

Stock Assessment of Petrale Sole: 2004

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Executive Summary

Stock: This is a stock assessment of petrale sole (*Eopsetta jordani*) in U.S. waters off California, Oregon, and Washington. Genetic information and stock structure are not well known for this species. Previous assessments of petrale sole in the U.S. Vancouver and Columbia INPFC areas (named the Northern assessment area for this assessment) were conducted by Demory (1984), Turnock et al. (1993), and Sampson and Lee (1999). In this assessment, petrale sole in the Eureka, Monterey and Conception INPFC areas (the Southern assessment area) are assessed separately from those in the Northern assessment area. Data on growth, CPUE, and the geographical distribution of petrale sole along the U.S. Pacific coast support the use of two separate assessment areas.

Catches: Almost all catches of petrale sole have been taken with trawl gears. Recent petrale sole catch statistics by fishing year are summarized in Table E-1 and Figure E-1. Monthly catches demonstrate a strong seasonality in the two assessment areas with the catches during the winter months (November to February) being higher than during the summer months (March to October). As a result, the assessment is based on winter and summer fishing seasons with a fishing year that starts on November 1 and ends on October 31. In the Northern assessment area, the fisheries are divided into WA-Winter, WA-Summer, OR-Winter and OR-summer fisheries. In the Southern assessment area, the fisheries are divided into winter and summer fisheries. For the period 1981–2004, the calendar year landings (PacFIN database) ranged between 824–1,778 mt in the Northern assessment area and 420–992 mt in the Southern assessment area. Catches for 1956–81 were obtained from Sampson and Lee (1999) based on the HAL database, which has been archived by PacFIN. Pre-1956 catches were estimated from several reports: Heimann and Carlisle (1970) for the Southern assessment area, Cleaver (1951) and Smith (1950) for Oregon, and WDF (1956) and Alverson and Chatwin (1957) for Washington. Discard rates for petrale sole were estimated by Demory (1984) for the period 1977–82, by Sampson and Lee (1999) for the period 1986–87 (based on the studies of Pikitch et al. (1988)), and by the NWFS Groundfish Observer program for the period 2001–04.

Data and Assessment: A variety of data sources were used in the assessment: 1) biomass indices and length compositions from the NMFS Triennial Surveys in 1980, 1983, 1986, 1989, 1992, 1995, 1998, 2001, and 2004; 2) standardized CPUE indices for 1987–2003 for each fishery; 3) length compositions of ODFW and WDFW commercial landings from the PacFIN BDS database; and 4) length and age compositions of California commercial

landings from the CALCOM database. The data sources included in the assessment were analyzed using the length-and-age structured Stock Synthesis 2 (SS2) Model developed by Dr. Richard Methot (NOAA Fisheries).

Unresolved Problems and Major Uncertainties: The major sources of uncertainty in this stock assessment include: 1) comparability of age data between age-reading laboratories and within laboratories over time (due to changes in ageing methods, and inadequate otolith sampling and between-laboratory variation); 2) the impact of fishery regulations on the utility of CPUE as an index of relative abundance for recent years (i.e., after 1999); 3) the use of an assumed value for the rate of natural mortality; 4) the impact of sampling and ageing methods on the values for the parameters of the von Bertalanffy growth curve; 5) the lack of historical discard rates and lengths, and 6) the impact of assumptions regarding length-based selectivity and retention curves for fisheries and surveys.

Reference Points: The Pacific Fishery Management Council uses the 40:10 control rule as the default harvest rate policy for groundfish. The target (MSY-proxy) harvest rate for petrale sole is $F_{40\%}$. The target spawning biomass levels, $0.4 SB_0$, are 5,753 mt and 6,394 mt in the northern and southern areas, respectively. Given the life history of petrale sole, this corresponds to an exploitation rate of 12% and 14%, respectively for the Northern and Southern assessment areas based on the exploitation rates in 2004. At this exploitation rate, the recruits, spawning stock biomass, Maximum Sustainable Yield (MSY), and age 3⁺ biomass are:

