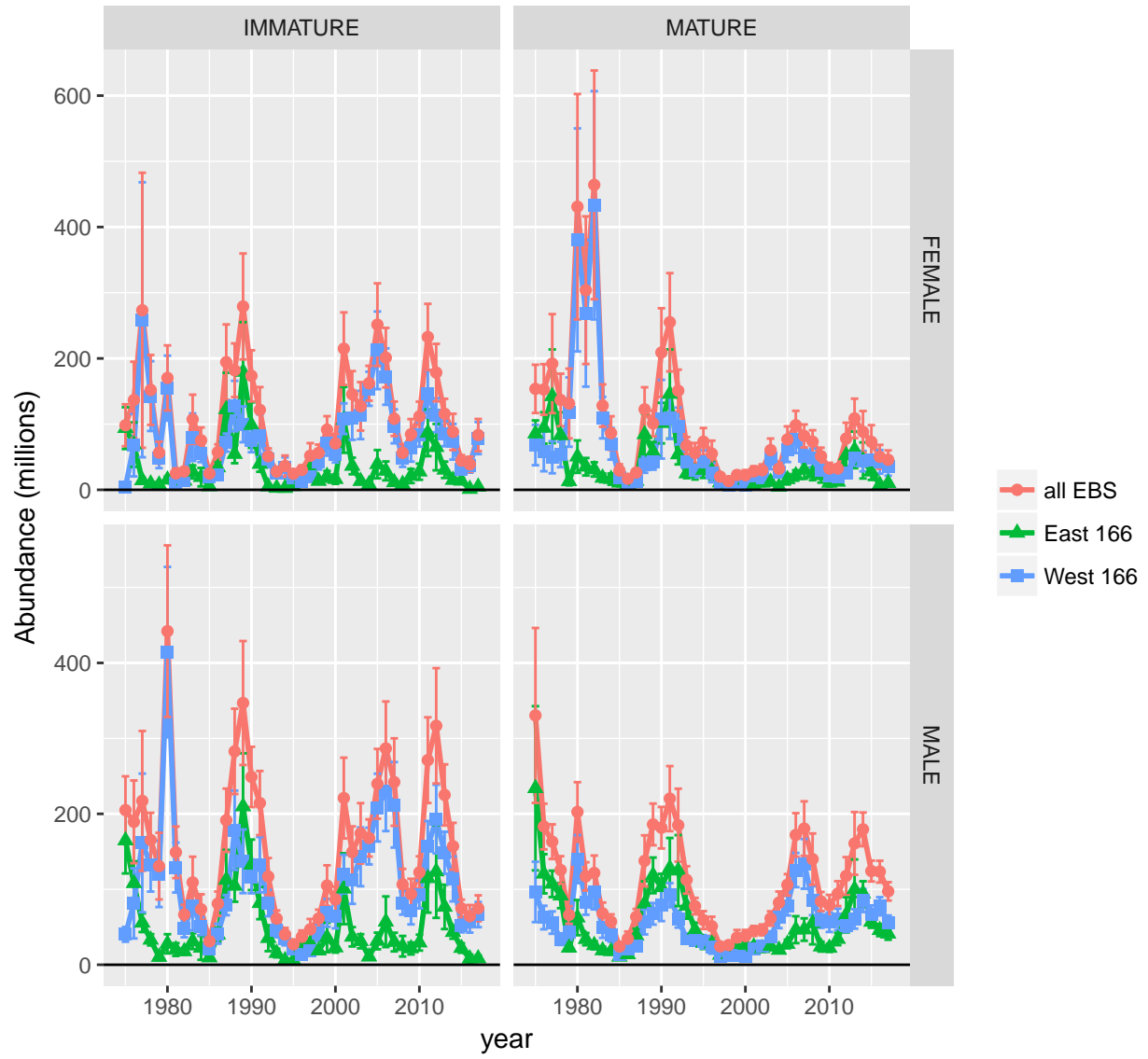


Figure 7: Tanner crab abundance in the NMFS EBS trawl survey, by sex, maturity state and area.

