Table C1. Total USA surfclam landings (metic tons of meats), total landings from the Exclusive Economic Zone (EEZ), landings from state waters, percent of total from the EEZ[1], and annual quotas. Landings not from the EEZ are from State waters.

Year	Total Landings	EEZ Landings	State Waters Landings	Percent of Total Landed from EEZ	EEZ Quota
1965	19,998	14,968	5,029	75	-
1966	20,463	14,696	5,766	72	-
1967	18,168	11,204	6,964	55	-
1968	18,394	9,072	9,322	49	-
1969	22,487	7,212	15,275	32	-
1970	30,535	6,396	24,139	21	-
1971	23,829	22,704	1,126	95	-
1972	28,744	25,071	3,674	87	-
1973	37,362	32,921	4,441	88	-
1974	43,595	33,761	9,834	77	-
1975	39,442	20,080	19,362	51	-
1976	22,277	19,304	2,982	87	-
1977	23,149	19,490	3,660	84	-
1978	17,798	14,240	3,558	80	13,880
1979	15,836	13,186	2,650	83	13,880
1980	17,117	15,748	1,369	92	13,882
1981	20,910	16,947	3,964	81	13,882
1982	22,552	16,688	5,873	74	18,506
1983	25,373	18,592	4,887	73	18,892
1984	31,862	22,888	7,086	72	18,892
1985	32,894	22,480	9,204	68	21,205
1986	35,720	24,520	10,797	69	24,290
1987	27,553	21,744	5,406	79	24,290
1988	28,824	23,377	4,873	81	24,290
1989	30,424	21,887	8,089	72	25,184
1990	32,556	24,018	8,528	74	24,282
1991	30,037	20,615	9,399	69	21,976
1992	33,831	21,685	11,722	64	21,976
1993	33,527	21,859	11,565	65	21,976
1994	31,048	21,942	9,106	71	21,976
1995	28,733	19,627	9,429	68	19,779
1996	28,775	19,771	8,980	69	19,779
1997	26,298	18,611	7,687	71	19,779
1998	24,509	18,233	6,276	74	19,779
1999	26,685	19,567	7,118	73	19,779
2000	31,093	19,778	11,315	64	19,779
2001	31,237	22,016	9,221	70	21,976
2002	29,614	23,838	5,776	80	24,174
2003	-	-	-	-	25,061

[1] Landings through 1982 are from the U.S. Dept. Of Commerce series “Fisheries of the United States”.
For 1983 - 2003, EEZ landings were computed from the logbook database, total landings were from “Fisheries of the US”, and state landings were computed as (Total - EEZ landings). 1 bushel of SC is assumed = 17 lbs meat = 7.711 kg.

Table C2. Annual EEZ surfclam landings from areas of the Mid-Atlantic region, and percent of Mid-Atlantic landings by region.

Year	Long Island mt	%	Northern New Jersey mt	%	Southern New Jersey mt	%	Delmarva mt	%	Southern Virginia North Carolina mt	%
1978	0	0	1,348	31	53	1	2,927	68	0	0
1979	0	0	1,463	38	97	3	2,268	59	0	0
1980	0	0	1,692	41	132	3	2,300	56	0	0
1981	0	0	6,462	97	114	2	95	1	0	0
1982	49	4	7,440	44	434	3	6,777	41	1,988	12
1983	212	1	5,515	34	999	6	5,772	36	3,779	24
1984	6	4	8,787	49	1,776	10	5,303	30	1,897	11
1985	0	0	8,427	50	1,077	6	6,636	39	772	5
1986	16	1	14,703	75	1,474	8	2,604	13	849	4
1987	0	0	17,238	87	749	4	1,306	7	387	2
1988	0	0	19,196	91	195	1	1,147	5	591	3
1989	0	0	16,415	82	90	<1	3,118	16	461	2
1990	0	0	16,996	74	891	4	3,546	15	1,502	7
1991	15	<1	17,623	86	1,289	6	1,634	8	0	0
1992	61	<1	18,334	85	2,064	10	1,221	6	0	0
1993	62	<1	16,338	75	2,023	9	3,418	16	0	0
1994	71	<1	17,754	81	664	3	3,454	16	35	<1
1995	0	0	15,749	82	713	4	2,752	14	5	<1
1996	26	<1	16,077	82	1,331	7	2,237	11	0	0
1997	73	<1	14,060	76	2,934	16	1,540	8	5	<1
1998	89	<1	13,142	76	3,625	21	379	2	0	0
1999	157	<1	14,432	74	4,277	22	667	3	0	0
2000	119	<1	13,658	71	3,569	18	2,008	10	0	0
2001	913	4	16,137	75	1,172	6	3,175	15	0	0
2002	1,160	5	14,939	64	2,847	12	4,450	19	79	<1

Table C3. Mid-Atlantic EEZ surfclam landings per unit effort (LPUE, kilograms per hour fishing time) & percent of total annual catch from each region, by year and vessel class (Class 3 = largest, 105 tons +) for records with catch >0 and effort >0. Data Source: Logbooks. LPUE is not shown when % is <1, when few vessels took the catch, or for 1985-1990, when LPUE was unreliable due to effort reporting problems.

Region/Year	Vessel Class 1		Vessel Class 2		Vessel Class 3		Class 2 + 3	
	LPUE	%	LPUE	%	LPUE	%	LPUE	%
Northern NJ								
1980	-	5	407	36	646	59	528	95
1981	-	4	363	36	476	60	426	96
1982	-	7	219	44	317	49	261	93
1983	-	6	353	68	372	26	358	94
1984	-	5	569	72	697	23	596	95
1985	-	5	-	57	-	38	-	95
1986	-	3	-	35	-	61	-	96
1987	-	2	-	35	-	63	-	98
1988	-	2	-	33	-	64	-	97
1989	-	3	-	35	-	62	-	97
1990	-	2	-	33	-	66	-	99
1991	-	<1	959	29	1,063	71	1,031	100
1992	-	<1	1,018	22	851	77	884	99
1993	-	<1	1,118	20	904	79	941	99
1994	-	<1	1,058	26	791	73	847	100
1995	-	<1	1,179	29	796	70	880	99
1996	-	<1	971	35	764	65	826	100
1997	-	<1	863	28	745	72	775	100
1998	-	<1	1,031	26	663	74	730	100
1999	-	<1	1,104	27	817	73	879	100
2000	-	<1	1,161	36	770	64	876	100
2001	-	<1	944	33	721	67	781	100
2002	-	<1	915	28	764	72	801	100
Southern NJ								
1980	-	4	130	35	284	62	199	98
1981	-	5	290	32	342	63	322	95
1982	-	7	182	40	289	53	230	93
1983	-	12	236	54	399	35	281	89
1984	-	10	438	31	595	59	529	90
1985	-	4	-	12	-	84	-	96
1986	-	3	-	17	-	80	-	97
1987	-	<1	-	22	-	78	-	100
1988	-	0	-	31	-	69	-	100
1989	-	3	-	47	-	50	-	97
1990	-	<1	-	37	-	62	-	99
1991	-	<1	1,454	39	1,701	61	1,595	100
1992	-	0	1,589	43	2,008	57	1,804	100
1993	-	<1	2,238	54	1,694	46	1,949	100
1994	-	1	2,072	16	1,272	83	1,355	99
1995	-	0	997	14	1,033	86	1,027	100
1996	-	4	1,042	25	866	71	905	96
1997	-	2	1,334	60	1,256	38	1,303	98
1998	-	2	2,272	44	1,803	54	1,986	98
1999	-	2	2,089	36	1,610	62	1,760	98
2000	-	0	1,572	51	1,230	48	1,385	99
2001	-	<1	913	38	820	61	853	99
2002	-	<1	969	63	706	36	853	99
Delmarva								
1980	-	2	157	21	308	77	255	98
1981	-	2	211	15	437	83	377	98
1982	-	5	197	14	309	81	285	95
1983	-	6	234	15	408	80	366	95
1984	-	5	444	15	734	80	664	95
1985	-	3	-	13	-	84	-	97
1986	-	4	-	13	-	83	-	96
1987	-	3	-	3	-	94	-	97
1988	-	2	-	10	-	88	-	98
1989	-	<1	-	13	-	87	-	100
1990	-	0	-	21	-	79	-	100
1991	-	0	1,008	20	1,406	80	1,302	100
1992	-	0	1,733	34	1,326	66	1,442	100
1993	-	0	1,361	44	1,353	56	1,356	100
1994	-	0	1,612	43	1,937	57	1,782	100
1995	-	0	1,772	40	1,756	60	1,762	100
1996	-	0	1,443	56	1,362	44	1,406	100
1997	-	<1	1,594	47	1,278	53	1,409	100
1998	-	0	1,768	81	869	19	1,472	100
1999	-	0	1,223	12	691	88	901	100
2000	-	0	1,183	53	956	47	1,065	100
2001	-	<1	1,309	51	1,048	49	1,167	100
2002	-	0	894	42	729	58	790	100

Table C4. Standardized LPUE from a general linear model (GLM) for each major surfclam region. The model included Year and Subregion. Data from "small" vessels were excluded. Coefficients from this model were highly correlated with raw catch rates, as well as with coefficients from other GLMs that included Year, Tonclass, Subregion and Month.

	DMV		NNJ		SNJ	
Year	GLM Year Coef.	Backtransf. Coeffs.	GLM Year Coef.	Backtransf. Coeffs.	GLM Year Coef.	Backtransf. Coeffs.
1980	0.000	1.000	0.000	1.000	0.000	1.000
1981	0.369	1.447	-0.240	0.787	0.615	1.850
1982	0.150	1.162	-0.776	0.460	0.238	1.268
1983	0.363	1.437	-0.346	0.707	0.389	1.476
1984	0.990	2.690	0.157	1.170	1.019	2.772
1991	1.829	6.229	0.729	2.072	2.292	9.898
1992	1.962	7.112	0.601	1.825	2.367	10.663
1993	1.902	6.696	0.670	1.954	2.533	12.585
1994	2.299	9.968	0.583	1.792	2.403	11.061
1995	2.217	9.177	0.611	1.843	2.055	7.808
1996	1.953	7.048	0.546	1.727	2.114	8.284
1997	1.967	7.148	0.491	1.634	2.265	9.628
1998	1.996	7.358	0.418	1.520	2.663	14.345
1999	1.504	4.498	0.586	1.797	2.427	11.329
2000	1.655	5.235	0.584	1.794	2.190	8.935
2001	1.744	5.720	0.455	1.576	1.644	5.177
2002	1.330	3.781	0.520	1.682	1.706	5.506

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Table C5. Summary statistics on surf clam commercial length frequency data by region/year. Data were collected by port agents taking random samples from landings.

Region/Year	Mean Length (mm)[1]	Min L	Max L	Number of Clams Measured[2]
New Jersey				
1982[3]	140.5	75	205	7477
1983	142.5	75	205	11253
1984	142.1	45	195	12751
1985	140.4	55	195	7674
1986	136.3	105	175	5130
1987	134.4	95	185	900
1988	137.7	85	165	900
1989	139.9	105	175	919
1990	136.5	95	175	901
1991	143.0	93	188	2272
1992	141.1	64	186	1710
1993	139.8	80	170	928
1994	138.5	85	185	900
1995	141.9	85	175	510
1996	138.0	85	185	1117
1997	136.7	75	195	957
1998	147.3	95	205	690
1999	144.3	95	205	856
2000	147.0	103	195	2655
2001	145.0	107	180	1080
2002	148.0	97	184	961
Delmarva				
1982	159.0	85	205	7756
1983	151.5	45	205	5923
1984	138.8	95	195	3066
1985	132.0	95	175	1832
1986	130.0	95	155	1260
1987	131.4	105	165	730
1988	136.0	115	165	420
1989	136.6	115	175	866
1990	139.1	95	175	892
1991	125.5	20	183	1080
1992	123.5	73	198	1170
1993	122.4	77	155	1392
1994	109.2	85	135	119
1995	125.1	105	155	720
1996	124.0	95	155	1154
1997	127.1	95	175	1622
1998	122.7	95	155	1560
1999	130.4	105	205	1720
2000	131.0	75	178	1290
2001	131.0	106	159	1060
2002	136.0	90	174	360
S. New England				
1982	153.7	135	175	30
1983	150.0	125	165	30
1984	147.9	115	175	90
1985	151.6	115	175	150
1986	161.0	125	195	330
1987	160.9	115	195	569
1988	154.3	105	185	810
1989	155.8	115	185	449
1990[4]	164.1	135	185	209

[1] "Mean length" is the expected value from the length frequency distribution, using size classes of 1 cm. Length frequency distributions were derived by weighting trips by their respective landings.