	Estimates	
	Northern Area	Southern Area
Unfished Spawning Stock Biomass (SB_0)	14,382	15,985
Unfished Summary Biomass, Age 3 ⁺	25,165	28,920
Unfished Recruitment (age0)	12,174	14,829
SB_{MSY}	2,658	4,121
Basis for SB_{MSY}	SB_{MSY}	SB_{MSY}
SPR_{MSY}	0.214	0.330
Basis for SPR_{MSY}	F_{MSY}	F_{MSY}
Exploitation Rate at SPR_{MSY}	0.12	0.14
MSY	1,760	1,404

Stock Biomass: The estimated spawning stock biomass of petrale sole in the Northern assessment area reached the historical low in 1992 (1,267 mt or 8.8% SB_0 , Figure E-2). It has increased steadily since that point: to 1,554 mt (11% SB_0) in 1995, and to 4,960 mt (34% SB_0) in 2005 (Table E-1). The estimated spawning stock biomass of petrale sole in the Southern assessment area reached the historical low in 1986 (1,012 mt or 6% SB_0 , Figure E-2). The biomass in the Southern assessment area was generally stable over the next ten years, reaching 1,252 mt (8% SB_0) by 1995. However, the estimated spawning biomass has increased rapidly in recent years, with a value of 4,667 mt (29% SB_0) in 2005 (Table E-1).

Recruitment: Annual recruitment was treated as stochastic, and estimated as annual deviations from log-mean recruitment. In the Northern assessment area, recruitment decreased since 1980 and reached the historical low in 1989, but generally increased after

1990 (Figure E-2). In the Southern assessment area, recruitment decreased through the 1980s, reaching the historical low during 1988, but generally increased after 1990 (Figure E-2).

Exploitation Status: The current assessment indicates that petrale sole was below 25% of SB_0 during 1980–2002 in the northern assessment area (Figure E-2) and during 1974–2004 in the southern assessment area (Figure E-2). The depletion level in 2005 is estimated to be 34% and 29% of SB_0 respectively for the northern and southern areas.

Management Performance: Petrale sole off the U.S. west coast have been managed historically using a coastwide ABC which represents the sum of ABCs calculated for the four INPFC areas (U.S. Vancouver-Columbia, Eureka, Monterey, and Conception; Table E-1). During 1995–2000, the coastwide total annual catch (landings and discard combined) did not exceed the ABC. However, the total annual catch in the Northern assessment area has exceeded the portion of the ABC attributed to that area since 2001.

Forecasts: A 12-year forecast of stock abundance and yield was developed using the base model (Table E-2). The 40:10 control rule reduces forecasted yields in the both assessment areas below those corresponding to $F_{40\%}$ because the stocks are estimated to be lower than the management target of $SB_{40\%}$. The 2004 exploitation rate was used to distribute catches among the four fisheries in the Northern assessment area. In contrast, the 5-yr (2000–4) average relative exploitation rate was used to distribute catches between the winter and summer fisheries in the Southern assessment area.

Decision Table: Decision tables (Table E-3) for the Northern and Southern assessment areas were constructed using three possible management actions: 1) catches are set at the forecast (40-10 control rule) catch level using a low spawning biomass model, 2) catches are set at the forecast catch level using the base model, and 3) catches are set at the forecast catch level using a high spawning biomass model. The results for 12-year projections of spawning biomass and stock depletion are evaluated for the base model as well as high and low spawning biomass models.

Research and Data Needs: The STAT identifies the following research needs (not in priority order):

A. Survey age data should be made available. Young individuals are not well represented in the fishery age and length compositions owing to discarding. The 2004 survey age determination data provide the growth parameters used in the assessment model for the Northern assessment area. It would be beneficial to future assessments if age data from surveys were available because they provide recruitment information as well as age compositions and information about growth.

B. Increase efforts to collect commercial fishery length and age data. Length and age data are sporadic after 1999. Without age data, the ability to estimate year-class strength and the extent of variation in recruitment is compromised. Uncertainty will continue unless additional length and age composition data become available.

C. Age-error matrices. Estimation of the age compositions and mean-size-at-age for petrale sole may be compromised because of the use of different ageing methods over time and sampling designs that differ among the states. Between-agencies age error matrices should be constructed.

D. Effect of fishery regulations. The impacts of trip-limits and other management approaches, such as closed areas, on discards and fishery selectivity requires further study.