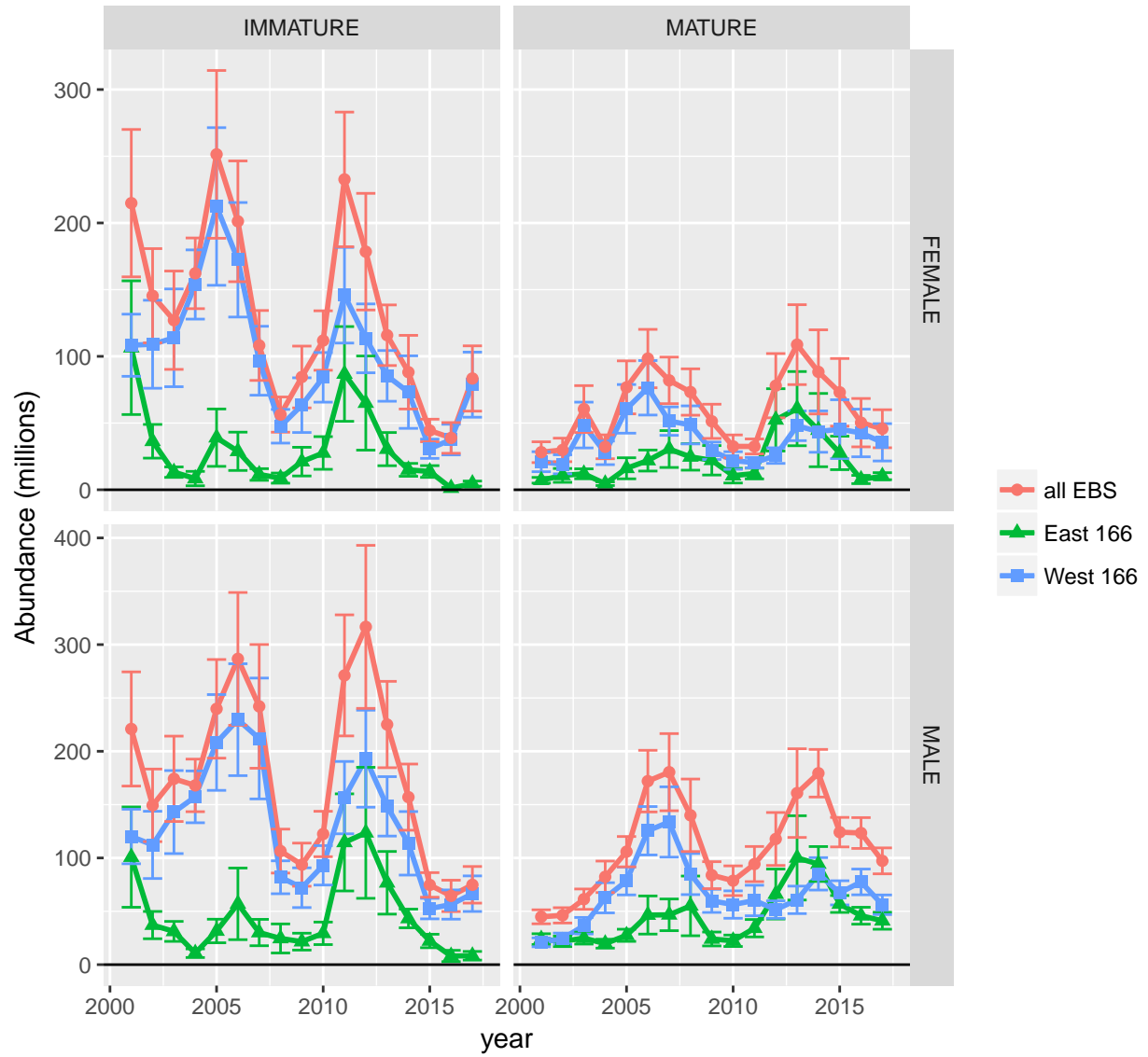


Figure 8: Tanner crab abundance in the NMFS EBS trawl survey, by sex, maturity state and area, since 2001.

## Time series survey trends in industry preferred-sized males

The Tanner crab fishery is managed separately east and west of 166°W longitude, and separate TACs are set for each area. Abundance and biomass trends from the NMFS EBS bottom trawl survey are shown in subsequent figures for the current industry-preferred size of legal crab (i.e.,  $\geq 125$  mm CW).