[2] Total number of clams used in this assessment. Typically, 30 clams are measured per trip.

[3] Values from 1987-1990 and 1994 are from subsamples of the data. Subsamples contained data from 30 randomly selected trips, when available.

[4] "-" = no data available after 1990

Table C6. List of research clam surveys and gear changes from 1965-1981, and 1997-2002. Column entries are shifted to accentuate changes. Changes in the gear and survey season did not occur from August, 1980 to 1992. Sources of information for 1978 - 1981 are Smolovitz and Nulk 1982 and NEFSC Cruise Reports. Sources of information for 1965 - 1977 are NEFSC 1995a and NEFSC Survey Reports. "Sensors Used" : refers to the velocity, tilt and pump pressure sensors, used in computing tow distance and pump performance. These were used for the first time in 1997. "-" : undetermined.

Cruise	Date	Vessel	Season	Purpose	Pump	Dredge Type	Mesh Size Width(cm)	Mesh Size (cm)	Doppler Measured	Sensors Used
65-	5/65	Undaunted	Spring	Survey	Surface	76	5.1		-	No
65-10	10/65	Undaunted	Fall	Survey	Surface	76	5.1		-	No
66-6,11	8/66	Albatross IV	Summer	Survey	Surface	76	5.1		-	No
69-1,7	6/69	Albatross IV	Summer	Survey	Surface	76	5.1		-	No
70-6	8/70	Delaware	Summer	Survey	Surface	122	3		-	No
SM742	6/74	Delaware	Summer	Survey	Surface	76	5.1		-	No
76-1	4/76	Delaware	Spring	Survey	Surface	122	3		-	No
77-2	1/77	Delaware	Winter	Survey	Surface	122	3		-	No
7801	1/78	Delaware	Winter	Survey	Surface	122	1.91		No	No
7807	12/78	Delaware	Winter	Survey	Surface	122	1.91		Yes	No
7901	1/79	Delaware	Winter	Survey	Submerse	152	2.54		Yes	No
7908	8/79	Delaware	Summer	Gear test	Submerse	152	2.54 & 5.08		Yes	No
8001	1/80	Delaware	Winter	Survey	Submerse	152	5.08		Yes	No
8006	8/80	Delaware	Summer	Survey	Submerse	152	5.08		Yes	No
8105	8/81	Delaware	Summer	Survey	Submerse	152	5.08		Yes	No
9704	7/97	Delaware	Summer	Survey	Submerse	152	5.08		Yes	Yes[1]
9903	7/99	Delaware	Summer	Survey	Submerse	152	5.08		Yes	Yes[2]
200206	6/02	Delaware	Summer	Survey	Submerse	152	5.08		Yes	Yes[3]

[1.] Individual sensors were used.
[2.] A protoptype integrated sensor package was used for the first 2/3 of the cruise. After that, individuals sensors were used.
[3.] First use of Survey Sensor Package (SSP) from Woods Hole Group. Used for entire cruise. Individ. sensors used as backup.

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Table C7. Recent gear changes related to the NMFS Clam Survey, 1992-2002. Column entries were shifted to accentuate changes. Changes in the gear and survey season did not occur from August, 1980 to 1992, or from 1999 to 2002. Sources of information are NEFSC Cruise Meetings. "-" : undetermined.

Cruise	Date	Vessel	Ship Modified	Winch Changed	Winch Speed Out (met/min)	Winch Speed In (met/min)	Voltage to Pump
pre-92		Delaware II			60	60	460
9203	6/92	Delaware II		--	--	80	460
9404	8/94	Delaware II			Free spool	80	480
9704	7/97	Delaware II	1/97	1/97	20	20	460
9903	7/99	Delaware II		5/99	50-60	50-60	460
200206	7/02	Delaware II		5/99	50-60	50-60	460

Table C8. Equipment replaced during the 2002 Delaware II clam shakedown and survey legs.

Gear Changes , by Leg :

	Shakedown	Leg 1	Leg 2	Leg 3
Cruise	200205	200206	200206	200206
Stations	1-~40	1-235	236-401	402-552
Dates	5/17-5/31	6/3-6/14	6/17-6/28	7/1-7/12
Electrical Cable	#1A	#1A	#2	#1B
Pump	P1	P1	P1	P2

Gear Descriptions:

Elec. Cables		
	#1A	= New, purchased for 2002 clam survey, black, flexible, loose mesh wrap insulation, 1200'
	#1B	= twin of #1A
	#2	= Old cable used in 2nd half of 1999 clam survey. White, stiffer, tight insulation like fire hose. When loaded on, some metal pieces in this cable too (from previous use).
Pumps		
	P1	= Used in 1999 and first 2/3 of 2002
	P2	= Spare pump; May have been used pre-1999.

Table C9. Nominal and computed tow distances and CIs for Delaware II clam surveys. Distances computed from "Sensors" use actual data on dredge bottom contact and vessel speed. "Nominal" distance assumes speed of 1.5 knot for 5-min. Only good tows that captured surfclams were used to compute median lengths, with cutoff dredge angle 5.15 deg. The longer computed tow length in 1997 was caused by use of a slower winch than in 1999 and 2002.

Method	Year	DredgeWidth (inches)	DredgeWidth (nmi)	Length (nmi)	Tow Area (nmi^2)	Comments/Conditions
Nominal		60	0.00082289	**0.125**	0.000102862	Not based on data. (1.5kn, 5 min)
Doppler	**1997**	60	0.00082289	**0.130**	0.000106976	Median Doppler (5-min only).
	1999	60	0.00082289	**0.130**	0.000106976	"
	2002	60	0.00082289	**0.124**	0.000102039	"
Sensors	**1997**	60	0.00082289	**0.2528**	0.000208028	Median from sensors
	1999	60	0.00082289	**0.2135**	0.000175688	"
	2002	60	0.00082289	**0.2086**	0.000171656	"

CI for Tow Length (nmi), for Stations w/ Surfclams (based on Sensors).						
		0.05	**0.1**	**median L**	**0.9**	**0.95**
Sensors	**1997**	0.1833	0.2067	**0.2528**	0.3146	0.3405
	1999	0.1616	0.1701	**0.2135**	0.2739	0.2984
	2002	0.1729	0.1769	**0.2086**	0.2355	0.2424

Source of Mortality	Species	Magnitude of Mortality	Reference	Comments
Indirect	Surfclam	20%	Meyer, et al. 1981	NMFS dredge used; % of large clams (90-130 mm) on bottom w/ broken shells; Diver observations in windrow area.
	Ocean quahog	"significant" (greater than for sea scallop, which was <5%)	Murawski and Serchuk, 1989b	Commercial vessel and dredge used. Observations from submersible.
Discard	Surfclam	>50%	Murawski and Serchuk, 1989b	Observed reburrowing of marked clams from submersible.
		33%-50%	Haskin and Starypan, 1976	Replanting experiments with divers.
	Ocean quahog	<10%	Murawski and Serchuk, 1989b	Observations from submersible; Details of dredge and dredging not given.

Table C10 .
Summary of mortality studies on surfclams and ocean quahogs. " **Indirect**" mortality is death in those clams that encountered the dredge, but they were not captured (i.e., they remained on the ocean floor). "**Discard**" mortality is death in clams that were captured, had intact shells, and died after being returned to the ocean floor.

SITE	LATITUDE (dd)	LONGITUDE (dd)
DEII	39.272609	73.782036
SC02-1	40.109080	73.844233
SC02-2	39.269225	73.781163
SC02-3	38.857905	74.408881
SC02-4	36.771116	75.049794
OQ02-1	40.727620	71.737299
OQ02-2	40.103116	73.191079
OQ02-3	38.814912	73.813348
OQ02-4	37.887552	74.644855
OQ02-5	40.730020	70.118408
OQ02-6	40.896190	71.213913

Table C11. Locations of NMFS clam dredge calibration experiments and sediment samples during the 2002 Delaware-II clam survey.

A.

Code	Location	Length (mm)	
1	NJ - Repeats	137	
2	DMV - Repeats	122	
3	SC-02	132	
4	SC-03	129	
5	SC-04	--	Bimodal, Not Used
	Median	**130**	

B.

Code:	1	2	3	4	5	1	2	3	4	5
Vessel	DE-2	DE-2	DE-2	DE-2	DE-2	JG	JG	JG	JG	JG
Region	NJ	DMV	NNJ	SNJ	DMV	NJ	DMV	NNJ	SNJ	DMV
Purpose	Random	Random	SC02-2 setups	SC02-3 setups	SC02-4 setups	Repeat DE-II	Repeat DE-II	SC02-2	SC02-3	SC02-4
Fraction	0.866	0.303	0.868	0.921	0.359	0.971	0.459	0.940	0.996	0.528

Table C12 .
A. Shell length , for each data set (code), at which the relative selectivity of the FV Jersey Girl to the RV Delaware II was 0.75.

B. Fraction of surfclams >= 130 mm collected at locations that were sampled by the FV Jersey Girl and RV Delaware II. 130 mm was the shell size where the selectivity of the Jersey Girl was about 75% that of the Delaware. The Delaware had higher selectivity of smaller clams.

Table C13. Likelihood profile results for estimated dredge efficiency and density (N/ft^2) from the Patch model for surfclams in 2002 depletion studies based on data from depletion studies carried out by the R/V Delaware II (experiment DE02) and the F/V Jersey Girl (experiments JG02-2 to JG02-4). All estimates assume no indirect effects (clams lost but not caught). Results from JG01-JG03 are for surflcams 130+ mm. Results from DE02 are for all size groups captured.

CI for Efficiency

Experiment	Best Estimate	Lo 50%	Hi 50%	Lo 90%	Hi 90%	Comments
DE02	0.695	0.61	0.78	0.46	0.93	
JG02-2	0.934	0.87	0.99	0.75	NA	a
JG02-3	0.457	0.35	0.57	0.23	0.71	
JG02-4	0.950	0.84	NA	0.57	NA	c

CI for Density

Experiment	Best Estimate	Lo 50%	Hi 50%	Lo 90%	Hi 90%	
DE02	0.054	0.048	0.061	0.044	0.077	
JG02-2	0.058	0.056	0.060	0.051	0.065	
JG02-3	0.011	0.010	0.012	0.008	NA	b
JG02-4	0.044	0.037	0.051	0.032	0.061	

a) Efficiency estimate near upper bound (e=1); profile hit upper bound on efficiency before hitting upper 90% bound.

b) Profile hit lower bound on efficiency (e=0) before hitting upper 90% bound on density.

c) Efficiency estimate near upper bound (e=1); profile hit upper bound bound on efficiency (e=1) before hitting upper 50% or 90% confidence interval bounds.

Table C14. Summary of *Delaware-II* dredge efficiency for surfclams in 2002 (Cruise 200206), inferred by comparing catches in DE-II Setup Tows with Patch Model Estimates, assuming no indirect losses, from data collected with commercial clam vessel *F/V Jersey Girl*.