E. Studies on stock structure of petrale sole.

F. Collect length compositions for discarded petrale sole.

G. Winter-summer spawning migration should investigated in the field and be incorporated into future assessment models.

H. Examine the advantages and disadvantages of different ways for constructing age and size compositions.

Table E-1. A summary of reference point statistics.

Element		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Total Catch (mt) ¹	Coastwide	1,669	1,942	2,061	1,724	1,616	1,892	1,959	2,009	1,832	2,377	
	North											
	Landings	920	932	880	1,015	857	1,059	1,180	1,258	1,270	1,716	
	Predicted Discards*	71	73	70	74	62	78	89	91	87	134	
	South											
Landings	662	914	1,084	619	680	736	674	644	464	514		
Predicted Discards	17	23	27	15	17	18	17	16	12	13		
ABC (mt)	Coastwide	2,700	2,700	2,700	2,700	2,700	2,950	2,762	2,762	2,762	2,762	2,736**
	North	1,200	1,200	1,200	1,200	1,200	1,450	1,262	1,262	1,262	1,262	2,045**
	South	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	691**
SPR	North	0.2225	0.2258	0.2445	0.2333	0.3062	0.3039	0.3126	0.3241	0.3573	0.3199	
	South	0.2942	0.2425	0.1881	0.3240	0.3129	0.2877	0.3041	0.3453	0.5355	0.6582	
Age3+ Biomass (mt)	Coastwide	8,292	8,763	9,313	10,037	10,985	12,005	12,887	15,392	17,956	20,831	23,056
	North	4,584	4,660	5,153	6,086	6,843	7,782	8,545	10,347	11,343	11,959	12,032
	South	3,708	4,103	4,159	3,951	4,142	4,223	4,343	5,046	6,613	8,872	11,024
Spawning Biomass (mt)	Coastwide	2,807	3,165	3,334	3,358	3,784	4,411	4,813	5,178	5,911	7,687	9,628
	North Estimate	1,554	1,601	1,639	1,779	2,062	2,602	3,038	3,383	3,863	4,631	4,960
	std deviation	166	173	182	197	227	273	324	378	445	543	644
	South Estimate	1,252	1,564	1,695	1,579	1,723	1,809	1,775	1,795	2,048	3,056	4,667
	std deviation	281	311	335	342	363	380	384	401	455	602	888
Recruitment	Coastwide	18,260	15,427	18,141	22,593	49,709	29,184	24,183	19,034	23,499	18,977	22,191
	North Estimate	13,041	10,832	10,966	11,501	23,398	12,239	10,227	11,522	15,546	9,661	11,401
	std deviation	3,143	2,802	3,372	3,612	4,549	3,987	3,530	4,124	6,945	4,836	503
	South Estimate	5,219	4,595	7,175	11,092	26,311	16,945	13,956	7,512	7,953	9,315	10789.9
	std deviation	1,474	1,393	1,731	2,776	6,701	5,191	5,345	3,577	3,764	4,340	1,014
Depletion	Coastwide	9%	10%	11%	11%	12%	15%	16%	17%	19%	25%	32%
	North	11%	11%	11%	12%	14%	18%	21%	24%	27%	32%	34%
	(std deviation)										(4%)	(5%)
	South	8%	10%	11%	10%	11%	11%	11%	11%	13%	19%	29%
	(std deviation)										(4%)	(5%)

¹ All catches are reported by fishing year

* based on assumed discard rates of 10% in summer and 5% in winter

** PFMC GMT projected coastwide OY/ABC = 2,762 mt with the landed catch split 75:25 between the northern and southern areas

Table E-2. 12-yr forecasts for the Northern and Southern assessment areas.