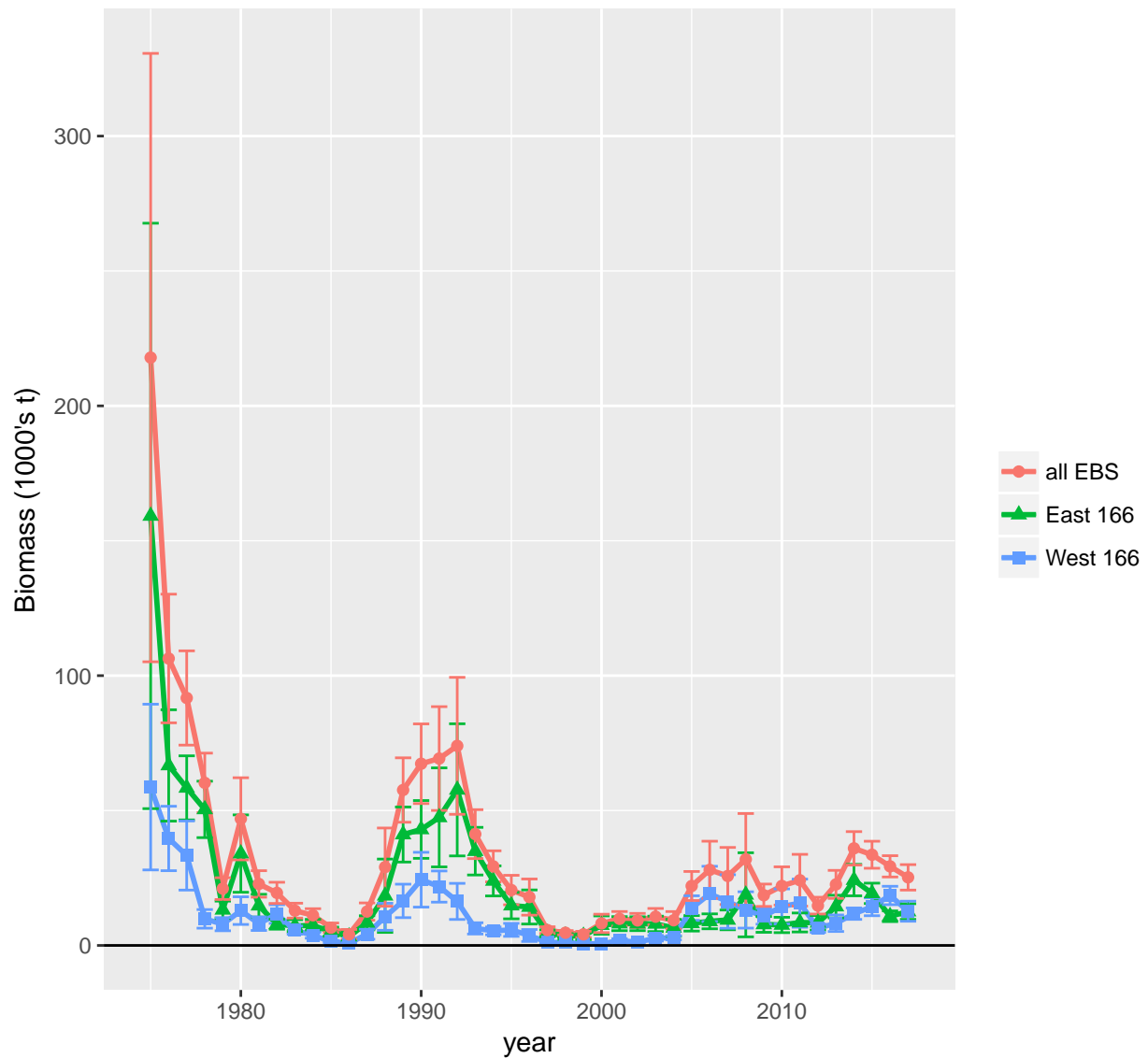


Figure 9: Legal male Tanner crab biomass in the NMFS EBS trawl survey, by area.

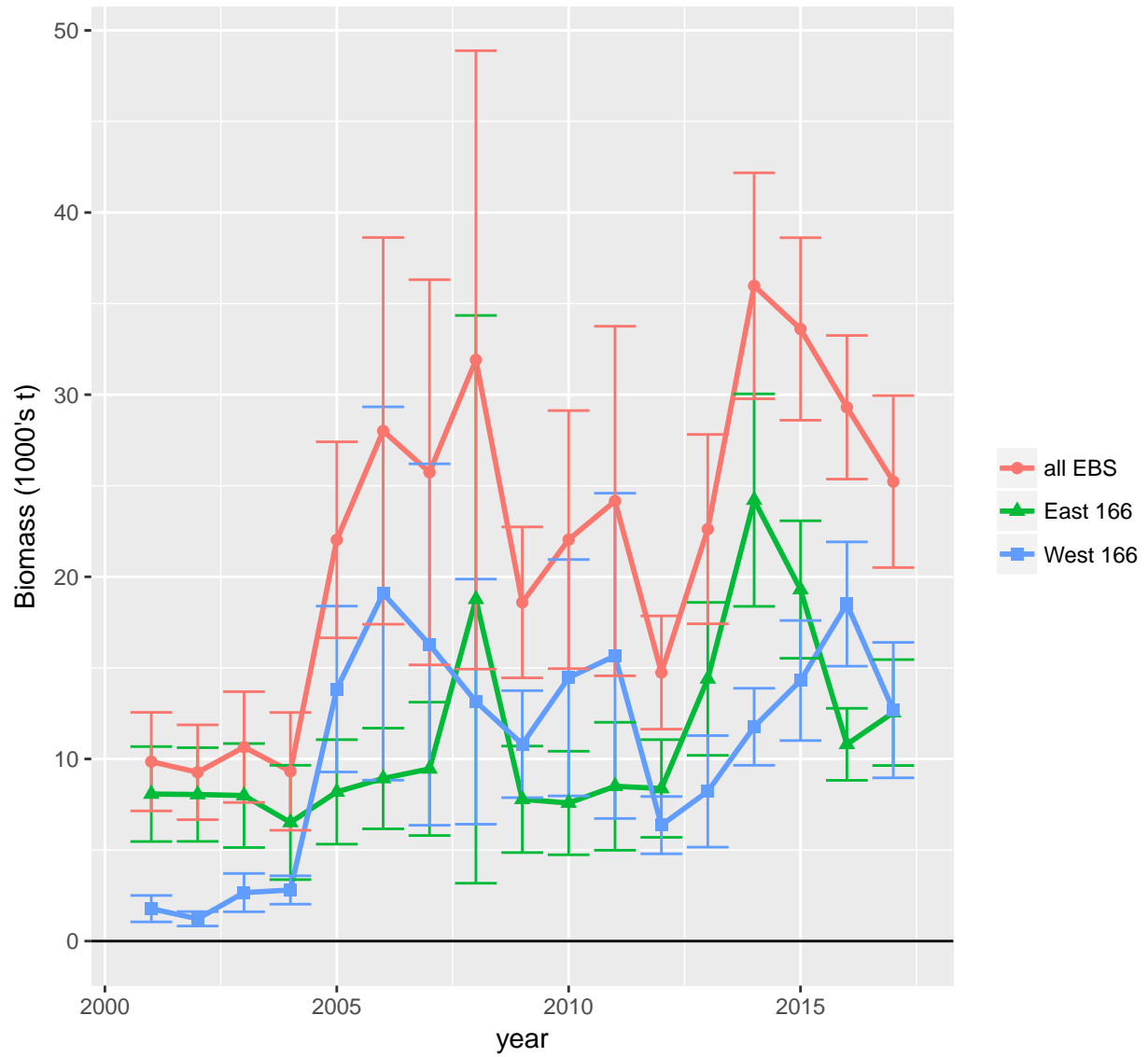


Figure 10: Industry-preferred male Tanner crab biomass in the NMFS EBS trawl survey, by area, since 2001.