Formula used to compute DEL-II dredge efficiency (EFF) in experiments with the Jersey Girl (JG):

EFF(DEL) = [EFF(JG)*Density(DEL)] / Density(JG)

Experiment	Region	Jersey Girl	Jersey Girl	Delaware	Delaware	Delaware	Delaware vs Jersey Girl	Delaware
		Density (#/ft^2)	Efficiency	Station #	Density (#/ft^2)	Density (#/ft^2)	Relative Efficiency	Efficiency
					Setup Tows	Setup Tows		(from formula)
SC02-2	NJ, offshore			87	0.0280			
				88	0.0073			
				89	0.0077			
				90	0.0119			
				91	0.0169			
		0.0575	0.934		Average:	0.0143	0.249	**0.233**
					SD of samples:	0.0085		
SC02-3	SNJ			202	0.0153			
				203	0.0029			
				204	0.0344			
				205	0.0004			
				206	0.0000			
		0.0108	0.457		Average:	0.0106	0.982	**0.449**
					SD of samples:	0.0147		
SC02-4	DMV			335	0.0194			
				336	0.0364			
				337	0.0574			
				338	0.0043			
				339	0.0063			
		0.0439	0.949		Average:	0.0248	0.564	**0.536**
					SD of samples:	0.0223		
					Grand Mean			**0.406**
					SD of 3 averages:			**0.156**
					N			**3**

Region:	DMV		NJ		NJ		NJ	
Vessel:	DE-II (Leg 2) # SC / tow	F/V JG # SC / tow	DE-II (Leg 1) # SC / tow	F/V JG # SC / tow	DE-II (Leg 2) # SC / tow	F/V JG # SC / tow	DE-II (Leg 3) # SC / tow	F/V JG # SC / tow
	9	90	213	523	82	523	59	523
	90	237	74	848	22	848	41	848
	44	97	86	738	42	738	43	738
	7	458	122	1101	17	1101	45	1101
	1	36	42	390	12	390	59	390
	5	42	41	384	22	384	84	384
	14	13	139	561	65	561	170	561
	1	39	23	280	25	280	5	280
	30	1044	64	191	5	191	22	191
Aver. catch	**22.33**	**228.41**	**89.33**	**557.43**	**32.44**	**557.43**	**58.67**	**557.43**
SD catch	29.15	336.88	59.89	292.19	25.72	292.19	47.44	292.19
CV of catch (%)	130.54	147.49	67.04	52.42	79.26	52.42	80.87	52.42
Aver. area (ft^2) / tow	**6,289.3**	**13,398.1**	**6,044.9**	**15,187.4**	**6,087.6**	**15,187.4**	**6,600.7**	**15,187.4**
SD (area)	453.80	1995.41	551.83	2017.26	407.51	2017.26	378.98	2017.26
CV of area (%)	7.22	14.89	9.13	13.28	6.69	13.28	5.74	13.28
Density (no./ft^2)	0.00355	0.01705	0.01478	0.03670	0.00533	0.03670	0.00889	0.03670

Table C15.
Estimates of relative efficiency between the Delaware II and FV Jersey Girl (JG) in Delmarva and New Jersey, 2002. Estimates are based on the ratio, between vessels, of the average density (SC catch per area towed) from 9 stations in each region, sampled by both vessels. For each vessel/region combination, average distance towed was computed from sensor data. To achieve similar clam size-selectivity between vessels, surfclams <130 mm were excluded.

	DMV Stations	NJ Stations
DE-II catch (# per tow)	22.33	180.44
DE-II area (ft^2 per tow)	6289	18731
DE-II ratio (= density)	0.003551	0.009633
JG catch	228.41	557.43
JG area	13398	15187
JG ratio (raw)	0.017048	0.036704
JG ratio (adjusted)	0.018942	0.040783
Adjustment	0.9	0.9
Efficiency of DEII (no/adj)	0.208	0.262
Efficiency of DEII (w/adj)	**0.187**	**0.236**

Table C16.
Analysis of Delaware II surfclam stations Repeated by the F/VJersey Girl. (9 stations in Delmarva and 9 in New Jersey. Assumed Jersey Girl (JG) efficiency is 0.9.

Data Source	Year 1997	Data Source	Year 1999	Data Source	Year 2002	All years combined
DE depl (patch)	0.727	DE depl patch	0.148	DE depl patch	0.695	
PP1A (patch)	0.277	Median of five experiments from SARC 30	0.246	SC02-2 patch	0.233	
AC2 (patch)	0.290	Christy Cross Check	0.243	SC02-3 patch	0.449	
AC1 (patch)	0.544	Repeated stations	0.389	SC02-4 patch	0.536	
		99-97 ratio random stations	0.353	JG Repeats, DMV	0.187	
				JG Repeats, NJ	0.236	
average	**0.460**		**0.276**		**0.389**	**0.370**
var	0.0469		0.0093		0.0414	0.0331
sd	0.2166		0.0963		0.2035	0.1820
CV	0.471		0.349		0.523	0.492
n	4		5		6	15

Table C17.
Efficiency estimates for the Delaware II (DE) survey dredge catching Atlantic surfclams in 1997, 1999, 2002 and for all years combined. Values for 1997 and 1999 are from SARC31, Table C10, p 222. "Patch" = Rago Patch model with cell size set at 2 dredge widths. Revised 17 May 2003.

REGION	ALPHA	BETA	Year Data Collected or Source of Data
SVA	-7.05830	2.30330	Murawski
DMV	-9.10630	2.76750	Serchuk and Murawski (1980)
NJ	-9.20610	2.82510	Serchuk and Murawski (1980)
LI	-7.98370	2.58020	Murawski
SNE	-7.98370	2.58020	Murawski
GBK	-7.99670	2.57720	Gledhill (1984)
DMV	-9.92060	2.96190	1997 Survey
SNJ	-9.41160	2.89970	1997 Survey
NNJ	-9.41160	2.89970	1997 Survey
GBK	-8.55830	2.73070	1997 Survey
DMV	-10.83117	3.13644	2002 Survey
SNJ	-9.68603	2.93156	2002 Survey
NNJ	-9.68603	2.93156	2002 Survey
GBK	-10.27049	3.06418	2002 Survey
SVA	-7.05830	2.30330	Values used in SARC-30 (NEFSC 2000a)
DMV	-9.489134	2.860176	"
NNJ and SNJ	-9.312103	2.863716	"
LI	-7.98370	2.58020	"
SNE	-7.98370	2.58020	"
GBK	-8.274427	2.654215	"

Table C18.
Parameter estimates for the relationship between drained meat weight (gr) and shell length (mm) in surfclams, by region and time. Samples collected in 1997 and 2002 include all tissue minus shell, weighed fresh at sea. Weight = (e^alpha) *(L^beta).

Table C19. Number of NEFSC clam survey tows during 1982-2002 (random and nearly random "fill" tows) by survey, region and stratum. "Holes" (strata with zero tows) are highlighted.

		Cruise									
Stratum	Region	8204	8305	8403	8604	8903	9203	9404	9704	9903	200206
9	DMV	30	26	35	29	37	37	39	39	38	39
10	DMV	2	2	3	3	3	3	3	3	3	3
13	DMV	19	18	25	20	20	20	21	22	19	20
14	DMV	2	2	3	3	3	3	5	3	3	3
82	DMV	1	1	1	1	1	1	1	1	2	2
83	DMV	2	2	2	2	2	2	2	2	2	2
84	DMV	4	3	3	4	4	4	4	4	3	4
85	DMV	6	5	4	5	5	5	5	5	5	5
86	DMV	2	2	3	3	3	2	3	2	3	3
54	GBK			3	3		3	3	3		
55	GBK	3			3	1	3	3	3	2	2
57	GBK				2	1	2	5	2	2	2
59	GBK	1	4		1	2	6	5	5	4	5
61	GBK	8	1		5		7	6	6	6	6
65	GBK				3		2	2	3		1
67	GBK			5	5	7	7	7	7		
68	GBK	1		7	3	6	6	5	5		
69	GBK	2	5		6	6	6	7	6	7	
70	GBK	1	2		4		4	4	4	3	2
71	GBK			2	3	1	2	3	3	1	2
72	GBK	2		8	1	8	8	8	8	6	
73	GBK	1	1		3	6	6	6	6	5	6
74	GBK	3		1	3		4	4	4	3	3
29	LI	11	10		10	10	10	10	10	11	10
30	LI	7	8		6	6	6	6	6	7	6
33	LI	4	4		4	4	4	5	4	4	4
34	LI	2	2		2	2	2	5	2	2	2
91	LI	3	2	4	4	3	3	3	3	3	3
92	LI	2	2	3	2	2	2	2	2	2	2
93	LI	1	1	2	1	1	1	1	1	1	2
21	NNJ	18	18	22	19	20	20	23	26	39	29
25	NNJ	9	9	13	8	9	9	9	12	8	9
88	NNJ	15	15	24	17	20	20	20	21	22	20
89	NNJ	15	15	21	15	18	17	17	19	18	18
90	NNJ	2	2	3	2	2	2	2	2	2	2
37	SNE	7	4		3		3	5	4	4	3
38	SNE	3	2		3	3	3	5	3	3	3
41	SNE	6	5	7	5	6	6	6	6	5	6
45	SNE	3	7	9	4	4	4	4	4	4	3
46	SNE	2	5	5	3	2	3	5	3	3	2
47	SNE	4	3	4	2	2	4	5	4	3	1
94	SNE	1	2				1	2	2		2
95	SNE	4	14	11	4	4	4	4	4	4	4
96	SNE		12		1	1	3	2	4		
17	SNJ	11	11	18	12	12	12	12	14	12	12
87	SNJ	8	7	10	9	9	9	9	9	9	16
1	SVA		10	14	7	10	10	11	10		
2	SVA					1	2	1	1		
5	SVA	4	9	13	8	8	8	8	8		8
6	SVA	1	1	1	1	1	1	1	1		2
80	SVA		6	9	3	7	7	8	7		
81	SVA		4	7	3	5	5	5	5		5
Total		233	264	305	273	288	324	347	343	283	284

NMFS Survey	1982	1983	1984	1986	1989	1992	1994	1997	1999	2002
Total # of Station in Strata 9	30	26	35	29	37	37	39	39	37	38
# of Stations w/one or more clams	24	18	26	25	27	29	35	34	26	23
# of Stations w/zero clams	6	8	9	4	10	8	4	5	11	15
p= Proportion of Zeros	**0.20**	**0.31**	**0.26**	**0.14**	**0.27**	**0.22**	**0.10**	**0.13**	**0.30**	**0.39**
Var(p)	0.0053	0.0082	0.0055	0.0041	0.0053	0.0046	0.0024	0.0029	0.0056	0.0063

Table C20. Trends in percentage of random stations in Stratum # 9, off DMV, that captured no surfclams. Var(p)=pq/n.

Table C21. Efficiency corrected swept-area biomass estimates (1000 mt) by stock assessment area and CVs for surfclam during 1997, 2000 and 2002.