Northern Assessment Area

Year	Age3+			age0 (,000)	WA Winter Fishery				WA Summer Fishery				OR Winter Fishery				OR Summer Fishery			
	(mt)	SB (mt)	Depletion		Total Catch	Retain- ed	Discard- ed	Harvest Rate	Total Catch	Retain- ed	Discard- ed	Harvest Rate	Total Catch	Retain- ed	Discard- ed	Harvest Rate	Total Catch	Retain- ed	Discard- ed	Harvest Rate
2005	12,032	4,960	34%	10,061	353	317	35	4.7%	349	314	35	4.7%	811	730	81	10.9%	583	525	58	7.9%
2006	12,130	4,859	34%	11,378	353	317	35	4.8%	349	314	35	4.8%	811	730	81	10.9%	583	525	58	8.1%
2007	11,718	4,716	33%	11,344	218	196	22	3.0%	213	192	21	2.9%	501	451	50	6.9%	356	321	36	4.8%
2008	11,953	5,077	35%	11,426	239	215	24	3.1%	230	207	23	3.0%	550	495	55	7.2%	385	347	39	5.0%
2009	12,102	5,245	36%	11,461	250	225	25	3.2%	237	213	24	3.0%	574	517	57	7.2%	396	357	40	5.0%
2010	12,170	5,276	37%	11,468	252	226	25	3.2%	238	214	24	3.0%	579	521	58	7.3%	398	358	40	5.0%
2011	12,228	5,299	37%	11,472	252	227	25	3.2%	238	215	24	3.0%	580	522	58	7.3%	399	359	40	5.0%
2012	12,288	5,332	37%	11,478	253	228	25	3.2%	240	216	24	3.0%	583	524	58	7.3%	401	361	40	5.1%
2013	12,343	5,366	37%	11,485	255	230	26	3.2%	242	217	24	3.0%	587	528	59	7.3%	404	364	40	5.1%
2014	12,390	5,396	38%	11,491	257	231	26	3.2%	243	219	24	3.0%	590	531	59	7.3%	406	366	41	5.1%
2015	12,428	5,421	38%	11,496	258	232	26	3.2%	244	220	24	3.0%	594	534	59	7.3%	409	368	41	5.1%
2016	12,458	5,440	38%	11,499	259	233	26	3.2%	245	221	25	3.0%	596	537	60	7.3%	410	369	41	5.1%

Southern assessment area

Year	Biomass		Depletion Level	Recruits age0 (,000)	Winter Fishery				Summer Fishery			
	Age3+ (mt)	SB (mt)			Total Catch	Retention	Discard	Harvest Rate	Total Catch	Retention	Discard	Harvest Rate
2005	11,024	4,667	29.2%	10,790	400	390	10	7.3%	267	260	7	4.9%
2006	12,485	5,998	37.4%	12,759	400	390	10	6.5%	267	260	7	4.7%
2007	13,346	6,838	42.4%	13,119	1,052	1,025	26	17.0%	576	562	14	11.3%
2008	12,776	6,467	40.1%	12,969	934	911	23	17.0%	509	497	13	11.3%
2009	12,272	5,959	37.0%	12,740	836	815	21	16.5%	465	454	12	11.0%
2010	12,019	5,569	34.6%	12,543	785	766	20	16.1%	451	440	11	10.8%
2011	12,002	5,380	33.4%	12,439	781	762	20	15.9%	460	448	11	10.6%
2012	12,110	5,369	33.4%	12,433	801	781	20	15.9%	474	462	12	10.6%
2013	12,245	5,436	33.8%	12,470	821	801	21	16.0%	485	473	12	10.7%
2014	12,356	5,510	34.3%	12,511	835	814	21	16.1%	492	480	12	10.7%
2015	12,430	5,564	34.6%	12,540	842	821	21	16.2%	495	482	12	10.8%
2016	12,476	5,592	34.8%	12,555	844	823	21	16.2%	495	483	12	10.8%

Table E-3. The decision tables for petrale sole in the northern, southern and coastwide assessment areas.