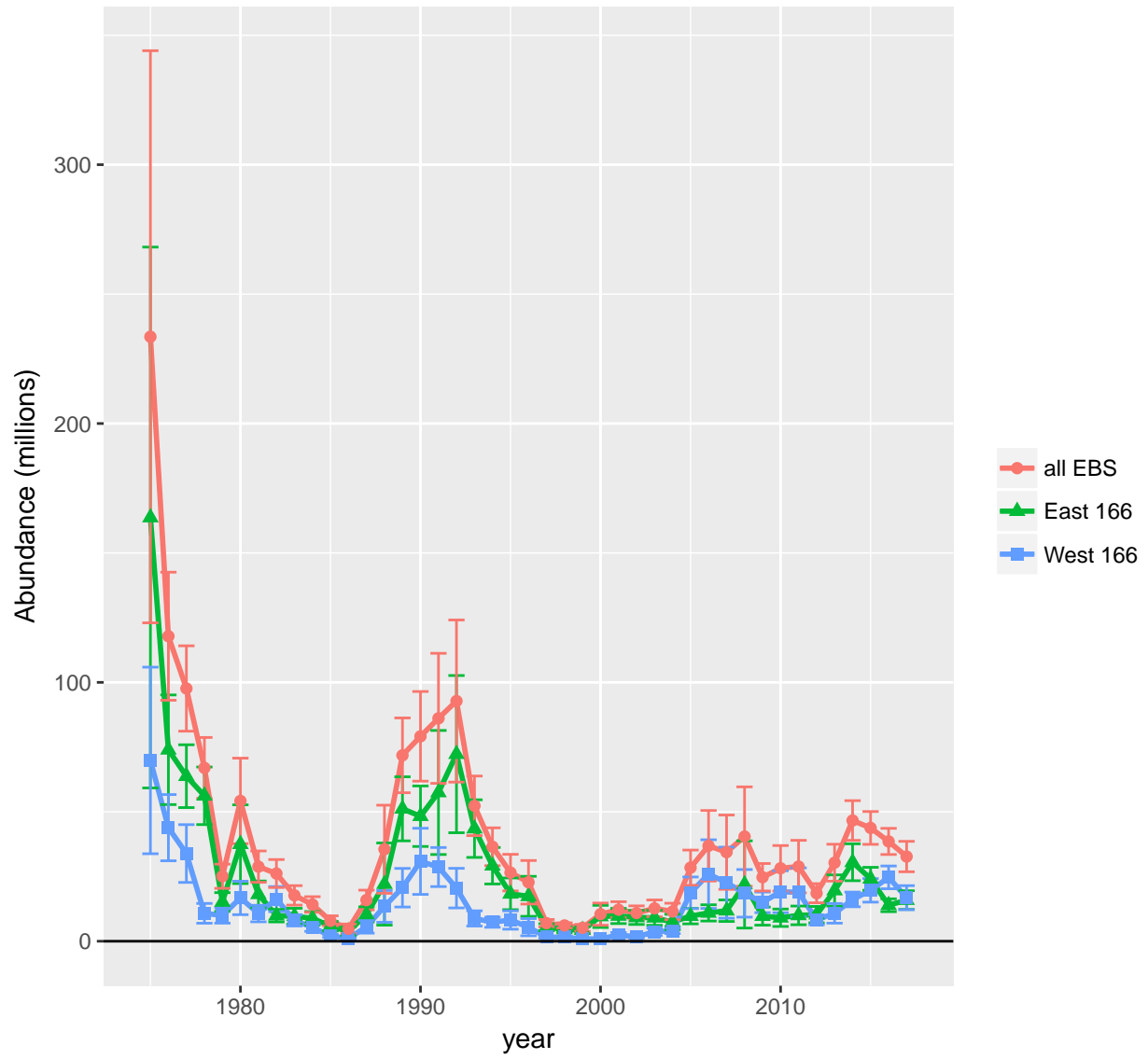


Figure 11: Legal male Tanner crab abundance in the NMFS EBS trawl survey, by area.