	Estimate	CV
INPUT: Nominal tow distance (d_n, *nm*) and CV for Doppler tow distance	0.15	
INPUT: Dredge width (nm)	0.0008225	
Area swept per standard tow (a, nm^2)	1.23375E-04	10%

Area of assessment region (A, nm^2) - no correction for stations with unsuitable clam habitat

Northern New Jersey (NNJ)	3,284	10%
Southern New Jersey (SNJ)	1,059	10%
Delmarva (DMV)	4,660	10%
S. Virginia and N. Carolina (SVA)	3,119	10%
Long Island (LI)	2,917	10%
Southern New England (SNE)	4,321	10%
Georges Bank (GBK)	5,772	10%
Total	25,132	

INPUT: Fraction suitable habitat (u)

Northern New Jersey (NNJ)	100%	10%
Southern New Jersey (SNJ)	100%	10%
Delmarva (DMV)	100%	10%
S. Virginia and N. Carolina (SVA)	100%	10%
Long Island (LI)	100%	10%
Southern New England (SNE)	100%	10%
Georges Bank (GBK)	88%	10%

Habitat area in assessment region (A', nm2)

Northern New Jersey (NNJ)	3,284	14%
Southern New Jersey (SNJ)	1,059	14%
Delmarva (DMV)	4,660	14%
S. Virginia and N. Carolina (SVA)	3,119	14%
Long Island (LI)	2,917	14%
Southern New England (SNE)	4,321	14%
Georges Bank (GBK)	5,079	14%

INPUT: Original survey mean survey catch (kg/tow, for tows adjusted to nominal tow distance using sensors)	**Estimates for 1997**	**CV**	**Estimates for 1999**	**CV**	**Estimates for 2002**	**CV**
Northern New Jersey (NNJ) 120+ mm	8.3896	12%	5.0454	12%	4.6001	18%
Southern New Jersey (SNJ) 120+ mm	1.9938	38%	3.7458	73%	1.9190	44%
Delmarva (DMV) 100+ mm	3.5577	21%	2.3135	21%	1.4707	17%
S. Virginia and N. Carolina (SVA) 100+ mm	0.1065	50%	0.1045	35%	0.2826	54%
Long Island (LI) 100+ mm	0.3514	66%	0.9832	57%	0.1918	63%
Southern New England (SNE) 100+ mm	1.0006	34%	0.4854	64%	0.4046	23%
Georges Bank (GBK) 100+ mm	2.5842	26%	2.5836	32%	2.2333	44%
INPUT: Survey dredge efficiency (e)	0.460	49%	0.276	49%	0.389	49%
Efficiency adjusted swept area biomass (B, 1000 mt)						
Northern New Jersey (NNJ) 120+ mm	485	53%	487	53%	315	55%
Southern New Jersey (SNJ) 120+ mm	37	64%	116	90%	42	68%
Delmarva (DMV) 100+ mm	292	56%	317	56%	143	55%
S. Virginia and N. Carolina (SVA) 100+ mm	6	72%	10	62%	18	75%
Long Island (LI) 100+ mm	18	84%	84	77%	12	82%
Southern New England (SNE) 100+ mm	76	62%	62	82%	36	57%
Georges Bank (GBK) 100+ mm	231	58%	385	61%	236	68%
Total fishable biomass less GBK (100+ and 120+ mm)	915	34%	1,075	32%	566	34%
Total fishable biomass (100+ and 120+ mm)	1,146	30%	1,460	28%	803	31%

Lower bound for 80% confidence intervals on biomass (1000 mt, for lognormal distribution with no bias correction)	**Estimates for 1997**	**Estimates for 1999**	**Estimates for 2002**
Northern New Jersey (NNJ) 120+ mm	256	256	163
Southern New Jersey (SNJ) 120+ mm	18	44	19
Delmarva (DMV) 100+ mm	150	162	74
S. Virginia and N. Carolina (SVA) 100+ mm	3	5	8
Long Island (LI) 100+ mm	7	35	5
Southern New England (SNE) 100+ mm	37	25	18
Georges Bank (GBK) 100+ mm	116	188	107
Total fishable biomass less GBK (100+ and 120+ mm)	599	723	370
Total fishable biomass (100+ and 120+ mm)	791	1,022	542

Upperbound for 80% confidence intervals on biomass (1000 mt, for lognormal distribution with no bias correction)			
Northern New Jersey (NNJ) 120+ mm	922	924	607
Southern New Jersey (SNJ) 120+ mm	79	311	93
Delmarva (DMV) 100+ mm	570	618	275
S. Virginia and N. Carolina (SVA) 100+ mm	13	20	43
Long Island (LI) 100+ mm	46	202	29
Southern New England (SNE) 100+ mm	158	155	72
Georges Bank (GBK) 100+ mm	462	792	521
Total fishable biomass less GBK (100+ and 120+ mm)	1,398	1,599	867
Total fishable biomass (100+ and 120+ mm)	1,661	2,086	1,188

Table C22. Fishing mortality rates (F yr^{-1}) during 1997, 1999 and 2002 with CVs from catch and efficiency corrected swept-area biomass estimates.

INPUT: Upper bound incidental mortality allowance	12%
INPUT: Assumed CV for catch	10%

INPUT: Landings (1000 mt, discard ~ 0)	**Estimates for 1997**	**Estimates for 1999**	**Estimates for 2002**
Northern New Jersey (NNJ)	14.060	14.432	14.939
Southern New Jersey (SNJ)	2.934	4.277	2.847
Delmarva (DMV)	1.540	0.667	4.450
S. Virginia and N. Carolina (SVA)	0.005	0.000	0.079
Long Island (LI)	0.073	0.157	1.160
Southern New England (SNE)	0.000	0.016	0.124
Georges Bank (GBK)	0.000	0.000	0.000
Total	18.611	19.548	23.600

Catch (1000 mt, landings + upper bound incidental mortality allowance)			
Northern New Jersey (NNJ)	15.747	16.163	16.732
Southern New Jersey (SNJ)	3.286	4.790	3.189
Delmarva (DMV)	1.725	0.747	4.984
S. Virginia and N. Carolina (SVA)	0.005	0.000	0.088
Long Island (LI)	0.081	0.175	1.300
Southern New England (SNE)	0.000	0.018	0.139
Georges Bank (GBK)	0.000	0.000	0.000
Total	20.844	21.894	26.432

INPUT: Efficiency Corrected Swept Area Biomass (1000 mt)	**Estimates for 1997**	**CV**	**Estimates for 1999**	**CV**	**Estimates for 2002**	**CV**
Northern New Jersey (NNJ) 120+ mm	485	53%	487	53%	315	55%
Southern New Jersey (SNJ) 120+ mm	37	64%	116	90%	42	68%
Delmarva (DMV) 100+ mm	292	56%	317	56%	143	55%
S. Virginia and N. Carolina (SVA) 100+ mm	6	72%	10	62%	18	75%
Long Island (LI) 100+ mm	18	84%	84	77%	12	82%
Southern New England (SNE) 100+ mm	76	62%	62	82%	36	57%
Georges Bank (GBK) 100+ mm	231	58%	385	61%	236	68%
Total fishable biomass less GBK (100+ and 120+ mm)	915	34%	1,075	32%	566	34%
Total fishable biomass (100+ and 120+ mm)	1,146	30%	1,460	28%	803	31%
Fishing mortality (y^{-1})						
Northern New Jersey (NNJ) 120+ mm	0.032	54%	0.033	54%	0.053	56%
Southern New Jersey (SNJ) 120+ mm	0.088	65%	0.041	90%	0.075	69%
Delmarva (DMV) 100+ mm	0.006	57%	0.002	57%	0.035	56%
S. Virginia and N. Carolina (SVA) 100+ mm	0.001	NA	0.000	NA	0.005	75%
Long Island (LI) 100+ mm	0.004	84%	0.002	78%	0.111	82%
Southern New England (SNE) 100+ mm	0.000	63%	0.000	83%	0.004	58%
Georges Bank (GBK) 100+ mm	0.000	NA	0.000	NA	0.000	NA
Total fishable biomass less GBK (100+ and 120+ mm)	0.023	35%	0.020	33%	0.047	36%
Total fishable biomass (100+ and 120+ mm)	0.018	31%	0.015	30%	0.033	33%

Lower bound for 80% confidence intervals for fishing mortality (y^{-1}, for lognormal distribution with no bias correction)	**Estimates for 1997**	**Estimates for 1999**	**Estimates for 2002**
Northern New Jersey (NNJ) 120+ mm	0.017	0.017	0.027
Southern New Jersey (SNJ) 120+ mm	0.041	0.015	0.034
Delmarva (DMV) 100+ mm	0.003	0.001	0.018
S. Virginia and N. Carolina (SVA) 100+ mm	NA	NA	0.002
Long Island (LI) 100+ mm	0.002	0.001	0.044
Southern New England (SNE) 100+ mm	NA	0.000	0.002
Georges Bank (GBK) 100+ mm	NA	NA	NA
Total fishable biomass less GBK (100+ and 120+ mm)	0.015	0.013	0.030
Total fishable biomass (100+ and 120+ mm)	0.012	0.010	0.022

Upper bound for 80% confidence intervals for fishing mortality (y^{-1}, for lognormal distribution with no bias correction)			
Northern New Jersey (NNJ) 120+ mm	0.062	0.064	0.104
Southern New Jersey (SNJ) 120+ mm	0.189	0.110	0.167
Delmarva (DMV) 100+ mm	0.012	0.005	0.068
S. Virginia and N. Carolina (SVA) 100+ mm	NA	NA	0.011
Long Island (LI) 100+ mm	0.011	0.005	0.280
Southern New England (SNE) 100+ mm	NA	0.001	NA
Georges Bank (GBK) 100+ mm	NA	NA	NA
Total fishable biomass less GBK (100+ and 120+ mm)	0.035	0.031	0.073
Total fishable biomass (100+ and 120+ mm)	0.027	0.022	0.050

Table C23 (1 of 7). Survey trend data used in the KLAMZ model for surfclam.

Region	Cruise	Length Bin	Group Name	N/Tow	CV	Kg/Tow	CV	Number Tows	Number PositiveTows	Number Strata Sampled
SVA	7801	83-99	Prerecruits	0.1639	0.76	0.0049	0.76	40	2	5
SVA	7807	83-99	Prerecruits	0.1639	0.76	0.0049	0.76	40	2	5
SVA	*78 Mean*	*83-99*	*Prerecruits*	*0.1639*	*0.76*	*0.0049*	*0.76*	*80*	*4*	*NA*
SVA	7901	83-99	Prerecruits	9.8913	1.00	0.2985	1.00	16	2	4
SVA	8001	83-99	Prerecruits	9.8063	1.00	0.2959	1.00	21	2	5
SVA	8006	83-99	Prerecruits	9.8913	1.00	0.2985	1.00	16	2	4
SVA	*80 Mean*	*83-99*	*Prerecruits*	*9.8488*	*1.00*	*0.2972*	*1.00*	*37*	*4*	*NA*
SVA	8105	83-99	Prerecruits	0.0000	.	0.0000	.	5	0	2
SVA	8204	83-99	Prerecruits	0.7931	0.68	0.0212	0.68	25	4	5
SVA	8305	83-99	Prerecruits	0.9569	0.57	0.0260	0.57	30	7	5
SVA	8403	83-99	Prerecruits	1.5296	0.43	0.0435	0.44	44	12	5
SVA	8604	83-99	Prerecruits	0.1118	0.93	0.0032	0.93	23	2	6
SVA	8903	83-99	Prerecruits	1.3304	0.80	0.0367	0.79	32	6	6
SVA	9203	83-99	Prerecruits	1.2098	0.38	0.0353	0.40	33	12	6
SVA	9404	83-99	Prerecruits	2.6695	0.36	0.0766	0.37	34	14	6
SVA	9704	83-99	Prerecruits	2.0080	0.40	0.0595	0.41	32	11	6
SVA	9903	83-99	Prerecruits	2.7725	0.41	0.0779	0.40	42	14	6
SVA	200206	83-99	Prerecruits	7.9737	0.72	0.2139	0.71	15	4	3
SVA	7801	100-112	New recruits	0.1144	1.00	0.0047	1.00	40	1	5
SVA	7807	100-112	New recruits	0.1144	1.00	0.0047	1.00	40	1	5
SVA	*78 Mean*	*100-112*	*New recruits*	*0.1144*	*1.00*	*0.0047*	*1.00*	*80*	*2*	*NA*
SVA	7901	100-112	New recruits	13.9301	1.00	0.5275	1.00	16	2	4
SVA	8001	100-112	New recruits	13.8519	1.00	0.5245	1.00	21	3	5
SVA	8006	100-112	New recruits	13.9301	1.00	0.5275	1.00	16	2	4
SVA	*80 Mean*	*100-112*	*New recruits*	*13.8910*	*1.00*	*0.5260*	*1.00*	*37*	*5*	*NA*
SVA	8105	100-112	New recruits	0.4846	1.00	0.0189	1.00	5	1	2
SVA	8204	100-112	New recruits	1.9710	0.95	0.0815	0.95	25	3	5
SVA	8305	100-112	New recruits	3.1862	0.68	0.1315	0.68	30	5	5
SVA	8403	100-112	New recruits	2.6895	0.42	0.1094	0.42	44	10	5
SVA	8604	100-112	New recruits	0.5201	0.42	0.0211	0.43	23	6	6
SVA	8903	100-112	New recruits	0.4841	0.61	0.0194	0.61	32	5	6
SVA	9203	100-112	New recruits	9.6412	0.95	0.3960	0.95	33	7	6
SVA	9404	100-112	New recruits	6.3030	0.57	0.2557	0.57	34	12	6
SVA	9704	100-112	New recruits	3.6891	0.61	0.1475	0.61	32	8	6
SVA	9903	100-112	New recruits	2.2219	0.52	0.0881	0.53	42	12	6
SVA	200206	100-112	New recruits	1.5710	0.45	0.0593	0.45	15	4	3
SVA	7801	113+	Old recruits	1.8229	0.34	0.1736	0.33	40	10	5
SVA	7807	113+	Old recruits	1.8229	0.34	0.1736	0.33	40	10	5
SVA	*78 Mean*	*113+*	*Old recruits*	*1.8229*	*0.34*	*0.1736*	*0.33*	*80*	*20*	*NA*
SVA	7901	113+	Old recruits	0.8328	0.83	0.0470	0.75	16	2	4
SVA	8001	113+	Old recruits	2.9293	0.71	0.2007	0.74	21	5	5
SVA	8006	113+	Old recruits	0.8328	0.83	0.0470	0.75	16	2	4
SVA	*80 Mean*	*113+*	*Old recruits*	*1.8810*	*0.83*	*0.1238*	*0.75*	*37*	*7*	*NA*
SVA	8105	113+	Old recruits	26.3764	0.92	1.9494	0.91	5	3	2
SVA	8204	113+	Old recruits	4.3047	0.93	0.2847	0.89	25	5	5
SVA	8305	113+	Old recruits	7.2900	0.59	0.4812	0.57	30	9	5
SVA	8403	113+	Old recruits	24.6144	0.31	1.7467	0.30	44	13	5
SVA	8604	113+	Old recruits	22.7574	0.74	1.5810	0.74	23	8	6
SVA	8903	113+	Old recruits	9.9908	0.82	0.7682	0.81	32	8	6
SVA	9203	113+	Old recruits	18.6504	0.65	1.1278	0.66	33	8	6
SVA	9404	113+	Old recruits	10.2603	0.48	0.6142	0.42	34	6	6
SVA	9704	113+	Old recruits	1.5904	0.45	0.0835	0.45	32	6	6
SVA	9903	113+	Old recruits	1.8460	0.36	0.1141	0.38	42	10	6
SVA	200206	113+	Old recruits	5.9706	0.56	0.4139	0.55	15	4	3