Northern Assessment Area

Management Action	Year	40:10 adj. Catch	Low Spawning Biomass Model (Base Model 2004 SB-1.25*SD)		Base Model (Base Model 2004 SB)		High Spawning Biomass Model (Base Model 2004 SB+1.25*SD)	
			SB	Depletion	SB	Depletion	SB	Depletion
Low catch (from Low Spawning Biomass Model)	2005	2,095	4,038	28%	4,960	34%	5,915	41%
	2006	2,095	3,742	26%	4,859	34%	6,035	42%
	2007	818	3,454	24%	4,716	33%	6,054	42%
	2008	1,001	3,977	28%	5,340	37%	6,780	47%
	2009	1,128	4,344	30%	5,735	40%	7,193	50%
	2010	1,207	4,569	32%	5,937	41%	7,356	51%
	2011	1,267	4,744	33%	6,071	42%	7,424	51%
	2012	1,316	4,888	34%	6,167	43%	7,445	51%
	2013	1,356	5,004	35%	6,230	43%	7,428	51%
	2014	1,388	5,099	36%	6,268	44%	7,383	51%
2015	1,415	5,174	36%	6,285	44%	7,321	51%	
2016	1,436	5,233	37%	6,286	44%	7,246	50%	
Medium catch (from Base Model)	2005	2,095	4,038	28%	4,960	34%	5,915	41%
	2006	2,095	3,742	26%	4,859	34%	6,035	42%
	2007	1,289	3,454	24%	4,716	33%	6,054	42%
	2008	1,405	3,721	26%	5,077	35%	6,512	45%
	2009	1,457	3,867	27%	5,245	36%	6,694	46%
	2010	1,466	3,922	27%	5,276	37%	6,685	46%
	2011	1,469	3,985	28%	5,299	37%	6,643	46%
	2012	1,477	4,062	28%	5,332	37%	6,603	46%
	2013	1,487	4,141	29%	5,366	37%	6,561	45%
	2014	1,497	4,216	29%	5,396	38%	6,516	45%
2015	1,505	4,285	30%	5,421	38%	6,469	45%	
2016	1,511	4,347	30%	5,440	38%	6,421	44%	
High catch (from High Spawning Biomass Model)	2005	2,095	4,038	28%	4,960	34%	5,915	41%
	2006	2,095	3,742	26%	4,859	34%	6,035	42%
	2007	1,754	3,454	24%	4,716	33%	6,054	42%
	2008	1,788	3,470	24%	4,818	34%	6,248	43%
	2009	1,769	3,411	24%	4,776	33%	6,215	43%
	2010	1,720	3,313	23%	4,650	32%	6,047	42%
	2011	1,675	3,270	23%	4,565	32%	5,897	41%
	2012	1,642	3,278	23%	4,533	32%	5,794	40%
	2013	1,614	3,313	23%	4,532	32%	5,722	40%
	2014	1,596	3,362	23%	4,551	32%	5,675	39%
2015	1,584	3,418	24%	4,581	32%	5,643	39%	
2016	1,575	3,475	24%	4,614	32%	5,621	39%	

Table E-3. Continued.

Southern Assessment Area

Management Action	Year	40:10 adj. Catch	Low Spawning Biomass Model (Base Model 2004 SB-1.25*SD)		Base Model (Base Model 2004 SB)		High Spawning Biomass Model (Base Model 2004 SB+1.25*SD)	
			SB	Depletion	SB	Depletion	SB	Depletion
Low catch (from Low Spawning Biomass Model)	2005	667	3,630	22%	4,667	29%	5,735	43%
	2006	667	4,431	26%	5,998	38%	7,863	59%
	2007	1,048	4,960	30%	6,838	43%	9,070	68%
	2008	975	4,897	29%	6,870	43%	9,190	69%
	2009	929	4,730	28%	6,691	42%	8,931	67%
	2010	932	4,620	28%	6,526	41%	8,595	65%
	2011	982	4,640	28%	6,476	41%	8,320	63%
	2012	1,050	4,779	29%	6,543	41%	8,133	61%
	2013	1,109	4,955	30%	6,654	42%	7,988	60%
	2014	1,152	5,111	31%	6,757	42%	7,859	59%
	2015	1,180	5,229	31%	6,835	43%	7,734	58%
2016	1,200	5,311	32%	6,886	43%	7,612	57%	
Medium catch (from Base Model)	2005	667	3,630	22%	4,667	29%	5,735	43%
	2006	667	4,431	26%	5,998	38%	7,863	59%
	2007	1,628	4,960	30%	6,838	43%	9,070	68%
	2008	1,444	4,498	27%	6,467	40%	8,826	67%
	2009	1,301	4,008	24%	5,959	37%	8,269	62%
	2010	1,237	3,677	22%	5,569	35%	7,730	58%
	2011	1,241	3,557	21%	5,380	34%	7,331	55%
	2012	1,275	3,610	22%	5,369	34%	7,078	53%
	2013	1,307	3,729	22%	5,436	34%	6,905	52%
	2014	1,327	3,827	23%	5,510	34%	6,769	51%
	2015	1,337	3,876	23%	5,564	35%	6,651	50%
2016	1,340	3,879	23%	5,592	35%	6,543	49%	
High catch (from High Spawning Biomass Model)	2005	667	3,630	22%	4,667	29%	5,735	43%
	2006	667	4,431	26%	5,998	38%	7,863	59%
	2007	2,458	4,960	30%	6,838	43%	9,070	68%
	2008	2,058	3,934	23%	5,893	37%	8,307	63%
	2009	1,797	3,036	18%	4,965	31%	7,361	55%
	2010	1,648	2,434	15%	4,291	27%	6,556	49%
	2011	1,579	2,146	13%	3,927	25%	5,994	45%
	2012	1,546	2,097	13%	3,820	24%	5,659	43%
	2013	1,524	2,139	13%	3,841	24%	5,461	41%
	2014	1,504	2,151	13%	3,889	24%	5,337	40%
	2015	1,478	2,085	12%	3,918	25%	5,250	40%
2016	1,456	1,947	12%	3,920	25%	5,185	39%	