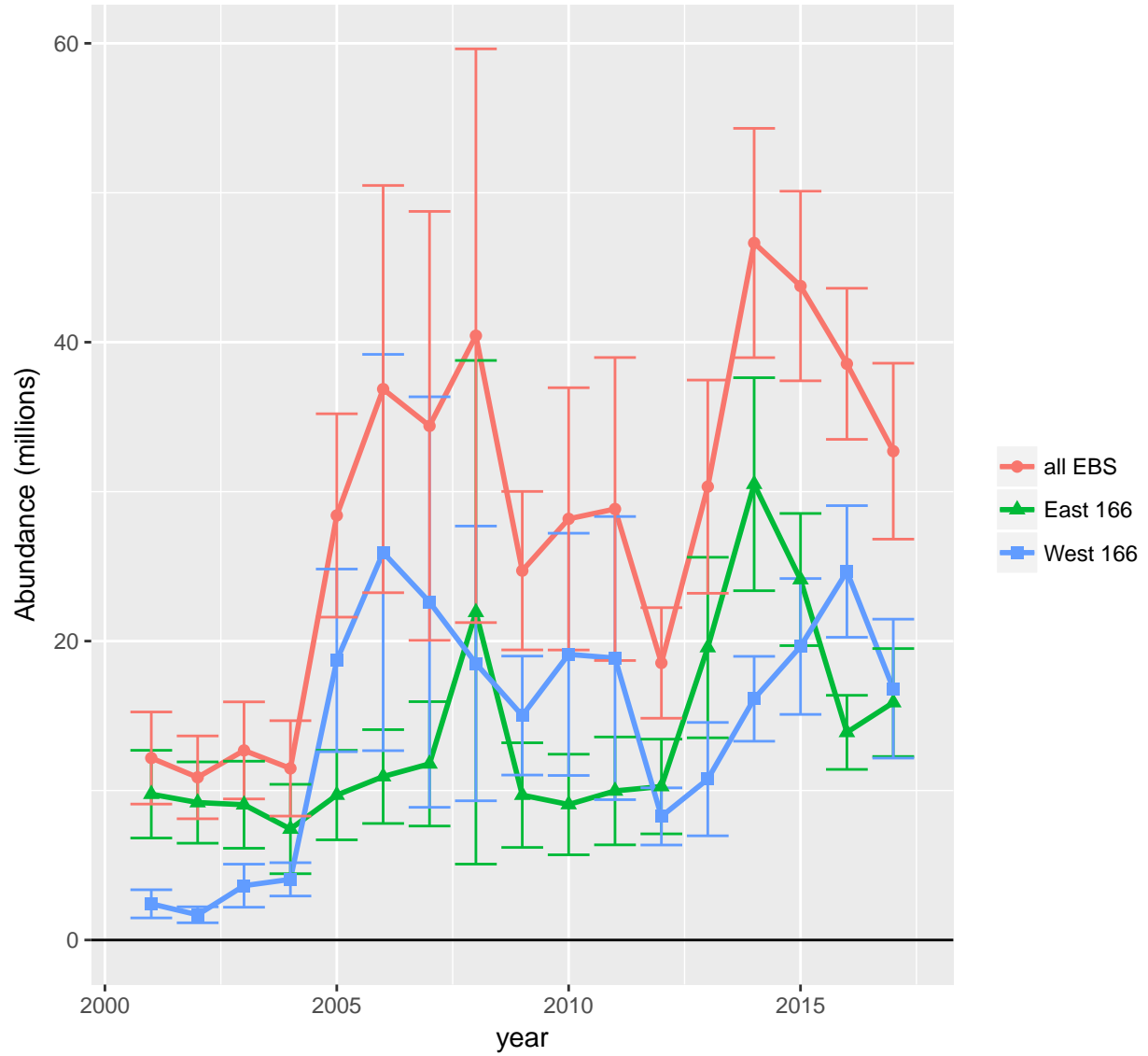


Figure 12: Industry-preferred male Tanner crab abundance in the NMFS EBS trawl survey, by area, since 2001.

## **Size compositions**

Annual size compositions for Tanner crab in the NMFS EBS trawl survey were calculated by sex, maturity state, shell condition, and 5mm size (carapace width) bin, excluding individuals with sizes < 25mm CW and accumulating individuals in the last size bin (180-185 mm CW) for sizes > 185 mm CW. Individuals classified in the survey as “immature, old shell” crab were assumed to really be “immature, new shell” crab and were re-classified as such.

### **By sex**



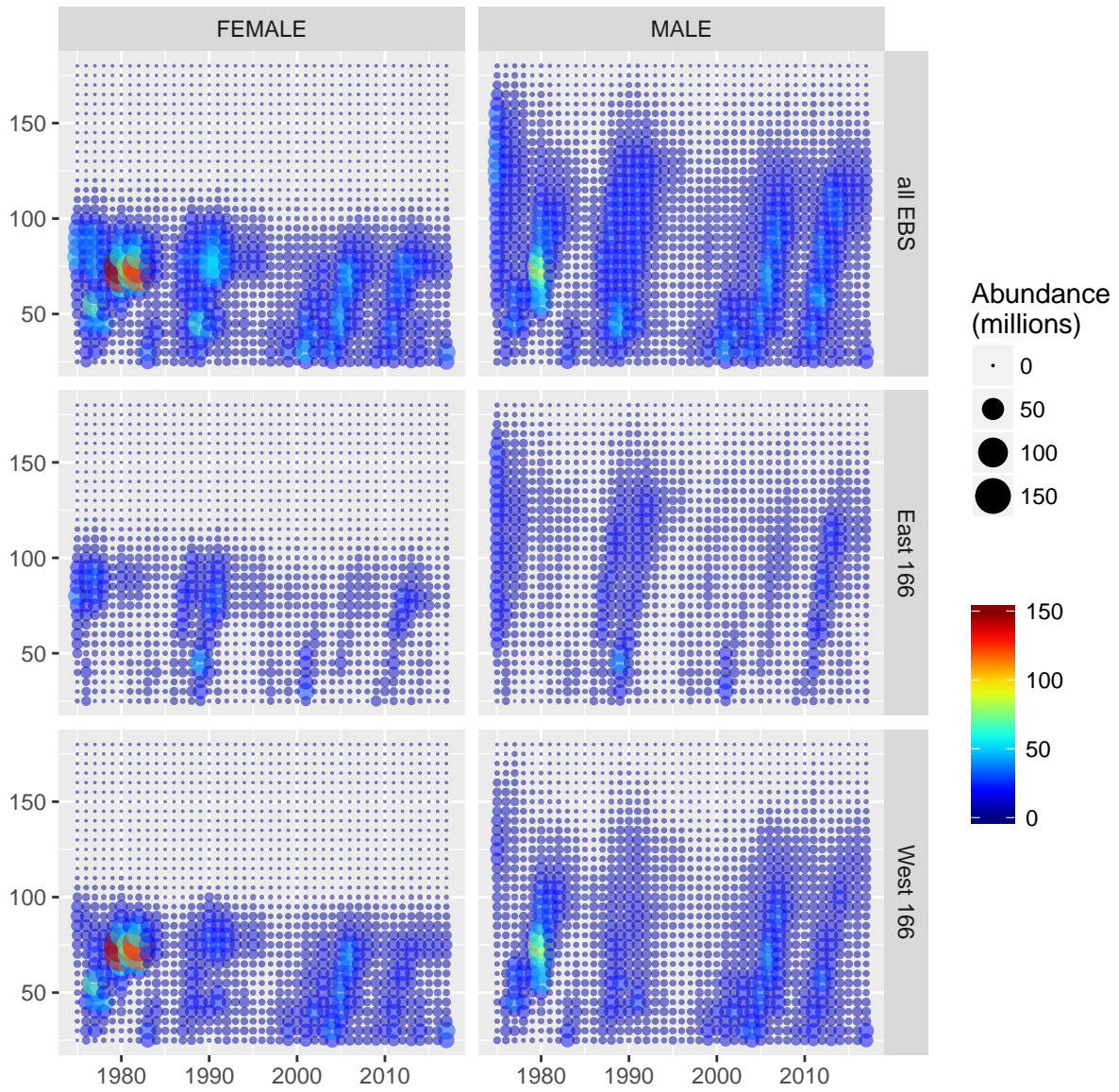


Figure 13: Annual size compositions for Tanner crab in the NMFS EBS trawl survey, by sex and area.