Table C23 (cont) (p.2 of 7)

Region	Cruise	Length Bin	Group Name	N/Tow	CV	Kg/Tow	CV	Number Tows	Number PositiveTows	Number Strata Sampled
DMV	7801	83-99	Prerecruits	1.7443	0.43	0.0544	0.44	61	9	9
DMV	7807	83-99	Prerecruits	1.9197	0.31	0.0607	0.31	58	14	9
DMV	*78 Mean*	*83-99*	*Prerecruits*	*1.8320*	*0.43*	*0.0576*	*0.44*	*119*	*23*	*NA*
DMV	7901	83-99	Prerecruits	0.5520	0.59	0.0182	0.57	49	3	9
DMV	8001	83-99	Prerecruits	31.8887	0.90	0.9399	0.90	70	27	9
DMV	8006	83-99	Prerecruits	22.1965	0.56	0.6822	0.60	51	22	9
DMV	*80 Mean*	*83-99*	*Prerecruits*	*27.0426*	*0.90*	*0.8110*	*0.90*	*121*	*49*	*NA*
DMV	8105	83-99	Prerecruits	79.3071	0.62	2.5299	0.61	47	14	9
DMV	8204	83-99	Prerecruits	56.0215	0.62	1.8850	0.62	68	25	9
DMV	8305	83-99	Prerecruits	3.4159	0.32	0.1081	0.32	61	23	9
DMV	8403	83-99	Prerecruits	63.8289	0.85	1.7656	0.82	79	26	9
DMV	8604	83-99	Prerecruits	4.9484	0.34	0.1668	0.35	70	25	9
DMV	8903	83-99	Prerecruits	2.4888	0.50	0.0837	0.53	78	25	9
DMV	9203	83-99	Prerecruits	2.6017	0.21	0.0800	0.21	77	38	9
DMV	9404	83-99	Prerecruits	11.0529	0.25	0.3408	0.25	83	57	9
DMV	9704	83-99	Prerecruits	21.4606	0.23	0.6608	0.23	81	51	9
DMV	9903	83-99	Prerecruits	2.2844	0.26	0.0745	0.27	78	31	9
DMV	200206	83-99	Prerecruits	5.2042	0.31	0.1548	0.31	81	34	9
DMV	7801	100-112	New recruits	0.6232	0.55	0.0290	0.56	61	8	9
DMV	7807	100-112	New recruits	1.8929	0.31	0.0875	0.31	58	13	9
DMV	*78 Mean*	*100-112*	*New recruits*	*1.2580*	*0.55*	*0.0583*	*0.56*	*119*	*21*	*NA*
DMV	7901	100-112	New recruits	0.9719	0.55	0.0431	0.55	49	7	9
DMV	8001	100-112	New recruits	3.3542	0.49	0.1521	0.47	70	19	9
DMV	8006	100-112	New recruits	11.8311	0.90	0.5172	0.89	51	18	9
DMV	*80 Mean*	*100-112*	*New recruits*	*7.5926*	*0.90*	*0.3346*	*0.89*	*121*	*37*	*NA*
DMV	8105	100-112	New recruits	67.7290	0.84	3.1077	0.84	47	16	9
DMV	8204	100-112	New recruits	80.5405	0.45	3.6940	0.45	68	25	9
DMV	8305	100-112	New recruits	11.7466	0.49	0.5814	0.51	61	23	9
DMV	8403	100-112	New recruits	24.3551	0.58	1.1603	0.58	79	35	9
DMV	8604	100-112	New recruits	18.8035	0.40	0.9347	0.40	70	26	9
DMV	8903	100-112	New recruits	8.0890	0.69	0.3876	0.68	78	25	9
DMV	9203	100-112	New recruits	3.0911	0.26	0.1506	0.28	77	35	9
DMV	9404	100-112	New recruits	25.5786	0.50	1.2493	0.51	83	52	9
DMV	9704	100-112	New recruits	24.5648	0.21	1.1750	0.21	81	51	9
DMV	9903	100-112	New recruits	12.6531	0.32	0.6232	0.32	78	32	9
DMV	200206	100-112	New recruits	3.9517	0.31	0.1861	0.31	81	32	9
DMV	7801	113+	Old recruits	7.2558	0.21	1.0545	0.20	61	34	9
DMV	7807	113+	Old recruits	9.5939	0.34	1.3085	0.34	58	18	9
DMV	*78 Mean*	*113+*	*Old recruits*	*8.4248*	*0.34*	*1.1815*	*0.34*	*119*	*52*	*NA*
DMV	7901	113+	Old recruits	15.1010	0.50	2.0363	0.43	49	22	9
DMV	8001	113+	Old recruits	15.6895	0.21	2.1606	0.22	70	38	9
DMV	8006	113+	Old recruits	13.5695	0.24	1.8941	0.24	51	29	9
DMV	*80 Mean*	*113+*	*Old recruits*	*14.6295*	*0.24*	*2.0273*	*0.24*	*121*	*67*	*NA*
DMV	8105	113+	Old recruits	23.7939	0.44	2.3456	0.31	47	26	9
DMV	8204	113+	Old recruits	38.4884	0.30	3.7702	0.27	68	43	9
DMV	8305	113+	Old recruits	44.6220	0.56	3.9819	0.43	61	36	9
DMV	8403	113+	Old recruits	46.7133	0.28	4.2844	0.26	79	49	9
DMV	8604	113+	Old recruits	107.2927	0.43	8.6805	0.37	70	44	9
DMV	8903	113+	Old recruits	37.3597	0.24	3.4548	0.23	78	48	9
DMV	9203	113+	Old recruits	33.7532	0.33	3.2207	0.26	77	47	9
DMV	9404	113+	Old recruits	77.7309	0.23	6.9976	0.20	83	55	9
DMV	9704	113+	Old recruits	76.8682	0.24	6.2856	0.22	81	52	9
DMV	9903	113+	Old recruits	39.9086	0.23	3.2314	0.21	78	45	9
DMV	200206	113+	Old recruits	23.6741	0.21	2.4152	0.19	81	48	9

Table C23 (cont) (p.3 of 7)

Region	Cruise	Length Bin	Group Name	N/Tow	CV	Kg/Tow	CV	Number Tows	Number PositiveTows	Number Strata Sampled
SNJ	7801	107-119	Prerecruits	0.7375	0.58	0.0508	0.59	26	4	2
SNJ	7807	107-119	Prerecruits	0.3893	0.76	0.0245	0.77	11	2	2
SNJ	*78 Mean*	*107-119*	*Prerecruits*	*0.5634*	*0.76*	*0.0377*	*0.77*	*37*	*6*	*NA*
SNJ	7901	107-119	Prerecruits	0.0000	.	0.0000	.	10	0	2
SNJ	8001	107-119	Prerecruits	0.5680	0.34	0.0405	0.34	18	5	2
SNJ	8006	107-119	Prerecruits	0.3603	0.61	0.0247	0.62	18	3	2
SNJ	*80 Mean*	*107-119*	*Prerecruits*	*0.4642*	*0.61*	*0.0326*	*0.62*	*36*	*8*	*NA*
SNJ	8105	107-119	Prerecruits	0.2101	1.00	0.0158	1.00	16	1	2
SNJ	8204	107-119	Prerecruits	13.0322	0.98	0.9156	0.98	19	5	2
SNJ	8305	107-119	Prerecruits	0.5427	0.46	0.0364	0.48	18	5	2
SNJ	8403	107-119	Prerecruits	0.0461	1.00	0.0032	1.00	28	1	2
SNJ	8604	107-119	Prerecruits	0.4665	0.66	0.0302	0.68	21	4	2
SNJ	8903	107-119	Prerecruits	0.4315	0.68	0.0300	0.71	21	4	2
SNJ	9203	107-119	Prerecruits	1.0162	0.49	0.0696	0.49	21	5	2
SNJ	9404	107-119	Prerecruits	14.5266	0.72	0.9910	0.72	21	12	2
SNJ	9704	107-119	Prerecruits	1.4060	0.36	0.0993	0.37	23	10	2
SNJ	9903	107-119	Prerecruits	6.1756	0.99	0.4561	0.99	21	2	2
SNJ	200206	107-119	Prerecruits	1.1262	0.22	0.0754	0.22	28	15	2
SNJ	7801	120-129	New recruits	0.5585	0.59	0.0501	0.59	26	3	2
SNJ	7807	120-129	New recruits	0.5053	1.00	0.0421	1.00	11	1	2
SNJ	*78 Mean*	*120-129*	*New recruits*	*0.5319*	*1.00*	*0.0461*	*1.00*	*37*	*4*	*NA*
SNJ	7901	120-129	New recruits	0.0000	.	0.0000	.	10	0	2
SNJ	8001	120-129	New recruits	0.9737	0.46	0.0879	0.47	18	6	2
SNJ	8006	120-129	New recruits	0.4426	0.70	0.0388	0.70	18	2	2
SNJ	*80 Mean*	*120-129*	*New recruits*	*0.7081*	*0.70*	*0.0633*	*0.70*	*36*	*8*	*NA*
SNJ	8105	120-129	New recruits	0.0000	.	0.0000	.	16	0	2
SNJ	8204	120-129	New recruits	4.9934	0.84	0.4353	0.84	19	7	2
SNJ	8305	120-129	New recruits	0.3868	0.49	0.0347	0.49	18	4	2
SNJ	8403	120-129	New recruits	0.2450	0.58	0.0229	0.58	28	4	2
SNJ	8604	120-129	New recruits	0.1397	0.57	0.0131	0.57	21	3	2
SNJ	8903	120-129	New recruits	0.3229	0.57	0.0287	0.57	21	4	2
SNJ	9203	120-129	New recruits	0.6666	0.44	0.0599	0.43	21	6	2
SNJ	9404	120-129	New recruits	14.3583	0.72	1.2528	0.71	21	12	2
SNJ	9704	120-129	New recruits	3.6370	0.54	0.3320	0.54	23	8	2
SNJ	9903	120-129	New recruits	23.5977	1.00	2.1528	1.00	21	3	2
SNJ	200206	120-129	New recruits	1.8377	0.43	0.1711	0.44	28	9	2
SNJ	7801	130+	Old recruits	12.7466	0.28	2.4382	0.27	26	14	2
SNJ	7807	130+	Old recruits	4.2720	0.33	0.7629	0.33	11	6	2
SNJ	*78 Mean*	*130+*	*Old recruits*	*8.5093*	*0.33*	*1.6006*	*0.33*	*37*	*20*	*NA*
SNJ	7901	130+	Old recruits	4.1451	0.31	0.8564	0.39	10	6	2
SNJ	8001	130+	Old recruits	10.2916	0.29	2.0474	0.28	18	10	2
SNJ	8006	130+	Old recruits	12.3756	0.37	2.6891	0.39	18	13	2
SNJ	*80 Mean*	*130+*	*Old recruits*	*11.3336*	*0.37*	*2.3682*	*0.39*	*36*	*23*	*NA*
SNJ	8105	130+	Old recruits	12.2688	0.38	2.8345	0.39	16	10	2
SNJ	8204	130+	Old recruits	20.0771	0.34	4.1156	0.33	19	13	2
SNJ	8305	130+	Old recruits	11.6226	0.34	2.5251	0.35	18	10	2
SNJ	8403	130+	Old recruits	10.9630	0.29	2.2941	0.28	28	16	2
SNJ	8604	130+	Old recruits	19.2820	0.50	4.1915	0.52	21	13	2
SNJ	8903	130+	Old recruits	10.5571	0.31	2.0856	0.30	21	11	2
SNJ	9203	130+	Old recruits	6.8826	0.42	1.4120	0.43	21	8	2
SNJ	9404	130+	Old recruits	58.5203	0.68	9.0087	0.66	21	14	2
SNJ	9704	130+	Old recruits	21.0333	0.36	3.0911	0.34	23	14	2
SNJ	9903	130+	Old recruits	31.3131	0.71	4.1551	0.62	21	12	2
SNJ	200206	130+	Old recruits	16.5809	0.44	2.8528	0.48	28	20	2