Table E-3. Continued.

Coastwide

Management Action	Year	40:10 adj. Catch	Low Spawning Biomass Model (Base Model 2004 SB-1.25*SD)		Base Model (Base Model 2004 SB)		High Spawning Biomass Model (Base Model 2004 SB+1.25*SD)	
			SB	Depletion	SB	Depletion	SB	Depletion
Low catch (Projected from Low Spawning Biomass Model)	2005	2,762	7,667	25%	9,628	32%	11,650	38%
	2006	2,762	8,173	27%	10,858	36%	13,898	46%
	2007	1,866	8,415	28%	11,554	38%	15,124	50%
	2008	1,976	8,873	29%	12,211	40%	15,970	53%
	2009	2,057	9,074	30%	12,426	41%	16,124	53%
	2010	2,139	9,189	30%	12,463	41%	15,951	53%
	2011	2,249	9,385	31%	12,546	41%	15,744	52%
	2012	2,366	9,667	32%	12,710	42%	15,577	51%
	2013	2,465	9,959	33%	12,884	42%	15,416	51%
	2014	2,541	10,210	34%	13,026	43%	15,243	50%
	2015	2,595	10,403	34%	13,121	43%	15,055	50%
2016	2,635	10,544	35%	13,172	43%	14,857	49%	
Medium catch (from Base Model)	2005	2,762	7,667	25%	9,628	32%	11,650	38%
	2006	2,762	8,173	27%	10,858	36%	13,898	46%
	2007	2,916	8,415	28%	11,554	38%	15,124	50%
	2008	2,849	8,220	27%	11,544	38%	15,338	51%
	2009	2,758	7,875	26%	11,204	37%	14,963	49%
	2010	2,702	7,598	25%	10,846	36%	14,415	47%
	2011	2,710	7,542	25%	10,679	35%	13,974	46%
	2012	2,752	7,673	25%	10,701	35%	13,681	45%
	2013	2,794	7,869	26%	10,802	36%	13,466	44%
	2014	2,824	8,043	26%	10,907	36%	13,286	44%
	2015	2,841	8,161	27%	10,985	36%	13,120	43%
2016	2,851	8,226	27%	11,031	36%	12,964	43%	
High catch (Projected from High Spawning Biomass Model)	2005	2,762	7,667	25%	9,628	32%	11,650	38%
	2006	2,762	8,173	27%	10,858	36%	13,898	46%
	2007	4,212	8,415	28%	11,554	38%	15,124	50%
	2008	3,845	7,404	24%	10,711	35%	14,554	48%
	2009	3,566	6,447	21%	9,741	32%	13,577	45%
	2010	3,368	5,746	19%	8,941	29%	12,603	42%
	2011	3,254	5,415	18%	8,492	28%	11,891	39%
	2012	3,189	5,375	18%	8,353	28%	11,452	38%
	2013	3,138	5,451	18%	8,372	28%	11,183	37%
	2014	3,100	5,514	18%	8,440	28%	11,012	36%
	2015	3,062	5,503	18%	8,499	28%	10,893	36%
2016	3,032	5,422	18%	8,534	28%	10,806	36%	