## By shell condition for males

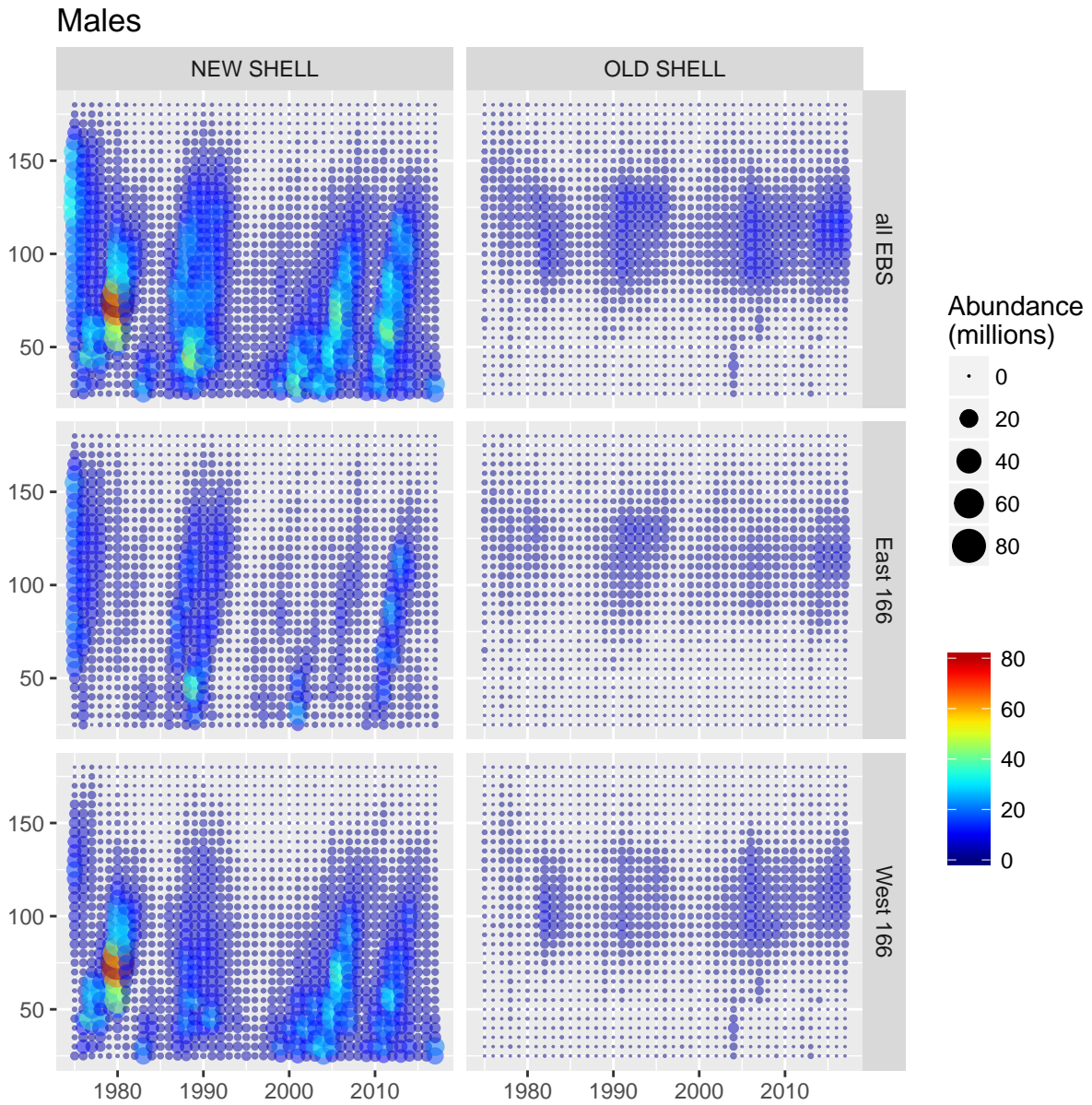


Figure 14: Annual size compositions for male Tanner crab in the NMFS EBS trawl survey, by shell condition and area.