Table C23 (cont) (p.4 of 7)

Region	Cruise	Length Bin	Group Name	N/Tow	CV	Kg/Tow	CV	Number Tows	Number PositiveTows	Number Strata Sampled
NNJ	7801	107-119	Prerecruits	0.2529	0.43	0.0171	0.43	67	6	5
NNJ	7807	107-119	Prerecruits	1.3798	0.46	0.0912	0.46	40	6	5
NNJ	*78 Mean*	*107-119*	*Prerecruits*	*0.8164*	*0.46*	*0.0541*	*0.46*	*107*	*12*	*NA*
NNJ	7901	107-119	Prerecruits	0.4291	0.57	0.0279	0.55	36	4	5
NNJ	8001	107-119	Prerecruits	5.5509	0.43	0.3646	0.43	59	22	5
NNJ	8006	107-119	Prerecruits	24.5250	0.80	1.6827	0.81	50	22	5
NNJ	*80 Mean*	*107-119*	*Prerecruits*	*15.0380*	*0.80*	*1.0236*	*0.81*	*109*	*44*	*NA*
NNJ	8105	107-119	Prerecruits	9.4792	0.28	0.6648	0.28	41	23	5
NNJ	8204	107-119	Prerecruits	18.9602	0.42	1.3045	0.42	59	34	5
NNJ	8305	107-119	Prerecruits	24.9287	0.57	1.7088	0.57	59	32	5
NNJ	8403	107-119	Prerecruits	8.4357	0.22	0.5861	0.22	83	50	5
NNJ	8604	107-119	Prerecruits	5.9367	0.22	0.4126	0.22	61	39	5
NNJ	8903	107-119	Prerecruits	6.6141	0.32	0.4630	0.32	69	36	5
NNJ	9203	107-119	Prerecruits	11.8811	0.58	0.8253	0.58	68	47	5
NNJ	9404	107-119	Prerecruits	25.6020	0.21	1.7717	0.21	71	59	5
NNJ	9704	107-119	Prerecruits	14.6337	0.20	1.0251	0.20	80	65	5
NNJ	9903	107-119	Prerecruits	3.6851	0.24	0.2574	0.24	89	45	5
NNJ	200206	107-119	Prerecruits	3.9985	0.19	0.2758	0.19	78	63	5
NNJ	7801	120-129	New recruits	0.0741	0.69	0.0067	0.70	67	2	5
NNJ	7807	120-129	New recruits	0.5520	0.37	0.0501	0.37	40	7	5
NNJ	*78 Mean*	*120-129*	*New recruits*	*0.3130*	*0.69*	*0.0284*	*0.70*	*107*	*9*	*NA*
NNJ	7901	120-129	New recruits	0.3336	0.84	0.0300	0.84	36	2	5
NNJ	8001	120-129	New recruits	1.0253	0.40	0.0915	0.40	59	16	5
NNJ	8006	120-129	New recruits	7.8636	0.74	0.6722	0.73	50	19	5
NNJ	*80 Mean*	*120-129*	*New recruits*	*4.4445*	*0.74*	*0.3819*	*0.73*	*109*	*35*	*NA*
NNJ	8105	120-129	New recruits	8.1425	0.31	0.7304	0.31	41	24	5
NNJ	8204	120-129	New recruits	16.6014	0.25	1.4897	0.25	59	33	5
NNJ	8305	120-129	New recruits	16.3749	0.33	1.4629	0.33	59	32	5
NNJ	8403	120-129	New recruits	14.7170	0.27	1.3238	0.27	83	50	5
NNJ	8604	120-129	New recruits	9.6039	0.28	0.8779	0.29	61	42	5
NNJ	8903	120-129	New recruits	9.8082	0.21	0.8857	0.21	69	43	5
NNJ	9203	120-129	New recruits	7.2160	0.28	0.6432	0.28	68	45	5
NNJ	9404	120-129	New recruits	25.7885	0.22	2.3034	0.22	71	56	5
NNJ	9704	120-129	New recruits	19.8317	0.23	1.8029	0.23	80	66	5
NNJ	9903	120-129	New recruits	6.0189	0.19	0.5507	0.19	89	61	5
NNJ	200206	120-129	New recruits	4.0246	0.28	0.3638	0.28	78	58	5
NNJ	7801	130+	Old recruits	0.4969	0.37	0.0895	0.39	67	10	5
NNJ	7807	130+	Old recruits	2.3121	0.41	0.4074	0.43	40	9	5
NNJ	*78 Mean*	*130+*	*Old recruits*	*1.4045*	*0.41*	*0.2484*	*0.43*	*107*	*19*	*NA*
NNJ	7901	130+	Old recruits	1.1416	0.55	0.1820	0.59	36	5	5
NNJ	8001	130+	Old recruits	6.0932	0.32	1.0637	0.33	59	23	5
NNJ	8006	130+	Old recruits	4.6301	0.31	0.7597	0.31	50	21	5
NNJ	*80 Mean*	*130+*	*Old recruits*	*5.3617*	*0.32*	*0.9117*	*0.33*	*109*	*44*	*NA*
NNJ	8105	130+	Old recruits	20.0586	0.42	2.9222	0.40	41	28	5
NNJ	8204	130+	Old recruits	26.7880	0.28	3.4843	0.27	59	35	5
NNJ	8305	130+	Old recruits	18.9996	0.22	2.5772	0.22	59	44	5
NNJ	8403	130+	Old recruits	28.1055	0.20	3.7137	0.20	83	57	5
NNJ	8604	130+	Old recruits	30.0218	0.19	4.2175	0.18	61	46	5
NNJ	8903	130+	Old recruits	35.9347	0.15	4.9326	0.14	69	56	5
NNJ	9203	130+	Old recruits	26.2561	0.17	3.8198	0.16	68	55	5
NNJ	9404	130+	Old recruits	86.4794	0.13	12.4319	0.13	71	56	5
NNJ	9704	130+	Old recruits	101.6671	0.13	14.7857	0.12	80	71	5
NNJ	9903	130+	Old recruits	55.5655	0.13	8.2520	0.12	89	79	5
NNJ	200206	130+	Old recruits	44.2097	0.18	7.1699	0.18	78	69	5

Table C23 (cont) (p.5 of 7)

Region	Cruise	Length Bin	Group Name	N/Tow	CV	Kg/Tow	CV	Number Tows	Number PositiveTows	Number Strata Sampled
LI	7801	82-99	Prerecruits	0.0498	1.00	0.0016	1.00	46	1	7
LI	7807	82-99	Prerecruits	0.1793	1.00	0.0074	1.00	23	1	7
LI	*78 Mean*	*82-99*	*Prerecruits*	*0.1146*	*1.00*	*0.0045*	*1.00*	*69*	*2*	*NA*
LI	7901	82-99	Prerecruits	0.1583	0.71	0.0064	0.71	33	2	7
LI	8001	82-99	Prerecruits	0.1789	0.61	0.0066	0.61	28	3	7
LI	8006	82-99	Prerecruits	0.1131	0.37	0.0047	0.35	28	2	7
LI	*80 Mean*	*82-99*	*Prerecruits*	*0.1460*	*0.61*	*0.0057*	*0.61*	*56*	*5*	*NA*
LI	8105	82-99	Prerecruits	0.0516	1.00	0.0022	1.00	29	1	7
LI	8204	82-99	Prerecruits	0.0000	.	0.0000	.	30	0	7
LI	8305	82-99	Prerecruits	0.0330	1.00	0.0012	1.00	29	1	7
LI	8403	82-99	Prerecruits	0.1860	0.37	0.0070	0.36	55	7	7
LI	8604	82-99	Prerecruits	0.1878	0.60	0.0067	0.61	29	3	7
LI	8903	82-99	Prerecruits	0.3889	1.00	0.0146	1.00	28	1	7
LI	9203	82-99	Prerecruits	1.6034	0.41	0.0629	0.41	28	7	7
LI	9404	82-99	Prerecruits	1.1167	0.12	0.0441	0.11	32	10	7
LI	9704	82-99	Prerecruits	0.2297	0.38	0.0091	0.37	28	4	7
LI	9903	82-99	Prerecruits	0.1529	0.52	0.0052	0.49	30	3	7
LI	200206	82-99	Prerecruits	0.2958	0.57	0.0101	0.57	29	5	7
LI	7801	100-113	New recruits	0.0203	1.00	0.0012	1.00	46	1	7
LI	7807	100-113	New recruits	0.0768	1.00	0.0048	1.00	23	1	7
LI	*78 Mean*	*100-113*	*New recruits*	*0.0486*	*1.00*	*0.0030*	*1.00*	*69*	*2*	*NA*
LI	7901	100-113	New recruits	0.1998	0.58	0.0118	0.59	33	3	7
LI	8001	100-113	New recruits	0.0000	.	0.0000	.	28	0	7
LI	8006	100-113	New recruits	0.0419	1.00	0.0021	1.00	28	1	7
LI	*80 Mean*	*100-113*	*New recruits*	*0.0209*	*1.00*	*0.0011*	*1.00*	*56*	*1*	*NA*
LI	8105	100-113	New recruits	0.0516	1.00	0.0029	1.00	29	1	7
LI	8204	100-113	New recruits	0.0000	.	0.0000	.	30	0	7
LI	8305	100-113	New recruits	0.0000	.	0.0000	.	29	0	7
LI	8403	100-113	New recruits	0.0622	0.56	0.0038	0.59	55	2	7
LI	8604	100-113	New recruits	0.0694	0.49	0.0041	0.44	29	2	7
LI	8903	100-113	New recruits	0.6813	0.83	0.0404	0.83	28	3	7
LI	9203	100-113	New recruits	2.3791	0.56	0.1457	0.56	28	4	7
LI	9404	100-113	New recruits	1.5826	0.32	0.0939	0.32	32	6	7
LI	9704	100-113	New recruits	0.7820	0.54	0.0455	0.55	28	4	7
LI	9903	100-113	New recruits	0.0882	0.71	0.0052	0.71	30	2	7
LI	200206	100-113	New recruits	0.2034	0.41	0.0121	0.41	29	4	7
LI	7801	114+	Old recruits	2.1478	0.36	0.3382	0.39	46	12	7
LI	7807	114+	Old recruits	6.5628	0.41	1.0222	0.42	23	5	7
LI	*78 Mean*	*114+*	*Old recruits*	*4.3553*	*0.41*	*0.6802*	*0.42*	*69*	*17*	*NA*
LI	7901	114+	Old recruits	3.4717	0.30	0.5170	0.31	33	5	7
LI	8001	114+	Old recruits	1.7597	0.10	0.2656	0.13	28	5	7
LI	8006	114+	Old recruits	5.2449	0.27	0.7588	0.31	28	7	7
LI	*80 Mean*	*114+*	*Old recruits*	*3.5023*	*0.27*	*0.5122*	*0.31*	*56*	*12*	*NA*
LI	8105	114+	Old recruits	0.0913	0.71	0.0180	0.71	29	2	7
LI	8204	114+	Old recruits	4.7463	0.51	0.7540	0.52	30	5	7
LI	8305	114+	Old recruits	0.4073	0.72	0.0545	0.72	29	2	7
LI	8403	114+	Old recruits	1.7534	0.32	0.2603	0.33	55	7	7
LI	8604	114+	Old recruits	1.7845	0.58	0.2902	0.60	29	3	7
LI	8903	114+	Old recruits	3.6611	0.73	0.4882	0.74	28	4	7
LI	9203	114+	Old recruits	3.6113	0.36	0.3530	0.34	28	7	7
LI	9404	114+	Old recruits	8.2497	0.19	0.9869	0.21	32	8	7
LI	9704	114+	Old recruits	4.5178	0.63	0.5880	0.62	28	4	7
LI	9903	114+	Old recruits	10.8701	0.64	1.4445	0.60	30	5	7
LI	200206	114+	Old recruits	2.0229	0.66	0.3102	0.67	29	5	7