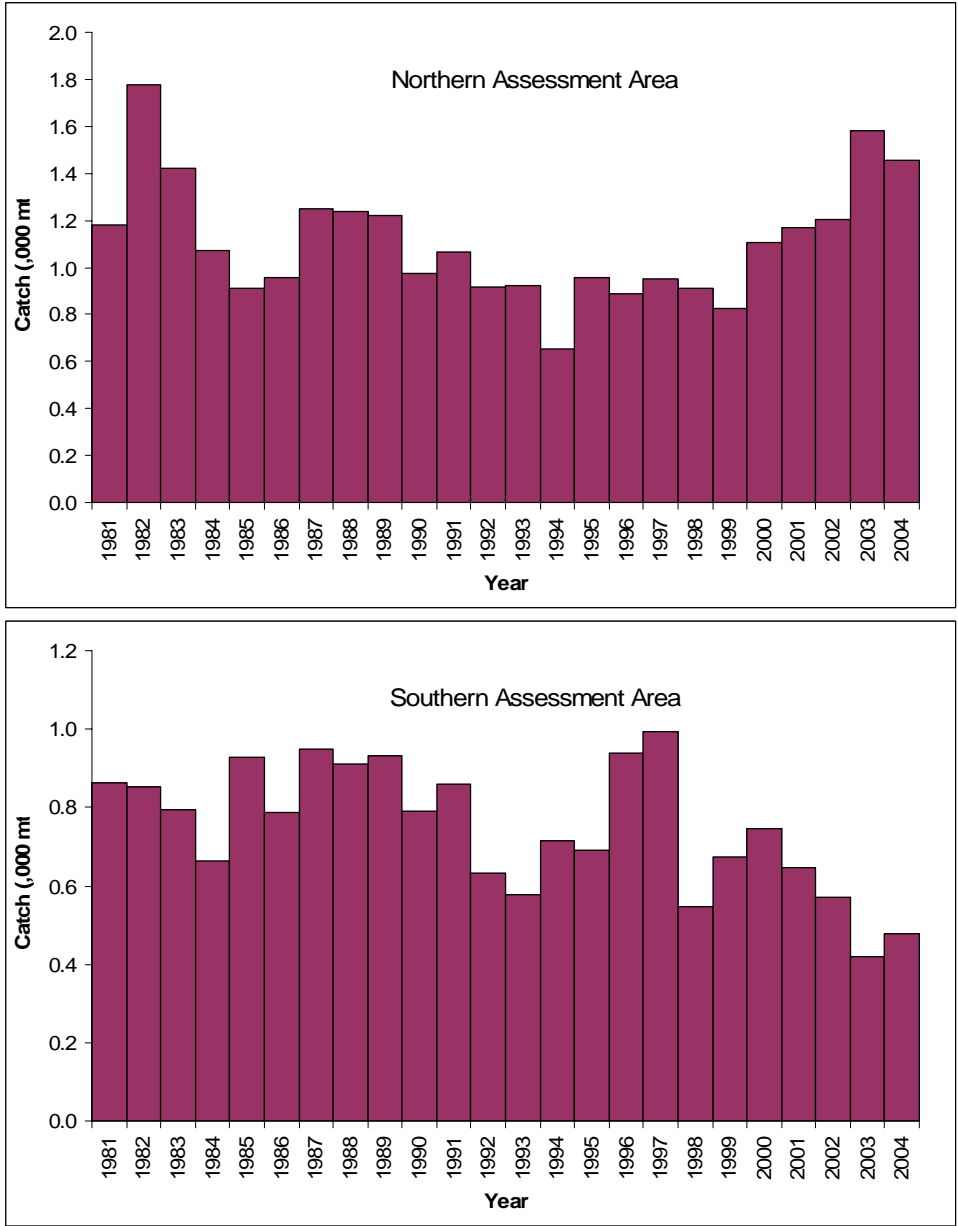


Figure E-1. Annual landings (1982–2004) extracted from the PacFIN database.