By maturity state for females

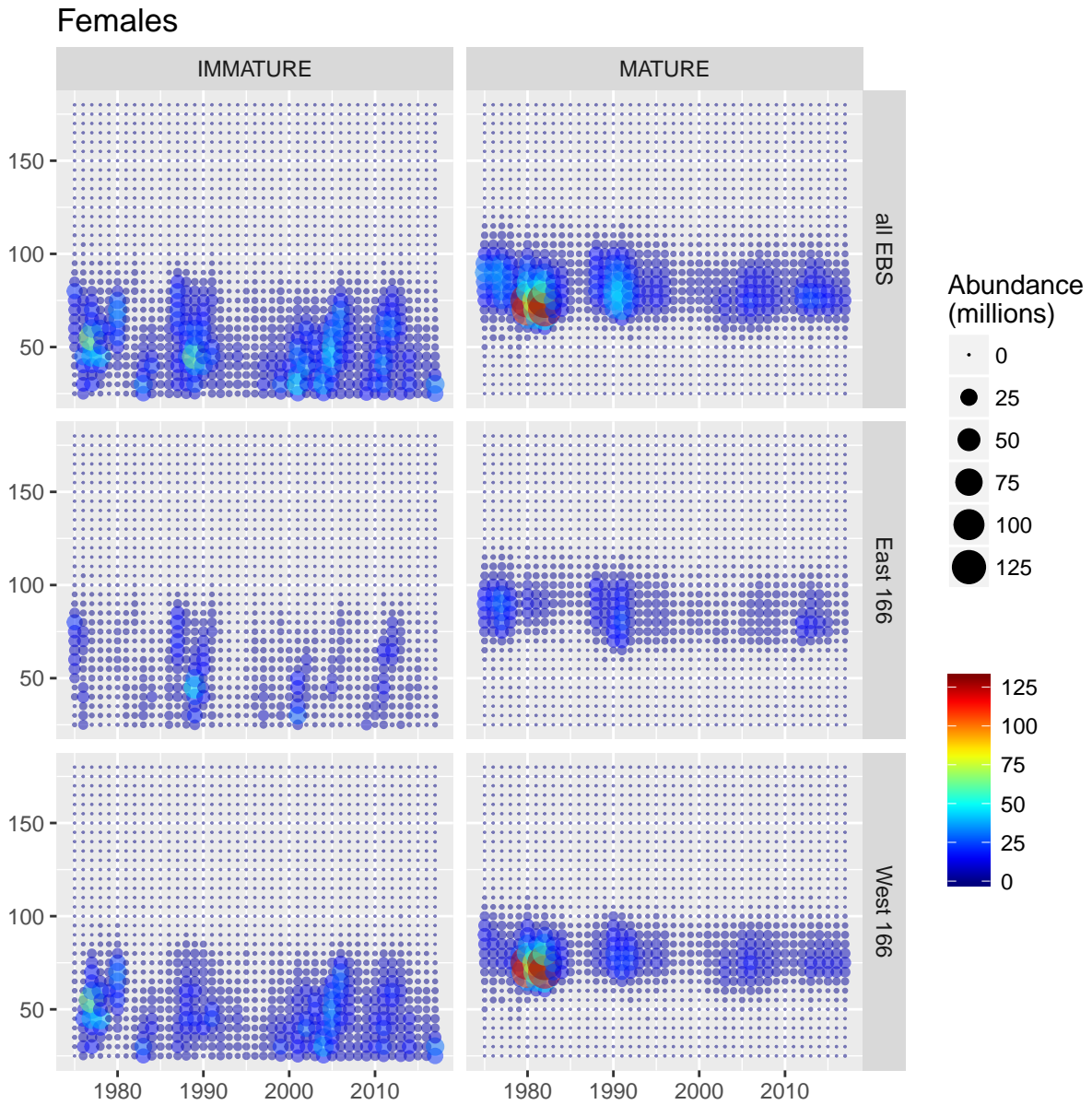


Figure 15: Annual size compositions for female Tanner crab in the NMFS EBS trawl survey, by shell condition and area.

## Sample sizes

The following tables summarize sample sizes for Tanner crab in the NMFS EBS bottom trawl survey.

Table 2: Observed numbers of Tanner crab in the annual NMFS EBS bottom trawl survey, by sex, maturity state, and shell condition.

year	female				male	
	immature		mature		unknown	
	new_shell	old_shell	new_shell	old_shell	new_shell	old_shell
1975	1,040	7	1,861	706	6,888	399
1976	1,095	2	1,304	311	4,492	242
1977	765	11	1,183	738	3,749	485
1978	1,932	17	638	1,307	4,527	700
1979	725	8	735	341	2,613	306
1980	1,476	15	1,471	570	6,961	569
1981	579	0	1,319	1,206	6,102	886
1982	814	9	457	2,384	3,122	2,082
1983	2,108	5	201	2,154	3,467	1,181
1984	1,867	12	284	1,531	2,455	1,399
1985	846	1	228	601	1,441	459
1986	1,581	7	191	331	2,669	468
1987	4,230	0	445	392	5,965	498
1988	3,733	2	1,753	530	7,837	475
1989	3,264	7	1,241	882	8,178	1,067
1990	3,105	9	1,502	1,511	8,256	1,342
1991	2,227	32	1,283	2,568	7,053	2,893
1992	1,494	0	820	2,205	5,005	1,924
1993	865	4	545	1,337	3,728	1,865
1994	909	12	148	1,293	2,005	1,827
1995	830	4	140	1,057	1,178	1,611
1996	869	14	109	963	1,291	1,414
1997	1,325	4	168	504	1,625	582
1998	1,704	6	160	344	2,428	624
1999	2,608	20	255	510	3,366	567
2000	2,249	0	242	345	3,464	653
2001	3,675	3	364	644	4,665	817
2002	3,583	2	350	500	4,370	1,089

Table 2: Observed numbers of Tanner crab in the annual NMFS EBS bottom trawl survey, by sex, maturity state, and shell condition.

year	female				male	
	immature		mature		unknown	
	new_shell	old_shell	new_shell	old_shell	new_shell	old_shell
2003	2,830	4	923	512	5,654	340
2004	3,563	359	427	656	5,595	1,873
2005	3,349	3	634	928	5,776	1,753
2006	4,355	9	1,332	1,327	7,981	4,054
2007	2,420	10	1,311	1,396	6,679	2,907
2008	1,747	0	580	1,783	5,243	2,146
2009	2,408	0	363	1,317	4,023	1,954
2010	3,171	9	245	941	4,922	1,702
2011	5,044	0	471	705	7,210	1,941
2012	3,577	34	942	720	7,090	1,296
2013	2,900	17	1,417	1,002	8,267	1,344
2014	2,207	4	482	1,584	8,032	2,829
2015	1,455	0	445	1,363	4,596	2,817
2016	1,372	1	370	1,248	3,405	3,668
2017	2,027	1	213	1,125	2,656	3,529