Table C23 (cont) (p.6 of 7)

Region	Cruise	Length Bin	Group Name	N/Tow	CV	Kg/Tow	CV	Number Tows	Number PositiveTows	Number Strata Sampled
SNE	7801	77-99	Prerecruits	1.0488	1.00	0.0323	1.00	15	1	5
SNE	7807	77-99	Prerecruits	1.2051	0.88	0.0380	0.86	17	2	5
SNE	*78 Mean*	*77-99*	*Prerecruits*	*1.1269*	*1.00*	*0.0352*	*1.00*	*32*	*3*	*NA*
SNE	7901	77-99	Prerecruits	0.9329	0.00	0.0341	0.00	9	1	4
SNE	8001	77-99	Prerecruits	0.2650	1.00	0.0069	1.00	20	1	6
SNE	8006	77-99	Prerecruits	0.2094	0.71	0.0082	0.71	14	2	5
SNE	*80 Mean*	*77-99*	*Prerecruits*	*0.2372*	*1.00*	*0.0076*	*1.00*	*34*	*3*	*NA*
SNE	8105	77-99	Prerecruits	1.4509	0.31	0.0490	0.36	27	8	8
SNE	8105	77-99	Prerecruits	2.5254	0.33	0.0883	0.38	10	6	4
SNE	8204	77-99	Prerecruits	1.2480	0.29	0.0435	0.34	42	11	9
SNE	8305	77-99	Prerecruits	0.2987	0.39	0.0111	0.39	54	15	9
SNE	8403	77-99	Prerecruits	0.1886	0.48	0.0061	0.49	63	7	9
SNE	8604	77-99	Prerecruits	0.1591	0.64	0.0047	0.66	25	3	8
SNE	8903	77-99	Prerecruits	0.7398	0.53	0.0257	0.52	23	6	8
SNE	9203	77-99	Prerecruits	0.4947	0.53	0.0172	0.52	31	7	9
SNE	9404	77-99	Prerecruits	0.4591	0.39	0.0159	0.40	38	9	9
SNE	9704	77-99	Prerecruits	1.2177	0.36	0.0441	0.38	34	10	9
SNE	9903	77-99	Prerecruits	1.2746	0.50	0.0482	0.54	34	10	9
SNE	200206	77-99	Prerecruits	0.2023	0.71	0.0080	0.75	24	3	8
SNE	7801	100-116	New recruits	1.1986	1.00	0.0729	1.00	15	1	5
SNE	7807	100-116	New recruits	1.1986	1.00	0.0729	1.00	17	1	5
SNE	*78 Mean*	*100-116*	*New recruits*	*1.1986*	*1.00*	*0.0729*	*1.00*	*32*	*2*	*NA*
SNE	7901	100-116	New recruits	0.3110	0.82	0.0175	0.84	9	2	4
SNE	8001	100-116	New recruits	0.1451	0.82	0.0082	0.84	20	2	6
SNE	8006	100-116	New recruits	0.1228	0.53	0.0074	0.54	14	3	5
SNE	*80 Mean*	*100-116*	*New recruits*	*0.1340*	*0.82*	*0.0078*	*0.84*	*34*	*5*	*NA*
SNE	8105	100-116	New recruits	0.8340	0.38	0.0488	0.34	27	2	8
SNE	8105	100-116	New recruits	1.7103	0.38	0.1001	0.34	10	2	4
SNE	8204	100-116	New recruits	0.8673	0.34	0.0504	0.31	42	5	9
SNE	8305	100-116	New recruits	0.3420	0.46	0.0206	0.46	54	13	9
SNE	8403	100-116	New recruits	0.3098	0.47	0.0179	0.46	63	8	9
SNE	8604	100-116	New recruits	0.1593	0.57	0.0088	0.58	25	4	8
SNE	8903	100-116	New recruits	0.3004	0.46	0.0176	0.47	23	5	8
SNE	9203	100-116	New recruits	0.0498	0.71	0.0028	0.71	31	2	9
SNE	9404	100-116	New recruits	0.6643	0.72	0.0409	0.72	38	4	9
SNE	9704	100-116	New recruits	1.0424	0.38	0.0627	0.38	34	8	9
SNE	9903	100-116	New recruits	0.2349	0.47	0.0136	0.48	34	5	9
SNE	200206	100-116	New recruits	0.7284	0.72	0.0464	0.72	24	4	8
SNE	7801	117+	Old recruits	26.2199	1.00	3.7305	1.00	15	1	5
SNE	7807	117+	Old recruits	26.2199	1.00	3.7305	1.00	17	1	5
SNE	*78 Mean*	*117+*	*Old recruits*	*26.2199*	*1.00*	*3.7305*	*1.00*	*32*	*2*	*NA*
SNE	7901	117+	Old recruits	12.5657	0.42	1.8324	0.42	9	4	4
SNE	8001	117+	Old recruits	5.8631	0.42	0.8550	0.42	20	4	6
SNE	8006	117+	Old recruits	1.7757	0.56	0.2617	0.57	14	4	5
SNE	*80 Mean*	*117+*	*Old recruits*	*3.8194*	*0.56*	*0.5584*	*0.57*	*34*	*8*	*NA*
SNE	8105	117+	Old recruits	10.9687	0.48	1.4624	0.48	27	9	8
SNE	8105	117+	Old recruits	16.9081	0.56	2.2296	0.57	10	4	4
SNE	8204	117+	Old recruits	12.5824	0.40	1.7896	0.41	42	11	9
SNE	8305	117+	Old recruits	8.0424	0.39	1.2844	0.39	54	20	9
SNE	8403	117+	Old recruits	10.9240	0.34	1.6826	0.34	63	18	9
SNE	8604	117+	Old recruits	4.1245	0.68	0.6436	0.69	25	7	8
SNE	8903	117+	Old recruits	5.7642	0.31	0.8650	0.31	23	7	8
SNE	9203	117+	Old recruits	2.5171	0.57	0.4011	0.58	31	3	9
SNE	9404	117+	Old recruits	1.7225	0.53	0.2674	0.54	38	6	9
SNE	9704	117+	Old recruits	12.3193	0.30	1.9161	0.30	34	9	9
SNE	9903	117+	Old recruits	4.4130	0.65	0.7338	0.65	34	7	9
SNE	200206	117+	Old recruits	3.8853	0.27	0.6039	0.22	24	7	8

Table C23 (cont) (p.7 of 7)

Region	Cruise	Length Bin	Group Name	N/Tow	CV	Kg/Tow	CV	Number Tows	Number PositiveTows	Number Strata Sampled
GBK	8001	85-99	Prerecruits	0.5911	0.00	0.0230	0.00	9	1	3
GBK	8006	85-99	Prerecruits	0.5911	0.00	0.0230	0.00	9	1	3
GBK	*80 Mean*	*85-99*	*Prerecruits*	*0.5911*	*0.00*	*0.0230*	*0.00*	*18*	*2*	*NA*
GBK	8105	85-99	Prerecruits	0.9919	0.22	0.0430	0.23	31	5	10
GBK	8105	85-99	Prerecruits	0.8700	0.25	0.0384	0.27	22	4	9
GBK	*81 Mean*	*85-99*	*Prerecruits*	*0.9310*	*0.25*	*0.0407*	*0.27*	*53*	*9*	*NA*
GBK	8204	85-99	Prerecruits	0.8700	0.25	0.0384	0.27	22	4	9
GBK	8305	85-99	Prerecruits	0.9310	0.33	0.0386	0.34	44	15	11
GBK	8403	85-99	Prerecruits	1.3811	0.31	0.0566	0.31	29	11	7
GBK	8604	85-99	Prerecruits	4.4127	0.80	0.1812	0.80	45	10	14
GBK	8903	85-99	Prerecruits	0.7516	0.28	0.0314	0.28	76	19	14
GBK	9203	85-99	Prerecruits	4.7721	0.46	0.2006	0.47	66	29	14
GBK	9404	85-99	Prerecruits	8.4210	0.36	0.3590	0.36	68	36	14
GBK	9704	85-99	Prerecruits	17.2458	0.32	0.7204	0.32	65	33	14
GBK	9903	85-99	Prerecruits	5.6447	0.49	0.2369	0.49	58	17	14
GBK	200206	85-99	Prerecruits	5.5683	0.58	0.2338	0.58	42	17	11
GBK	8001	100-111	Prerecruits	0.1478	0.00	0.0077	0.00	9	1	3
GBK	8006	100-111	Prerecruits	0.1478	0.00	0.0077	0.00	9	1	3
GBK	*80 Mean*	*100-111*	*Prerecruits*	*0.1478*	*0.00*	*0.0077*	*0.00*	*18*	*2*	*NA*
GBK	8105	100-111	Prerecruits	0.2439	0.43	0.0132	0.43	31	3	10
GBK	8105	100-111	Prerecruits	0.2132	0.51	0.0117	0.50	22	2	9
GBK	*81 Mean*	*100-111*	*Prerecruits*	*0.2286*	*0.51*	*0.0124*	*0.50*	*53*	*5*	*NA*
GBK	8204	100-111	New recruits	0.2132	0.51	0.0117	0.50	22	2	9
GBK	8305	100-111	New recruits	0.3912	0.46	0.0232	0.46	44	7	11
GBK	8403	100-111	New recruits	0.9156	0.19	0.0536	0.20	29	8	7
GBK	8604	100-111	New recruits	2.6033	0.73	0.1519	0.73	45	10	14
GBK	8903	100-111	New recruits	1.5841	0.43	0.0999	0.45	76	22	14
GBK	9203	100-111	New recruits	5.1266	0.53	0.3055	0.52	66	22	14
GBK	9404	100-111	New recruits	9.6806	0.39	0.5820	0.39	68	30	14
GBK	9704	100-111	New recruits	18.0554	0.36	1.0752	0.36	65	31	14
GBK	9903	100-111	New recruits	8.0000	0.50	0.4874	0.49	58	17	14
GBK	200206	100-111	New recruits	7.3069	0.63	0.4424	0.63	42	13	11
GBK	8001	112+	Old recruits	0.1478	0.00	0.0106	0.00	9	1	3
GBK	8006	112+	Old recruits	0.1478	0.00	0.0106	0.00	9	1	3
GBK	*80 Mean*	*112+*	*Old recruits*	*0.1478*	*0.00*	*0.0106*	*0.00*	*18*	*2*	*NA*
GBK	8105	112+	Old recruits	0.6260	0.01	0.0696	0.00	31	4	10
GBK	8105	112+	Old recruits	0.6095	0.01	0.0693	0.00	22	3	9
GBK	*81 Mean*	*112+*	*Old recruits*	*0.6177*	*0.01*	*0.0694*	*0.00*	*53*	*7*	*NA*
GBK	8204	112+	Old recruits	0.6095	0.01	0.0693	0.00	22	3	9
GBK	8305	112+	Old recruits	3.9641	0.58	0.5867	0.66	44	12	11
GBK	8403	112+	Old recruits	8.0097	0.61	1.2074	0.68	29	8	7
GBK	8604	112+	Old recruits	7.4371	0.53	0.8927	0.52	45	6	14
GBK	8903	112+	Old recruits	26.5323	0.72	3.1317	0.73	76	20	14
GBK	9203	112+	Old recruits	10.5515	0.31	1.1874	0.31	66	25	14
GBK	9404	112+	Old recruits	53.5769	0.36	6.4436	0.39	68	25	14
GBK	9704	112+	Old recruits	35.8057	0.27	3.6609	0.25	65	28	14
GBK	9903	112+	Old recruits	36.8253	0.31	3.9445	0.30	58	23	14
GBK	200206	112+	Old recruits	32.4079	0.43	3.6658	0.41	42	17	11