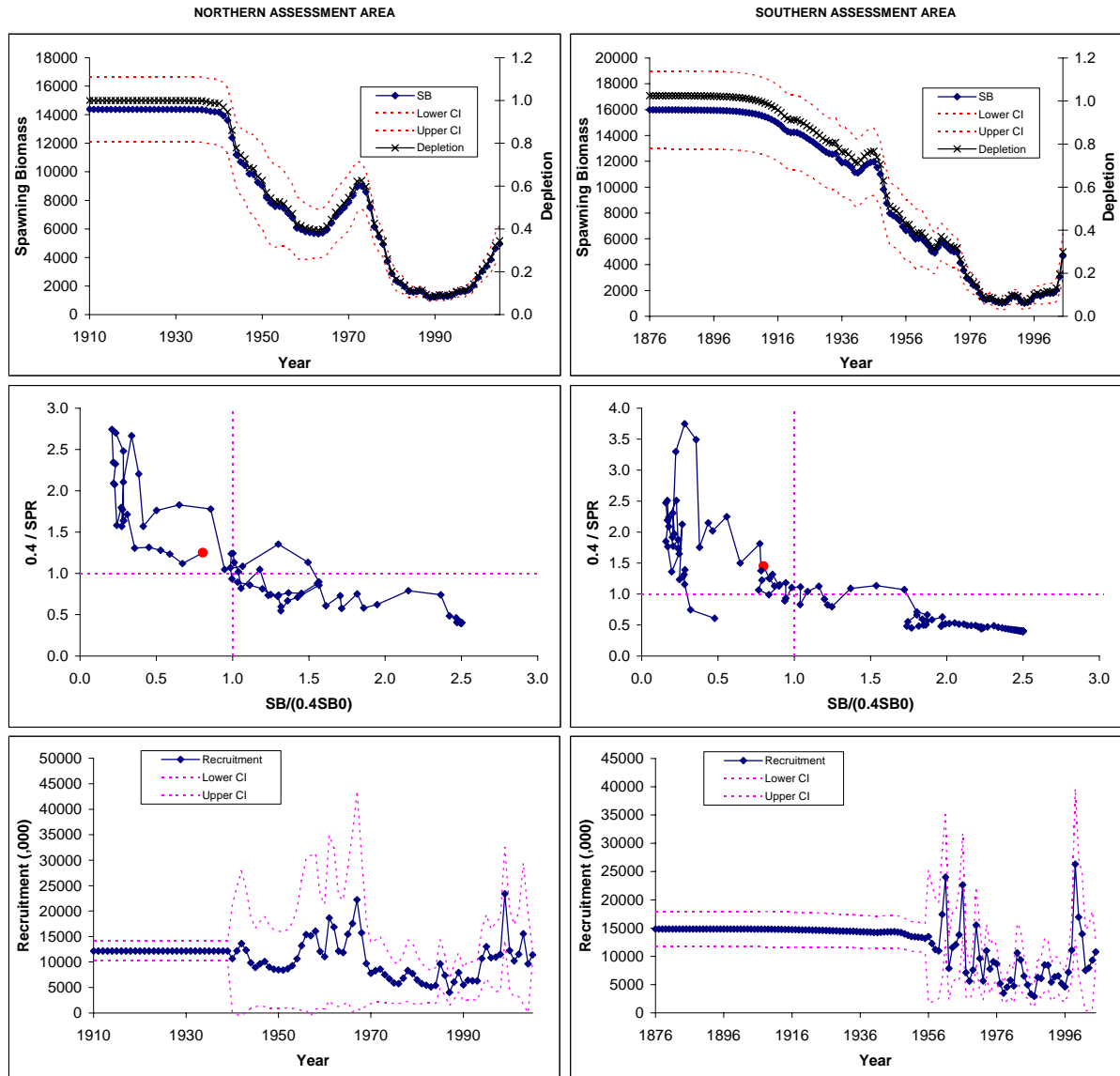


Figure E-2. Trajectories of spawning biomass (SB), depletion, recruitment and spawning potential ratio relative to the proxy target of 40% vs. estimated spawning biomass relative to the proxy 40% level.