Table 3: Number of hauls, numbers of hauls with Tanner crab, and number of observed Tanner crab in the annual NMFS EBS bottom trawl survey, by sex, maturity state, and shell condition.

year	Hauls	female										male							
		immature					mature					immature				mature			
		new shell non-0 hauls	crab	old shell non-0 hauls	crab	non-0 hauls	crab	new shell non-0 hauls	crab	old shell non-0 hauls	crab	new shell non-0 hauls	crab	old shell non-0 hauls	crab	new shell non-0 hauls	crab	old shell non-0 hauls	crab
1975	136	73	1,040	6	7	91	1,861	39	706	127	2,895	0	0	127	3,993	80	399		
1976	214	87	1,095	2	2	91	1,304	39	311	130	2,023	0	0	130	2,469	47	242		
1977	155	66	765	9	11	76	1,183	60	738	114	1,778	0	0	114	1,971	79	485		
1978	230	87	1,932	8	17	82	638	65	1,307	147	2,957	0	0	147	1,570	104	700		
1979	307	71	725	8	8	62	735	42	341	138	1,805	0	0	138	808	68	306		
1980	320	101	1,476	10	15	95	1,471	49	570	164	4,602	0	0	164	2,359	71	569		
1981	305	71	579	0	0	79	1,319	94	1,206	158	3,809	0	0	158	2,293	116	886		
1982	342	85	814	9	9	72	457	103	2,384	181	1,751	0	0	181	1,371	147	2,082		
1983	353	102	2,108	4	5	56	201	102	2,154	166	2,484	0	0	166	983	132	1,181		
1984	355	135	1,867	9	12	53	284	94	1,531	171	1,965	0	0	171	490	126	1,399		
1985	353	140	846	1	1	52	228	65	601	179	1,060	0	0	179	381	86	459		
1986	353	162	1,581	4	7	64	191	68	331	213	2,141	0	0	213	528	115	468		
1987	355	189	4,230	0	0	105	445	73	392	226	4,659	0	0	226	1,306	103	498		
1988	370	206	3,733	2	2	149	1,753	100	530	252	5,627	0	0	252	2,210	101	475		
1989	373	204	3,264	4	7	144	1,241	108	882	237	4,977	0	0	237	3,201	135	1,067		
1990	370	197	3,105	3	9	155	1,502	126	1,511	247	5,107	0	0	247	3,149	151	1,342		
1991	371	159	2,227	9	32	138	1,283	141	2,568	227	4,361	0	0	227	2,692	181	2,893		
1992	355	107	1,494	0	0	119	820	123	2,205	215	2,958	0	0	215	2,047	177	1,924		
1993	374	99	865	4	4	96	545	122	1,337	207	2,051	0	0	207	1,677	180	1,865		
1994	374	97	909	3	12	52	148	104	1,293	175	1,281	0	0	175	724	174	1,827		
1995	375	113	830	4	4	35	140	107	1,057	153	958	0	0	153	220	137	1,611		
1996	374	114	869	4	14	57	109	98	963	148	1,069	0	0	148	222	134	1,414		
1997	375	116	1,325	2	4	62	168	83	504	161	1,336	0	0	161	289	125	582		
1998	374	146	1,704	4	6	53	160	73	344	176	2,032	0	0	176	396	128	624		
1999	372	137	2,608	6	20	52	255	85	510	170	2,816	0	0	170	550	124	567		
2000	371	142	2,249	0	0	61	242	55	345	188	2,836	0	0	188	628	133	653		
2001	374	164	3,675	3	3	83	364	72	644	211	4,036	0	0	211	629	145	817		
2002	374	154	3,583	2	2	81	350	70	500	186	3,912	0	0	186	458	154	1,089		
2003	375	153	2,830	3	4	111	923	83	752	203	4,754	0	0	203	900	153	1,349		
2004	374	173	3,563	10	359	90	427	80	656	236	4,568	0	0	236	1,027	179	1,873		
2005	372	201	3,349	2	3	103	634	74	928	254	4,496	0	0	254	1,280	185	1,753		
2006	375	210	4,355	4	9	143	1,332	125	1,327	254	6,224	0	0	254	1,757	211	4,054		
2007	375	185	2,420	6	10	138	1,311	136	1,396	261	4,697	0	0	261	1,982	201	2,907		
2008	374	153	1,747	0	0	104	580	120	1,783	240	3,127	0	0	240	2,116	196	2,146		
2009	375	171	2,408	0	0	75	363	115	1,317	216	2,879	0	0	216	1,144	187	1,954		
2010	375	186	3,171	5	9	67	245	104	941	223	3,654	0	0	223	1,268	166	1,702		
2011	375	193	5,044	0	0	90	471	102	705	210	6,095	0	0	210	1,115	167	1,941		
2012	375	195	3,577	6	34	100	942	97	720	215	5,526	0	0	215	1,564	139	1,296		
2013	375	163	2,900	9	17	116	1,417	101	1,002	207	5,592	0	0	207	2,675	137	1,344		
2014	375	165	2,207	3	4	98	482	121	1,584	222	4,746	0	0	222	3,286	167	2,829		
2015	375	118	1,455	0	0	60	445	94	1,363	225	2,737	0	0	225	1,859	200	2,817		
2016	375	110	1,372	1	1	56	370	82	1,248	222	2,235	0	0	222	1,170	218	3,668		
2017	375	129	2,027	1	1	50	213	99	1,125	185	2,233	0	0	185	423	204	3,529		