Table C24. Database parameters for surfclam survey data used in this assessment and for data similar to data used by NEFSC (2000). Parameters for survey trends in NNJ and SNJ are shown as examples; length boundary parameters for other areas are given in Table C25. Database extractions for swept area biomass calculations used a lower length bound of 120 mm (NNJ and SNJ) or 100 mm (all other areas). Negative parameter values are ignored in database calculations.

Database Parameter	For comparison to N/Tow for various sizegroups in SARC 30 (Table E15)	For comparison to "KG/Tow All Sizes" in SARC 30 (Table E15)	Trends in NNJ and SNJ surfclam prior to 1982	Trends in NNJ and SNJ surfclam 1982 and later	Survey data for swept area biomass calculations
DISTANCE_TYPE	TREND	TREND	TREND	TREND	SENDIST_NEG1
LENGTH_BIN_SIZE_MM	10	10000	1000	1000	1000
FIRST_LENGTH_MM	0	0	107 or 120 or 130	107 or 120 or 130	100 or 120
FIRST_BIN_IS_PLUSGROUP	-1	-1	-1	-1	-1
LAST_LENGTH_MM	250	250	119 or 129 or 250	119 or 129 or 250	250
LAST_BIN_IS_PLUSGROUP	-1	-1	-1	-1	-1
SVSPP_TO_USE	403	403	403	403	403
AREAKIND	OLD	OLD	GIS	GIS	GIS
REV_DATE_FOR_AREAS	2002	2002	2002	2002	2002
REV_DATE_FOR_LW	0	0	1999	1999	1999
FIRST_JWSTCODE	-1	-1	-1	-1	-1
LAST_JWSTCODE	-1	-1	-1	-1	-1
FIRST_RANDLIKE	1	1	1	1	1
LAST_RANDLIKE	2	2	2	2	2
FIRST_STATION	-1	-1	-1	-1	-1
LAST_STATION	-1	-1	-1	-1	-1
FIRST_HAUL	1	1	-1	1	1
LAST_HAUL	3	3	-3	3	3
FIRST_GEARCOND	6	1	-1	1	1
LAST_GEARCOND	6	6	-6	6	6
FIRST_STRATUM	1	1	1	1	1
LAST_STRATUM	96	96	96	96	96
FIRST_REGION_CODE	1	1	3	3	1
LAST_REGION_CODE	7	7	4	4	7
WRITE_TOW_DATA	1	1	-1	-1	-1
WRITE_STRATUM_DATA	1	1	-1	-1	-1
FIRST_CRUISE	-9700	-9700	-7000	-7000	9700
LAST_CRUISE	-9800	-9800	8200	-8200	-9800
NOMINAL_TOW_DISTANCE_NM	0.15	0.15	0.15	0.15	0.15
FILLHOLZ	-1	-1	1	1	1

Table C25. Surfclam growth model (length at age) parameters (Weinberg and Helser 1996) and length groups for pre-recruit, recruit and old recruit survey data.

Stock	New Jersey (NNJ and SNJ)			Delmarva and SVA			Long Island (LI)	Southern New England (SNE)	Georges Bank (GBK)
Time Period	1980	1989-1992	Average	1980	1989-1992	Average	All	All	All
L_{max} (mm)	170.8	163.7		171.0	164.0		161.8	164.7	154.1
K (y^{-1})	0.254	0.217		0.256	0.177		0.251	0.300	0.242
t_o (y)	0.010	-0.214		0.132	-1.125		-0.443	0.319	0.203
Age at recruitment (k) in years	4.8	5.9	5.3	3.6	4.2	3.9	3.4	3.4	4.5
Length at age k-1	105	109	107	79	88	83	82	77	85
Length at age k	120	120	120	100	100	100	100	100	100
Length at age k+1	131	129	130	116	110	113	114	117	112

Table C26. Growth model parameters (meat weight at age) used in the KLAMZ model for surfclam (NEFSC 2000).

Area	Years	ρ	J_t
New Jersey (NNJ and SNJ)	< 1981	0.8392	0.6841
	1981-1988	0.8392	By interpolation
	>1988	0.8392	0.7569
Delmarva	< 1981	0.8621	0.5079
	1981-1988	0.8621	By interpolation
	>1988	0.8621	0.5553
Long Island (LI)	All	0.8278	0.5232
Southern New England (SNE)	All	0.8023	0.4346
Georges Bank (GBK)	All	0.8456	0.6588

Table C27. KLAMZ model results for DMV surfclam. CV's for biomass and recruitment are from a bootstrap analysis (1000 iterations). CV's for fishing mortality rates are by the delta method.

Year	Biomass (1000 mt)	CV	Recruitment (1000 mt)	CV	Fishing Mortality (y^{-1})	CV	Surplus Production (1000 mt)	Instantaneous Surplus Production Rate (y^{-1})
1977	79	800%	NA	NA	0.042	82%	29	0.318
1978	105	160%	26	0.043846	0.031	66%	37	0.298
1979	138	105%	31	0.508006	0.018	58%	59	0.355
1980	194	71%	52	0.501089	0.013	53%	87	0.369
1981	279	46%	76	0.404296	0.000	50%	93	0.289
1982	372	33%	77	0.286368	0.027	50%	57	0.143
1983	419	26%	41	0.168609	0.021	50%	26	0.061
1984	436	24%	21	0.278116	0.019	50%	20	0.045
1985	448	24%	27	0.368931	0.021	50%	8	0.019
1986	447	23%	22	0.229895	0.007	50%	-4	-0.009
1987	440	22%	15	0.358235	0.005	50%	-12	-0.027
1988	427	21%	13	0.359718	0.003	50%	-17	-0.041
1989	408	21%	11	0.417193	0.010	50%	-22	-0.055
1990	383	20%	8	0.563822	0.011	50%	-24	-0.065
1991	355	19%	7	0.728656	0.005	50%	-25	-0.073
1992	328	19%	6	0.913564	0.004	50%	-23	-0.072
1993	304	20%	7	1.201202	0.013	50%	-16	-0.055
1994	284	20%	12	0.834815	0.014	50%	-6	-0.023
1995	274	21%	19	0.421947	0.012	50%	5	0.017
1996	276	21%	26	0.268422	0.009	50%	14	0.051
1997	288	20%	32	0.309467	0.006	50%	21	0.071
1998	307	19%	35	0.618812	0.001	50%	5	0.016
1999	312	18%	17	0.156186	0.002	50%	-7	-0.023
2000	304	18%	8	0.439081	0.008	50%	-12	-0.040
2001	290	18%	7	0.798677	0.013	51%	-15	-0.052
2002	272	19%	6	0.936476	0.019	51%	NA	NA

Table C28. Projected biomass, catch and fishing mortality for surfclam during 2002-2003. Projections are uncertain, may be overly pessimistic, and should be interpreted with care (see text for additional details).

Table PROJ-1. Projected biomass, catch and fishing mortality for surfclam during 2002-2003. Projections assume a constant instantaneous rate of surplus production during 2002-2005, use actual catches in 2002 and use catches during 2003-2005 equal to the quota + 12% incidental mortality allowance, prorated by region based on average catches during 1999-2002. Total biomass for 2002 is from a regression model used to smooth original efficiency corrected swept area biomass (ESB) estimates. The biomass in each region during 2002 was calculated by prorating the total based on average ESB in each region during 1997-2002. See text for additional details.

Surplus production rate ρ (y^{-1})	-0.051

	Northern New Jersey (NNJ)	Southern New Jersey (SNJ)	Delmarva (DMV)	S. Virginia and N. Carolina (SVA)	Long Island (LI)	Southern New England (SNE)	Georges Bank (GBK)	Total
Average ESB 1997-2002 (1000 mt)	429	65	251	11	38	58	284	1,136
% Average ESB 1997-2002	38%	6%	22%	1%	3%	5%	25%	100%
Average Catch 1997-2002 (1000 mt)	16.21	3.76	2.49	0.03	0.52	0.05	0.00	23.06
% Average Catch 1997-2002	70%	16%	11%	0%	2%	0%	0%	100%
Biomass on 1 January (1000 mt)								
2002	348	53	203	9	31	47	230	921
2003	314	47	188	9	28	45	219	849
2004	279	40	176	8	26	42	208	780
2005	246	34	164	8	24	40	198	714
2006	215	28	153	7	22	38	188	651
Percent Change in Biomass								
2002	0%	0%	0%	0%	0%	0%	0%	0%
2003	-10%	-11%	-7%	-6%	-9%	-5%	-5%	-8%
2004	-20%	-24%	-13%	-11%	-16%	-10%	-10%	-15%
2005	-29%	-36%	-19%	-16%	-22%	-15%	-14%	-23%
2006	-38%	-47%	-25%	-20%	-28%	-19%	-18%	-29%
Catch = Landings + 12% (1000 mt)								
2002	16.73	3.19	4.98	0.09	1.30	0.14	0.00	26.43
2003	19.74	4.57	3.03	0.04	0.63	0.06	0.00	28.07
2004	19.74	4.57	3.03	0.04	0.63	0.06	0.00	28.07
2005	19.74	4.57	3.03	0.04	0.63	0.06	0.00	28.07
Fishing Mortality (y^{-1})								
2002	0.051	0.064	0.026	0.010	0.044	0.003	0.000	0.030
2003	0.067	0.105	0.017	0.005	0.023	0.001	0.000	0.034
2004	0.075	0.123	0.018	0.005	0.025	0.002	0.000	0.038
2005	0.086	0.149	0.019	0.005	0.027	0.002	0.000	0.041